Program Guide

March 30 - April 1, 2012
Doubletree Hotel • Philadelphia, PA

Jointly Sponsored By:
The Center for Continuing Education,
Tulane University Health Sciences Center

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Contents

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Help Support our exhibitors by visiting their booths during these hours:

Friday	6:00 pm - 7:30 pm
Saturday	7:30 am - 8:30 am
	10:30 am - 10:45 am
	4:00 pm - 4:15 pm
	6:00 pm - 7:30 pm
Sunday	7:45 am - 8:30 am
	9:30 am - 9:45 am

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The Division of Neonatology & Newborn Services
Children's Hospital of Philadelphia
Philadelphia, PA

Dear Colleagues,

Welcome to the 24th Annual Meeting of the Eastern Society for Pediatric Research (ESPR) and to our host city of Philadelphia, the Cradle of Liberty!

The Eastern Society for Pediatric Research Council and Planning Committee are confident that you will enjoy our exciting program. Highlights include State-of-the-Art Plenary Talks and the highly popular Lunch with the Professor educational program for trainees, which has been expanded to cover two pertinent topics. High-quality original research is presented in subspecialty platform sessions with leading clinical and scientific authorities moderating the presentations and in two poster sessions.

The goals of the Eastern SPR Annual Meeting are to create a forum where: i) young investigators can present their research in a structured yet relaxed atmosphere, ii) regional clinicians can be exposed to cutting edge clinical and basic science, iii) timely educational programs addressing important topics in Pediatrics are presented and iv) trainees are able to interact with senior investigators and clinicians in an informal setting.

The continued success of our previous meetings has enabled an entirely web-based system for membership, registration and payments, in making timely announcements, in enhanced room booking services, and for the improvement in the overall ease of running the meeting. In addition, we again have centralized informatics enabling presenters to load their slide-show in advance at a speaker-ready station.

ACKNOWLEDGEMENTS: The organization of this meeting would not have been possible without the help of the administrative offices of the American Pediatric Society (APS) and the Society for Pediatric Research (SPR). We are especially grateful to: Debbie Anagnostelis (Executive Director), Kathy Cannon, Belinda Thomas, Jesse Osman and Lisa Thompson. We also recognize the energetic efforts of the Eastern SPR Planning Committee and Council Members for their guidance and vision in selecting this new venue and the efforts of Tulane University in New Orleans as our 2012 sponsor for the CME program. In addition, we thank various members of the regional pediatric community for reviewing the submitted abstracts and for moderating our platform sessions. Lastly, our corporate and leading academic sponsors were instrumental in making this meeting possible.

Most of all, we want to thank you for attending and for contributing your wisdom and experience in the pursuit of excellence. We hope that you enjoy and profit from the meeting, and look forward to your continued participation in future meetings!

Vineet Bhandari, MD, DM
President

Michael Posencheg, MD
Secretary

George Porter, Jr. MD, PhD
Chair, Planning Committee

THE EASTERN SOCIETY FOR PEDIATRIC RESEARCH

RECOGNITION OF NEW MEMBERS

The Council of the Eastern Society for Pediatric Research would like to recognize the following new members who have joined the society within the last year.

Membership in the Society reflects not only peer recognition of research achievements in pediatrics, but continuing commitment to pediatric research and fostering the career development the next generation of pediatric researchers. The Council and Society members welcome active participation in the organization. Like our parent organization, the Eastern SPR seeks to promote the generation of new knowledge, the professional growth of the current and next generation of academic pediatricians, and the translation of research discoveries into treatments that will benefit children worldwide. We believe that membership and active participation in the Eastern Society for Pediatric Research can meaningfully contribute to professional success as an academic pediatrician.

To celebrate this achievement, new members will be recognized at the Opening Reception on Friday, March 30, 2012. Once again, congratulations and welcome to the Eastern Society for Pediatric Research.

Elizabeth Alpern, M.D., Children's Hospital of Philadelphia
Allan Arbeter, M.D., Albert Einstein Medical Center
Cynthia Bearer, M.D., Ph.D, University of Maryland School of Medicine
Christiane Dammann, M.D., Floating Hospital for Children at Tufts Medical Center
Benard Dreyer, M.D., NYU School of Medicine
Semsa Gogcu, M.D., Maria Fareri Children's Hospital, New York Medical College
Bassil Kublaoui, M.D., Ph.D, Children's Hospital of Philadelphia
Allison Malloy, B.Sc., M.D., Vaccine Research Center, NIAID, NIH
Stephen Pearlman, M.D., Christiana Neonatal Associates
Adam Ratner, M.D., MPH, Columbia University
Steven Rogers, M.D., Connecticut Children's Medical Center
Richard Schanler, M.D., North Shore University Hospital

** NEW FOR THIS YEAR **

This continuing medical education activity has been reviewed by the American Academy of Pediatrics and is acceptable for a maximum of **11.50** AAP credits. These credits can be applied toward the AAP CME/CPD Award available to Fellows and Candidate Members of the American Academy of Pediatrics.

Process for Attendees to Receive AAP Credit:

AAP Credit for attendees is recorded only when an attendee submits a copy of his/her certificate of attendance (pick up at the registration desk), **with AAP ID number,** to the American Academy of Pediatrics. The address to mail the certificate is:

American Academy of Pediatrics
Attn: Transcript Coordinator
141 Northwest Point Blvd.
Elk Grove, IL 60007-1098
Fax: 847-434-8387

Meeting Services & CME Accreditation

Registration and CME Desk Hours

Registration will be held on the 3rd floor. Registration hours are as follows:

Friday, March 30	4:00pm – 7:30pm
Saturday, March 31	7:30am – 7:30pm
Sunday, April 1	7:30am – 1:00pm

Abstract Publication

All abstracts being presented at the 2012 Eastern SPR Annual Meeting are printed in this Program Guide, beginning on page 19.

Audio/Visual Information

All oral presentations must be made using PowerPoint. Computers and LCD projectors will be provided. Presenters that have submitted their presentations in advance, are still required to check in at Speaker Ready.

Speaker Ready (Chamber Board Room-4th floor)

Presentations will be loaded onto a central computer during the session prior to the session in which the presentation is to be made (i.e., Friday evening for Saturday morning presentations, Saturday morning for Saturday afternoon presentations, and Saturday afternoon for Sunday morning presentations). Please also bring your CD-ROM, ZIP drive or flash memory.

Business Center

The Business Center at the Doubletree Philadelphia is located on the 3rd floor.

Statement Of Need

Research and technology are changing rapidly in medicine and it is important for physicians and healthcare professionals to critically evaluate the emerging developments. Physicians and healthcare professionals in pediatrics need to increase their competence in discerning which of the emerging research and technologies are applicable to their patient populations. Discussions and debates on these emerging data stimulate the development of new guidelines, appropriateness criteria and evidence-based changes in medical practice.

The ESPR annual meeting provides a forum for young investigators to share their translational and clinical research with mentors and senior investigators. This gives the junior investigators important feedback in a non-threatening environment, provides for critiques and opportunities to improve the presentation before presenting on a national stage, and fosters mentoring from senior investigators.

The senior investigators benefit from this educational format by engaging in discussions on how to translate the research into practice, debates on how the new information supports or discredits the "old" information, and assists in the design of possible new research options and extensions.

The Eastern Society for Pediatric Research Annual Meeting addresses a three-fold need:

1. Young investigators need to increase their competence and performance in presenting their research in a structured yet relaxed atmosphere.
2. Regional clinicians need to increase their competence in evaluating and designing strategies to incorporate cutting edge clinical and basic science into practice.
3. Trainees need to increase their competence and performance in establishing collaborative relationships with mentors to address the barriers which may be interfering with research development.

Target Audience

Physicians within the pediatric specialties, internal medicine and family medicine. Non-physicians: Scientific researchers in both translational and clinical research in pediatrics. Healthcare professionals engaged with the pediatric population.

Overview And Objectives

The overall goal of this meeting is to improve patient care by increasing learner competence in evaluating the emerging translational and clinical research in pediatrics and determining parameters for expansion and modification of promising research developments.

Learner Objectives: At the conclusion of this activity, participants should be better able to:

- Critically evaluate the emerging translational and clinical research.
- Discuss new developments in pathophysiology of human disease with colleagues.
- Identify new areas of investigation which will inform research and improve patient care.
- Develop optimal strategies for clinical investigation and transmission of clinical research results.
- Develop relationships with mentors and peers to address the barriers which interfere with research development.

Predicted Outcomes

Predicted Changes in Practice as a result of participating in this activity include the ability to:

- Determine whether appropriate changes need to be recommended in patient protocols as indicated in the emerging research data.
- Implement new tools for teaching, research and medical practice.
- Apply appropriate evidence based recommendations in my research, teaching and/or medical practice.
- Present research in a national forum.
- Establish collaborations to expand or address barriers which are identified

Accreditation:

This activity has been planned and implemented in accordance with the Essentials and Standards of the Accreditation Council for Continuing Medical Education through the joint sponsorship of Tulane University Health Sciences Center and the Eastern Society for Pediatric Research. Tulane University Health Sciences Center is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Designation

Tulane University Health Sciences Center designates this live activity for a maximum of *11.50 AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Tulane University Health Sciences Center presents this activity for educational purposes only and does not endorse any product, content of presentation or exhibit. Participants are expected to use their own expertise and judgment while engaged in the practice of medicine. The content of the presentations is provided solely by presenters, who have been selected because of their recognized expertise.

Tulane Disclosure Policy

It is the policy of the Center for Continuing Education at Tulane University Health Sciences Center to plan and implement all of its educational activities in accordance with the ACCME's Essential Areas and Policies to ensure balance, independence, objectivity and scientific rigor. In accordance with the ACCME's Standards for Commercial Support, everyone who is in a position to control the content of an educational activity certified for *AMA PRA Category 1 Credit™* is required to disclose all financial relationships with any commercial interests within the past 12 months that creates a real or apparent conflict of interest. Individuals who do not disclose are disqualified from participating in a CME activity. Individuals with potential for influence or control of CME content include planners and planning committee members, authors, teachers, educational activity directors, educational partners, and others who participate, e.g. facilitators and moderators. This disclosure pertains to relationships with pharmaceutical companies, biomedical device manufacturers or other corporations whose products or services are related to the subject matter of the presentation topic. Any real or apparent conflicts of interest related to the content of the presentations must be resolved prior to the educational activity. Disclosure of off-label, experimental or investigational use of drugs or devices must also be made known to the audience.

How To Obtain Your *AMA PRA Category 1 Credits™*

Tulane and the Eastern Society for Pediatric Research are now using a secure electronic format for evaluation and credit verification. The evaluation remains anonymous but the link does allow you to give us your contact information which will be incorporated into the Certificate of Credit.

At the conclusion of the conference on Sunday, you will be sent a link to an electronic evaluation and credit verification form from Tulane.edu. If you do not receive this in your inbox on Sunday afternoon, check your spam/junk mailbox. You can contact cme@tulane.edu if you did not receive it and Tulane will send you another link for claiming your credits.

You will receive your certificate of credit by Tuesday, May 1, 2012. If you do not receive it by then, please notify Tulane University at cme@tulane.edu.

Faculty

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Eastern SPR Schedule-at-a Glance

Doubletree Philadelphia
March 30 - April 1, 2012

Friday, March 30

6:00pm–7:30pm

Poster Session I & Reception
— Symphony Ballroom - 3rd Floor —

Saturday, March 31

7:30am–8:30am

Continental Breakfast
— Symphony Ballroom - 3rd Floor —

8:15am–10:30am

General Pediatrics I
— Aria A - 3rd Floor —

General Pediatrics - Vulnerabilities
— Maestro A - 4thFloor —

Infectious Diseases & Immunology
— Minuet - 4th Floor —

Neonatology - Monitoring I
— Concerto - 3rd Floor —

Neonatology - Pulmonary
— Overture - 3rd Floor —

Neurobiology I
— Maestro B - 4th Floor —

10:30am–10:45am

Coffee Break
— Symphony Ballroom - 3rd Floor —

10:45am–11:45am

Plenary Session I

PLENARY LECTURE
Catherine D. DeAngelis, MD, MPH
"Professionalism and Conflicts of Interest"
— Overture - 3rd Floor —

12:00pm–1:00pm

Meet the Professor Lunch

Catherine D. DeAngelis, MD, MPH
— Aria A - 3rd Floor —

Lisa M. Guay-Woodford, MD
"Translational Research: the long winding road from discovery to clinical impact"
— Concerto - 3rd Floor —

Eastern SPR Business Meeting
— Rhapsody - 4th Floor —

1:10pm–4:00pm

Plenary Session II

MENTOR OF THE YEAR
Heber Nielsen, MD
"Sex, Splices and Videotape: A Tale of Type II Cell Development"
— Overture - 3rd Floor —

YOUNG INVESTIGATOR PRESENTATIONS: (2:00pm–4:00pm)

4:00pm–4:15pm

Coffee Break
— Symphony Ballroom - 3rd Floor —

4:15pm–5:45pm

Cardiovascular & Critical Care
— Minuet - 4th Floor —

GI/Hematology - Oncology/Nephrology/Nutrition
— Maestro B - 4th Floor —

Neonatology - Clinical Studies I
— Concerto - 3rd Floor —

Neonatology - Epidemiology and Follow Up
— Aria A - 3rd Floor —

Neurobiology II
— Maestro A - 4thFloor —

Pulmonary Injury
— Overture - 3rd Floor —

6:00pm-7:30pm

Poster Session II & Reception
— Symphony Ballroom - 3rd Floor —

Sunday, April 1

7:45am–8:45am

Continental Breakfast
— Symphony Ballroom - 3rd Floor —

8:30am–9:30am

Plenary Session III

PRESENTATION OF THE YOUNG INVESTIGATOR AWARDS

PLENARY LECTURE
Lisa M. Guay-Woodford, MD
"Polycystic Kidney Disease: Clinical Practice, Research Advances, and New Therapeutic Strategies"
— Overture - 3rd Floor —

9:30am–9:45am

Coffee Break
— Symphony Ballroom - 3rd Floor —

9:45am–12:00pm

Cardiopulmonary Development
— Aria A - 3rd Floor —

Emergency Medicine
— Maestro A - 4th Floor —

Endocrinology & Obesity
— Minuet - 4th Floor —

General Pediatrics II
— Concerto - 3rd Floor —

General Pediatrics - Medical Education & Quality Improvement
— Maestro B - 4th Floor —

Neonatology - Clinical Studies II
— Overture - 3rd Floor —

Friday, March 30, 2012

Poster Session I

Cardiovascular & Critical Care

6:00pm-7:30pm **Symphony Ballroom**

1 **Discrepant ECGs in the Pediatric Emergency Department**
Danielle P. Federico, Katherine Miciak, Niket Shah, Ralynne Maitland, Marvin C. Culbertson, Harris Leopold, Sharon R. Smith. – Abstract 1

2 **Corticosteroid Therapy in Critically Ill Pediatric Asthmatic Patients**
John S. Giuliano, Jr., E. Vincent S. Faustino, Simon S. Li, Matthew G. Pinto, Michael S. Canarie, Christopher L. Carroll . – Abstract 2

3 **Reliability of Left Ventricular Hypertrophy by EKG Criteria in Children with Syncope: Do the Criteria Need To Be Revised?**
Maalika M. Banerjee, V. Ramesh Iyer, Victoria Vetter, Anirban Banerjee. – Abstract 3

4 **Accuracy of Prenatal Echocardiograms in Predicting Coarctation of the Aorta**
Joanne S. Chiu, Daniela Y. Rafii, Mary J. Ward, Sheila J. Carroll. – Abstract 4

5 **Effect of Dwell Time on Insulin Infusion Delivery**
Cecilia D. Thompson, Jessica Vital-Carona, E. Vincent S. Faustino. – Abstract 5

General Pediatrics

6:00pm-7:30pm **Symphony Ballroom**

6 **Correlates of Depressive Symptoms in Urban Latino Adolescents**
John Rausch, Patricia Hametz, Rachel Zuckerbrot, Karen Soren. – Abstract 6

7 **Cyclopedia: Empowering Urban Adolescents through Community-Based Programming (Pilot)**
Cappy Collins, Marc Lavender, Shawn Brown, C. Andrew Aligne. – Abstract 7

8 **Parental Perception of the Utility of the PEDS Questionnaire**
Claudia G. Lares, Lina Huerta-Saenz, Michelle King, Michael J. Janeczko. – Abstract 8

9 **Breastfeeding among Inner City Women: From Intention before Delivery to Breastfeeding at Hospital Discharge**
Shilpa G. Hundalani, Matilde Irigoyen, Ramesh Matam, Stefan Mandakovic-Falconi. – Abstract 9

10 **Postpartum Depression and Breastfeeding in an Inner City Population**
Shilpa G. Hundalani, Stefan Mandakovic-Falconi, Ramesh Matam, Matilde Irigoyen. – Abstract 10

11 **First Contact: Parental Knowledge and Attitudes Regarding Childhood Vaccines in the Newborn Nursery**
Francisco J. Silva, Sandy Ricks, Brian Lurie, Ben H. Lee. – Abstract 11

12 **Post Partum Depression and Emergency Department Use in Young Infants**
Amit Mukhia, Meyrick Sarmiento, Maheswari Ekambaram, Johelin DeFreitas Hernandez, Matilde Irigoyen. – Abstract 12

13 **Maternal EPDS and Its Impact on Routine Primary Care for the Infant and Utilization of Outpatient Health Care Services**
Meyrick Sarmiento, Amit Mukhia, Johelin De Freitas Hernandez, Maheswari Ekambaram, Matilde Irigoyen. – Abstract 13

14 **Pediatric Resident Perceptions of the 2011 RRC Proposed Guidelines**
Anna Marie Carr, Ishminder Kaur, Matilde Irigoyen. – Abstract 14

15 **Moved to Saturday Night - Poster 43**

16 **The General Pediatrician Subspecialist: A New Model for Improving Patient Access**
Matthew D. Di Guglielmo, Joanne Plesnick, Jay Greenspan, Iman Sharif. – Abstract 16

17 **The Impact of Limited English Proficiency on Asthma Action Plan Use**
Antonio Riera, Aledie Navas-Nazario, Federico Vaca. – Abstract 17

18 **Barriers to Physical Activity in Schoolchildren with Asthma: A Parent Perspective**
Marina Reznik, Laurie J. Bauman. – Abstract 18

19 **Provider Practices and Barriers to Demonstrating and Assessing MDI-Spacer Technique**
Marina Reznik, Yudilyn Jaramillo, Kathryn M. Scharbach, Judith Wylie-Rosett. – Abstract 19

20 **Parental Fears about Asthma and Physical Activity in Inner-City Schoolchildren**
Marina Reznik, Laurie J. Bauman. – Abstract 20

21 **Does the Initial Pediatric Asthma Score Correlate with Need for and Duration of Hospitalization?**
Sathish Adigopula, Fernanda Kupferman, Susana Rapaport, Louis Primavera, Dakshayani Guttal. – Abstract 21

Infectious Diseases & Immunology

6:00pm-7:30pm **Symphony Ballroom**

22 **Newborn and Adult Blood Monocytes Show Different Inflammatory Responses to Bacterial Infection: Studies of Regulatory Molecules**
Esther M. Speer, Avinash Chander. – Abstract 22

23 **Prevalence and Determinants of HIV Status Disclosure among HIV-Infected Children Enrolled in a Clinical Care Program in South India: Implications for Pediatric HIV Care Delivery and Support in Resource-Limited Settings**
Rajitha Devadoss, Rochelle D. Yepthomi, Lakshmi Prasad, Suniti S. Solomon, Kenneth H. Mayer, Kartik K. Venkatesh. – Abstract 23

24 **Is Bathing an Important Factor in the Management of Atopic Dermatitis? A Prospective, Randomized, Case-Control Study**
Ioannis Koutroulis, Won Baik-Han, Fernanda Kupferman, Kelly Cervellione, Susana Rapaport, Ashley Hiza. – Abstract 24

25 **Appropriateness of Testing for Serious Bacterial Infection in Children Hospitalized with Bronchiolitis**
Jamie Librizzi, Russell McCulloh, Kristin Koehn, Brian Alverson. – Abstract 25

26 **Neonatal Intensive Care Unit (NICU)-Based Administration of 23-Valent Pneumococcal Polysaccharide Vaccine (PPSV23) Vaccine to Parents Who Smoke and Referral to Smoking Cessation Quitlines**
Caitlin E. Welch, Shetal I. Shah. – Abstract 26

27 **Reduced Toxicity Conditioning (RTC) and Allogeneic Stem Cell Transplantation (ALLOSCT) for Recessive Dystrophic Epidermolysis Bullosa (RDEB)**
Kavita Radhakrishnan, Mark B. Geyer, Angela Ricci, Sandra Foley, Erin Morris, Angela M. Christiano, Mitchell S. Cairo. – Abstract 27

Neonatology

6:00pm-7:30pm **Symphony Ballroom**

28 **Does Thrombocytopenia Contribute to the Failure of Medical Management of Patent Ductus Arteriosus (PDA)?**
Simon Lee, Prasoon Verma, Dan Wang, Mimi Kim, Melissa Vega, Mamta Fuloria. – Abstract 28

29 **Screening Echocardiography for Diagnosis of Asymptomatic Patent Ductus Arteriosus (PDA) in Very Low Birth Weight (VLBW) Infants: A Randomized Trial**
Sara B. DeMauro, Soraya Abbasi, Sarah J. Ratcliffe, Meryl S. Cohen, Barbara Schmidt. – Abstract 29

30 **Epidemiology of Periventricular Echodensities in Very Low Birth Weight Infants**
Lauren M. Priolo, Richa Lakhotia, Benjamin Rosenfeld, Ben H. Lee. – Abstract 30

31 **Even Low Dose Steriods for BPD Is Associated with Worse Neurodevelopmental Outcome**
Rubia Khalak, Anthony Malone, Nur Zeinomar. – Abstract 31

32 **Developmental Outcome of Term Neonatal Intensive Care Unit Graduates at 48 to 60 Months of Age**
Mohamed F. Ahamed, Fernanda Kupferman, Susana Rapaport, Richard Jack, Lourdes Cohen, Louis Primavera, Kanchana Roychoudhury, Romina M. Barros. – Abstract 32

33 **Is Lumbar Puncture Required in Asymptomatic Newborns with Maternal Intrapartum Fever?**
Munmun Rawat, Praveen K. Chandrasekharan, Sri K.P. Narayana, Roger Kim, Dominique Jean-Baptiste, Myron Sokal. – Abstract 33

34 **Utility of Sepsis Evaluations in Term Infants Born of Mothers Diagnosed with Chorioamnionitis**
Michelle Quirk, Kabir M. Abubakar. – Abstract 34

35 **Congenital Tuberculosis in Five Neonates Conceived by In Vitro Fertilization**
John Flibotte, Grace E. Lee, Genevieve Buser, Sarbattama Sen, Shakuntala Chandra, Elizabeth P. Baorto, Kristina N. Feja, Robert W. Tolan, George D. McSherry, Sheila M. Nolan, Huayan Zhang. – Abstract 35

36 **Detection of C-Reactive Protein in Neonatal Saliva and Its Correlation to Serum Levels**
Anjali Iyengar, Jessica K. Paulus, Kirby L. Johnson, Jill L. Maron. – Abstract 36

37 **Should All Neutropenic Extremely Low Birth Weight Infants Receive Empiric Antibiotics at Birth?**
Suna Seo, Jayashree Ramasethu. – Abstract 37

38 **Feeding Intolerance and NEC Are Associated with Increased Markers of Nitrosative and Oxidative Stress in Stool of VLBW Infants**
Rania El-Khawam, Andrew Gow, Barry Weinberger, Changjiang Guo. – Abstract 38

39 **Similarities among Neonates from Different Institutions Diagnosed with Transfusion Related Acute Gut Injury (TRAGI) Reported in an Online Registry: www.tragiregistry.com**
Jonathan Blau, Edmund F. La Gamma. – Abstract 39

40 **Single Nucleotide Polymorphisms of the Platelet Activating Factor Acetyl Hydrolase Gene in ELBW Infants with Necrotizing Enterocolitis**
Narendra R. Dereddy, Umesh Paudel, Joseph Telliard, Johanna M. Calo, Sonya Strassberg, Lance A. Parton. – Abstract 40

41 **Optical Imaging of Ischemia in Necrotizing Enterocolitis (NEC)**
M. Roger Kim, Joon S. You, Sravan Reddy Matta, Jagdish Desai, Michael Fierro, Lizbeth Seckler, David Benaron. – Abstract 41

42 **Utility of Regional Splanchnic Oxygenation (rSO2) Using Near-Infrared Spectroscopy (NIRS) in Very Low Birth Weight Infants (VLBWI) with Abdominal Distension**
Anna Ganster, Melissa Scheiner, Deborah E. Campbell, Mimi Kim, Suhas M. Nafday. – Abstract 42

43 **Are eNOS Gene Polymorphisms Associated with Exhaled Nitric Oxide Levels in Extremely Low Birth Weight Infants?**
Johanna M. Calo, Divya Chhabra, Hima Maramreddy, Joseph Boyer, Lance A. Parton. – Abstract 43

44 **eNOS Gene Polymorphisms Are Associated with Bronchopulmonary Dysplasia in Extremely Low Birthweight Infants**
Johanna Calo, Divya Chhabra, Hima Maramreddy, Lance Parton. – Abstract 44

45 **Single Nucleotide Polymorphism of MUC5B Gene and Bronchopulmonary Dysplasia in ELBW Infants**
Umesh Paudel, Narendra R. Dereddy, Johanna M. Calo, Joseph Telliard, Lance A. Parton. – Abstract 45

46 **The Effect of a Single Nucleotide Polymorphism in the Glucocorticoid Induced Transcript 1 (GCCLI1) Gene on the Development of Bronchopulmonary Dysplasia**
Joseph T. Telliard, Edward Hurley, Divya Chhabra, Narendra Dereddy, Johanna M. Calo, Lance A. Parton. – Abstract 46

47 **Single Nucleotide Polymorphisms (SNPs) of the Toll Like Receptor (TLR)-4 in Extremely Low Birth Weight Infants with Bronchopulmonary Dysplasia**
Maryam Azizi, Narendra R. Dereddy, Joseph Thomas Telliard, Umesh Paudel, Johanna Calo, Divya Chhabra, Lance A. Parton. – Abstract 47

48 **Interleukin-1β Single Nucleotide Polymorphism and Susceptibility to Bronchopulmonary Dysplasia**
Lynn C. Palmeri, Joseph Telliard, Divya Chhabra, Narendra R. Dereddy, Johanna Calo, Lance A. Parton. – Abstract 48

49 **Vitamin D Improves Pulmonary Function in Neonatal Rat Lung**
Jody L. Zisk, Erin C. Killeen, Janet E. Larson. – Abstract 49

50 **How Common Is Transient Tachypnea of the Newborn?**
Annemarie Stroustrup, Claudia T. Cadet, Roxane Perez, Elissa DeLorenzo, Leonardo Trasande. – Abstract 50

51 **Recorded Pulse Oximetry Can Identify Oxygen Saturation Patterns in Premature Infants That Correlate with Longer Hospitalization**
Lawrence Rhein, Stephanie Beck, Munish Gupta. – Abstract 51

52 **Comparison of Postnatal Steriods (PNS) on Respiratory Severity Score (RSS) in Brochopulmonary Dysplasia (BPD)**
Sfurti Nath, Anne Marie Reynolds, Satyan Lakshminrusimha, Rita M. Ryan. – Abstract 52

53 **Testing the Oxygen Area under the Curve Model in Newborn Mice Exposed to Hyperoxia**
Echezona T. Maduekwe, Bradley Buczynski, Michael O'Reilly. – Abstract 53

54 **Does Humidified High Flow Nasal Cannula Improve Feeding Intolerance in Preterm Infants?**
Barbara Amendolia, Munnaza Basit, Nicole Kemble, Zubair H. Aghai. – Abstract 54

55 **Improved Growth Velocity Associated with a Decreased Odds of Chronic Lung Disease**
Julia D. Ryan, Amy B. Mackley, Robert Locke, David A. Paul. – Abstract 55

56 **BMP2 and eNOS Expression in HPAECs Exposed to Hyperoxia**
Johanna M. Calo, Lance A. Parton, Susan C. Olson. – Abstract 56

Neurobiology

6:00pm-7:30pm **Symphony Ballroom**

57 **Withdrawn**

58 **Long Term Effect of Src Kinase Inhibition on Caspase-9 Activation Following Hypoxia in the Newborn Piglet Brain**
Aun Woon Soon, Angely Modestin, Maria Delivoria-Papadopoulos. – Abstract 58

59 **Mechanism of Increased Activation of Ca++/Calmodulin-Dependent Protein Kinase IV (CaM Kinase IV) during Hypoxia in Neuronal Nuclei of the Cerebral Cortex of Newborn Piglets**
Ronald K. Sallas, Qazi Ashraf, Angely Mondestin, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 59

60 **Effect of Hyperoxia on Tyrosine Phosphorylation of Apaf-1 in the Cytosolic Fraction of the Cerebral Cortex of Newborn Piglets**
Subhasri Sangam, Qazi Ashraf, Hien Pham, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 60

61 **Mechanism of Hyperoxia Induced Inactivation of Protein Tyrosine Phosphatase Activity in the Newborn Brain**
Ronald K. Sallas, Qazi Ashraf, Anli Zhu, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 61

62 **Effect of Hypoxia on Caspase-8 Expression during Development in the Cerebral Cortex of the Guinea Pig Fetus**
Qazi M. Ashraf, Dimitris Angelis, Angely Modestin, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 62

63 **Protective Factors Against the Development of Intraventricular Hemorrhage (IVH) in a Large Cohort of Neonates with Respiratory Distress Syndrome (RDS)**
Harshit Doshi, Yogesh Moradiya, Philip Roth, Jonathan Blau. – Abstract 63

64 **Mechanism of CaMK IV Activation during Hyperoxia in the Cerebral Cortex of Newborn Piglets**
M. Elisabeth Heal, Qazi Ashraf, Justin Buland, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 64

65 **Effect of Pre-Hypoxic Intervention with Src Kinase and EGFR Kinase Inhibitors on Long Term Neurobehavioral and Cognitive Functions in Newborn Piglets**
Waseem Akhter, Justin Buland, Badal J. Patel, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 65

66 **Treating Migraine and Chronic Daily Headaches in Children with Gabapentin**
Denise Lee, Francis J. DiMario. – Abstract 66

Saturday, March 31, 2012

General Pediatrics I

Platform Session

8:15am-10:30am **Aria A**

Moderator: Andrew Adesman, MD

8:15am **Reproductive Health Experiences and Behaviors among Adolescent Females with Sickle Cell Disease Compared to Healthy Peers**
Meera Shah, Emily Meier, Meredith Lynn, Lisa Tuchman – Abstract 67

8:30am **Long-Term Developmental Outcome of Children Whose Mothers Reported Loss of Fetal Activity during Pregnancy**
Andrew Adesman, Sarah A. Keim. – Abstract 68

8:45am **Abnormal Neonatal Auditory Brainstem Response and 4 Month Arousal-Modulated Attention Are Jointly Associated with Autism Severity Scores in Childhood in NICU Graduates**
Ira L. Cohen, Judith M. Gardner, Bernard Z. Karmel, Tina R. Gomez, Maripaz M. Gonzalez, Ha T.T. Phan, Phyllis M. Kittler, Elizabeth M. Lennon, Krishanthi Satchi, Santosh L. Parab, Anthony L. Barone. – Abstract 69

9:00am **Inpatient Missed Opportunities for Screening Childhood Developmental Delays**
Hai Jung H. Rhim, Katherine M. O'Connor, Joanne M. Nazif, Sheila K. Liewehr, Ruth E.K. Stein. – Abstract 70

9:15am **Youth with and without Gestational Cocaine Exposure (GCE): Academic Achievement at Age 18**
Laura M. Betancourt, Katie L. Hatch, Nancy L. Brodsky, Elsa K. Malmud, Hallam Hurt. – Abstract 71

9:30am **Development of an Instrument To Measure Parents' Preferences and Goals for ADHD Treatment**
Alexander Fiks, Stephanie Mayne, Cayce Hughes, Elena DeBartolo, Carina Behrens, James Guevara, Thomas Power. – Abstract 72

9:45am **Stimulant Diversion and Access in Households with Children on Stimulant Medication for ADHD**
Andrew Adesman, Ruth Milanaik, Tova Rosen, Helen Papaioannou. – Abstract 73

10:00am **Positive Relationship between HEADSS Assessment and Abnormal Pediatric Symptoms Checklist (Y-PSC) Scores**
Nam Nguyen, James Burns, Jennifer Panganiban, Raid Amin. – Abstract 74

10:15am **Observational Study of Shared Medical Decision Making in Pediatric Chronic Conditions**
Tim Wysocki, Jennifer Blossom, Sandra Hassink, Pialee Roy, Vanessa Vigilante, Iman Sharif. – Abstract 75

General Pediatrics - Vulnerabilities

8:15am-10:30am **Maestro A**

Moderator: Iman Sharif, MD, MPH

8:15am **Lang Youth: Impact of a Longitudinal Hospital-Based Science Enrichment and Mentoring Program**
Marina Catallozzi, Monica A. Hidalgo, Ken Kitayama, Daniel H. Stephens, Mary McCord, José A. Luchsinger. – Abstract 76

8:30am **Barriers to Evaluation for Early Intervention Services**
Manuel Jimenez, Frances Barg, James Guevara, Marsha Gerdes, Alexander Fiks. – Abstract 77

8:45am **Using Health Education Community Baby Showers To Bridge Disparities in Knowledge of Perinatal Health Factors**
Amishi Shah, Cheryl Hunter-Grant, Heather Brumberg. – Abstract 78

9:00am **Are Some Disabilities More Handicapping Than Others? A Comparison of Teacher Grading of Children with Medical, Physical and Behavioral Disabilities**
Brett Gossett, Ruth Milanaik, Alyson Kaplan, Suzanne Sunday, Andrew Adesman. – Abstract 79

9:15am **Pediatric Emergency Department Categorization and Access to Care in Pennsylvania and Wisconsin**
Sage R. Myers, Rama A. Salhi, Brendan G. Carr. – Abstract 80

9:30am **Can a Pediatric Homeless Shelter Clinic Reduce Low Acuity Emergency Department Visits by Homeless Children?**
Stephen Sandelich, Mario Cruz. – Abstract 81

9:45am **Improving HIV Adolescent Screening in a Busy, Urban, Continuity Clinic**
Janice Hobbs, Mario Cruz, Daniel Taylor, Roberta Laguerre-Frederique, Barbara Bungy, Robert Bonner, Jill Foster. – Abstract 82

10:00am **Perception and Use of Marijuana among Children and Adolescents: A Community-Based Study**
Esmil Perez, Patricia Burris-Warmoth, Susana Rapaport, Louis Primavera, Joseph Cannavo, Jasmin Patel, Fernanda Kupferman. – Abstract 83

10:15am **Comparing the Knowledge, Perceptions and Perceived Consequences of Cyberbullying between Youth and Their Parents in an Urban Community**
De' Andra Davis, Fernanda Kupferman, Susana Rapaport, Louis Primavera, Patricia Burris-Warmoth. – Abstract 84

Infectious Diseases & Immunology

8:15am-10:30am **Minuet**

Moderator: Adam J. Ratner, MD, MPH

8:15am **Zoster in Children in the Era of Varicella Vaccine**
Marietta Vazquez, Anne A. Gershon, Alexandra P. Grizas, Phil LaRussa, Nancy Holabird, Sharon P. Steinberg, Eugene D. Shapiro. – Abstract 85

8:30am **Prevalence of the Urine Pneumococcal Antigen Test in Children with Sickle Cell Disease**
Duygu Unkaracalar, Tsoline Kojaoghlanian. – Abstract 86

8:45am **Prevalence of Pneumococcal Bacteremia in Low Risk Patients with Sickle Cell Disease and Fever**
Shashidhar R. Marneni, Jennifer H. Chao, Konstantinos G. Agoritsas, Shahriar Zehtabchi. – Abstract 87

9:00am **Does Mycoplasma Infection Worsen Symptoms in Acute Asthma Exacerbation? A Retrospective Case Control Study**
Ramkumar Natarajan, Sandeep Puranik, Fernanda Kupferman, Susana Rapaport, Kelly Cervellione, Dakshayani Guttal. – Abstract 88

9:15am **Rates of Neonatal Intensive Care Unit (NICU)-Based Administration of Trivalent, Inactivated Influenza Vaccine (TIV) in Parents Who Smoke Compared to Non-Smokers**
Caitlin E. Welch, Shetal Shah. – Abstract 89

9:30am **Retrocyclin: A Candidate Microbicide with Effects on the Vaginal Microbiota**
Thomas A. Hooven, Tara M. Randis, Saul R. Hymes, Ryan Rampersaud, Adam J. Ratner. – Abstract 90

9:45am **UNGAL as a Potential Biomarker for Late Onset Sepsis among Infants in the NICU**
Jennifer M. Pynn, Elvira Parravicini, Lisa Saiman, David Bateman, Jonathan Barasch, John Lorenz. – Abstract 91

10:00am **Determinants of Group B Streptococcal Colonization of the Murine Vaginal Epithelium**
Tara M. Randis, Ritwij Kulkarni, Adam J. Ratner. – Abstract 92

10:15am **Bacterial Meningitis in the Neonatal Intensive Care Unit (NICU): A Prospective Observational Study**
Lakshmi Srinivasan, Samir S. Shah, Soraya Abbasi, Lavanya Madhusudan, Michael A. Padula, Mary C. Harris. – Abstract 93

Neonatology - Monitoring

8:15am-10:30am **Concerto**

Moderator: Edmund F. La Gamma, MD

8:15am **Reliability of Transcutaneous Carbondioxide Monitoring in VLBW Infants**
Jagadish Elumalai, Shanthy Sridhar, Adriann Combs, Catherine Messina. – Abstract 94

8:30am **Methemoglobinemia and Inhaled Nitric Oxide, Are We Monitoring Too Much?**
Kathryn A. Ziegler, Ursula Nawab, Brian Glynn, Zubair H. Aghai. – Abstract 95

8:45am **Effect of Fresh Frozen Plasma (FFP) on Coagulation Status by Thromboelastography (TEG) in Encephalopathic Newborns Treated with Hypothermia**
Katie R. Forman, Edward Wong, Naomi Luban, Meanavy Gallagher, An N. Massaro. – Abstract 96

9:00am **Effect of Temperature on Thromboelastography (TEG) and Implications for Clinical Use in Neonates Undergoing Therapeutic Hypothermia**
Katie R. Forman, Edward Wong, Meanavy Gallagher, Naomi Luban, An N. Massaro. – Abstract 97

9:15am **NIRS Abdominal Somatic Tissue Oxygen Saturation Validation Model for Neonates ≤ 4kg**
Mariam M. Said, Nickie Niforatos, Khodayar Rais-Bahrami. – Abstract 98

9:30am **Comparison of NIRS Traditional Vs Stool Compensating Somatic Algorithms When Measuring Abdominal Tissue Oxygen Saturation on Neonates ≤ 4kg**
Mariam M. Said, Nickie Niforatos, Khodayar Rais-Bahrami. – Abstract 99

9:45am **Near-Infrared Spectroscopy (NIRS) Evaluation of the Efficacy and Safety of Booster Packed Red Blood Cell (pRBC) Transfusions in Very Low Birth Weight (VLBW) Neonates during the First Postnatal Week**
Jonathan P. Mintzer, Boriana Parvez, Michael Chelala, Gad Alpan, Edmund F. LaGamma. – Abstract 100

10:00am **Monitoring Mesenteric Tissue Oxygenation with Near-Infrared Spectroscopy (NIRS) during Packed Red Blood Cell Transfusion in Preterm Infants**
Lee T. White, Mariam M. Said, Khodayar Rais-Bahrami. – Abstract 101

10:15am **Continuous Tomographic Monitoring of Necrotizing Enterocolitis (NEC) in Preterm Infants Using Multi-Channel Tissue Oxymeter**
M. Roger Kim, David McNeil, Randal Barbour, Thati Ganganna, Sinora Shrestha, Harry Graber. – Abstract 102

Neonatology - Pulmonary

8:15am-10:30am **Overture**

Moderator: Larry M. Nogee, MD

8:15am **A Pharmacoeconomic Analysis of In-Hospital Costs Due to Reintubation in Preterm Infants: Impact of Surfactant Selection**
Carlos G. Guardia, Fernando R. Moya, Sunil Sinha, Phillip Simmons, Robert Segal, Jay S. Greenspan. – Abstract 103

8:30am **Effect of High Flow Nasal Cannula Flow Rate and Cannula Size on Generated Airway Pressures: An In-Vitro Study**
Emidio M. Sivieri, Jeffrey S. Gerdes, Soraya Abbasi. – Abstract 104

8:45am **Work of Breathing in Infants with Respiratory Insufficiency on High Flow Nasal Cannula vs. Nasal Continuous Positive Airway Pressure**
Beatriz E. de Jongh, Robert Locke, Amy Mackley, John Stefano, John Emberger, Elena Rodriguez, Thomas Shaffer. – Abstract 105

9:00am **Effect of Early Initiation of Inhaled Nitric Oxide (iNO) on Oxygenation and Oxidative Stress in PPHN**
Devaraj Sambalingam, Daniel D. Swartz, Bobby Mathew, Sylvia Gugino, Carmon Koenigsknecht, Jayasree Nair, Stephen Wedgwood, Robin H. Steinhorn, Satyan Lakshminrusimha. – Abstract 106

9:15am **Antenatal Betamethasone Decreases Hypoxic Pulmonary Vasoconstriction in Late Preterm Lambs Delivered by Elective C-Section**
Jayasree Nair, Bobby Mathew, Pritha Nayak, Sylvia F. Gugino, Stephen Wedgwood, Robin H. Steinhorn, Satyan Lakshminrusimha. – Abstract 107

9:30am **Perinatal Pulmonary Hemodynamics in Acute and Chronic Models of Persistent Pulmonary Hypertension of Newborn (PPHN)**
Satyan Lakshminrusimha, Bobby Mathew, Sylvia F. Gugino, Carmon Koenigsknecht, Robin H. Steinhorn, Daniel D. Swartz. – Abstract 108

9:45am **Does Parenchymal Lung Disease Alter the Relationship between PO2 and Pulmonary Vascular Resistance (PVR)?**
Satyan Lakshminrusimha, Bobby Mathew, Chang Xing Ma, Jayasree Nair, Sylvia F. Gugino, Carmon Koenigsknecht, Robin H. Steinhorn, Daniel D. Swartz. – Abstract 109

10:00am **Nfib Hemizygous Mice Are Protected from Hyperoxia-Induced Mortality**
Joseph Chaker El Khoury, Rita M. Ryan, Richard M. Gronostajski, Huamei Wang, Vasanth H. Kumar. – Abstract 110

10:15am **Expression Levels of Lung Heme Oxygenase Determine Its Cytoprotective Role In Vivo**
Jennifer A. Murphy, Fumihiko Namba, Ping La, Amal P. Fernando, Guang Yang, Phyllis A. Dennery. – Abstract 111

Neurobiology I

8:15am-10:30am **Maestro B**

Moderator: Cynthia F. Bearer, MD, PhD

8:15am **Mechanism of Hypoxia-Induced Expression of Caspase-1 in the Cerebral Cortex of Guinea Pig Fetus at Term**
Qazi M. Ashraf, Dimitris Angelis, Angely Modestin, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 112

8:30am **Mechanism of Increased Caspase-1 Activation during Hypoxia in the Cytosol of the Cerebral Cortex of Newborn Piglets**
Dimitrios Angelis, Qazi Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 113

8:45am **Effect of Systemic Inflammation on Hippocampal Volume in Newborn Mice: An MRI-Based Study**
Shadi Malaeb, Ilka Pinz, Maribel Rios, Jonathan Davis, Olaf Dammann. – Abstract 114

9:00am **Mast Cell Isolation from Neonatal Rat Brain**
Gillian Brennan, Jacqueline Brazin, Shayma Patel, Leah Elizondo, Randi B. Silver, Susan J. Vannucci. – Abstract 115

9:15am **Protective Effect of Methylxanthines in an In Vitro Model of Neuronal Injury**
John Ladino, Javier Pacheco-Quinto, Ben Lee, Hui Peng, Elizabeth Eckman, Christopher Eckman. – Abstract 116

9:30am **Bilirubin Inhibits Lipid Raft Dependent Neurite Outgrowth**
Gail S. Cameron, Penny Bamford, Ningfeng Tang, Cynthia F. Bearer. – Abstract 117

9:45am **Lead Concentrations in VLBWs Following Blood Transfusion Reduces Laminin-Mediated Neurite Outgrowth**
Misty C. McCaig, Penny Bamford, Ningfeng Tang, Min He, Cynthia F. Bearer. – Abstract 118

10:00am **Overexpression of EC-SOD Has a Protective Role Against Brain Injury Induced by Chronic Hypoxia in Adult Mice**
Nahla Zaghloul, Hardik Patel, Champa Codipilly, Philippe Marambaud, Stephen Dewey, Wynne Schiffer, Mohamed Ahmed. – Abstract 119

10:15am **Characterization of Hypoxia-Ischemia Induced Seizures in P7 Neonatal Rat Pups**
Aimee M. Parow, Murray Engel, Jeffrey M. Perlman, Susan J. Vannucci. – Abstract 120

10:30am **Break**

Plenary Session I

10:45am-11:45am **Overture**

10:45am **Plenary Lecture - "Professionalism and Conflicts of Interest"**
Catherine D. DeAngelis, MD, MPH, Johns Hopkins University School of Medicine, Baltimore, MD

Lunch with the Professor

12:00pm-1:00pm **Aria A**

Catherine D. DeAngelis, MD, MPH

Concerto

"Translational Research: the long winding road from discovery to clinical impact"
Lisa M. Guay-Woodford, MD

Plenary Session II: Mentor of the Year & Young Investigator Presentations

1:10pm-4:00pm **Overture**

1:10pm **Mentor of the Year Presentation**
"Sex, Splices and Videotape: A Tale of Type II Cell Development"
Heber Nielsen, MD, Tufts Medical Center and Tufts School of Medicine, Boston, MA

Young Investigator Presentations - Faculty

Moderator: Heber Nielsen, MD

2:00pm **Ultrastructural Consequences of VLY Exposure in Human Epithelial Cells**
Joanne Zaklama, Tara M. Randis, Tim LaRocca, Adam Ratner. – Abstract 125

2:15pm **Gas Exchange at Different Compression to Ventilation Ratios during Neonatal Resuscitation**
Bobby Mathew, Daniel D. Swartz, Sylvia F. Gugino, Devaraj Sambalingam, Carmon Koenigsknecht, Satyan Lakshminrusimha. – Abstract 126

2:30pm **Prenatal Bisphenol A Exposure Is Associated with Decreased Child Lung Function**
Adam J. Spanier, Robert S. Kahn, Allen Kunselman, Richard Hornung, Yingying Xu, Bruce P. Lanphear. – Abstract 127

2:45pm **Randomized Trial of Varying Levels of Oxygen (21%, 40% and 100%) at Resuscitation in Premature Infants < 32 wks GA**
Vasanth H. Kumar, Karen Wynn, Rita M. Ryan, Lori Nielsen, Anne Marie Reynolds, Vivien Carrion. – Abstract 128

Young Investigator Presentations - Trainee

Moderator: Heber Nielsen, MD

3:00pm **Heliox in Combination with High Flow Nasal Cannula Decreases Diaphragmatic Injury in Newborn Porcine Lung Injury Model**
Romal Sekhon, Haritha Vellanki, Anne Hesek, Jordan Wang, Yan Zhu, Maria Elena Rodriguez, Jichuan Wu, Thomas H. Shaffer, Marla R. Wolfson. – Abstract 129

3:15pm **Single Nucleotide Polymorphisms and Variability in Severity of Neonatal Abstinence Syndrome**
E. M. Wachman, M. S. Brown, J. A. Paul, B. A. Logan, N. A. Heller, K. B. Harvey-Wilkes, H. O. Kasaroglu, T. Marino, J. M. Davis, J. V. Aranda, M. J. Hayes. – Abstract 130

3:30pm **PRBC Transfusion Increases Mesenteric Vasoconstriction in Preterm Lambs**
Jayasree Nair, Sylvia F. Gugino, Bobby Mathew, Melissa Carmen, Daniel D. Swartz, Satyan Lakshminrusimha. – Abstract 131

3:45pm **Hyperoxia Regulates Degradation of Circadian Protein Rev-Erbα: Implications for Cytoprotection**
Maurice Hinson, Chhanda Biswas, Ping La, Guang Yang, Phyllis A. Dennery. – Abstract 132

4:00pm **Break**

Cardiovascular & Critical Care

4:15pm-5:45pm **Minuet**

Moderator: Vincent S. Faustino, MD

4:15pm **Incidence and Acute Complications of Asymptomatic Central Venous Catheter-Related Deep Venous Thrombosis in Critically Ill Children**
E. Vincent S. Faustino, Philip C. Spinella, Simon Li, Matthew Pinto, Cicero T. Silva. – Abstract 133

4:30pm **Hydrocortisone (HC) Prophylaxis To Prevent Postoperative Cardiovascular Instability Following Patent Ductus Arteriosus (PDA) Ligation**
Upender K. Munshi, Sachin D. Tadphale, Joaquim M.B. Pinheiro. – Abstract 134

4:45pm **Surgical Site Infections and Perioperative Antibiotic Prophylaxis in Neonates Undergoing Cardiac Surgery**
Meghan Murray, Rozelle Corda, Lisa Saiman, Emile Bacha, Rebecca Turcotte, Lisa Covington, Brian Thumm, Ganga Krishnamurthy. – Abstract 135

5:00pm **Donor-Specific Antibodies at and after Pediatric Heart Transplantation Are Associated with Increased Risk of Rejection, but Not Early Mortality**
Emily P. Williams, Kimberly Y. Lin, Brian D. Hanna, Curt T. Lind, Dimitri S. Monos, Robert E. Shaddy. – Abstract 136

5:15pm **Prevalence of Electrocardiogram Screening and Cardiac Diagnoses in Apparent Life-Threatening Events in Children**
Matthew D. Elias, V. Ramesh Iyer, Meryl S. Cohen. – Abstract 137

5:30pm **The Temporal Kinetics of Circulating Angiopoietin Levels in Children with Sepsis**
John S. Giuliano, Jr., Kevin Tran, Veronika Northrup, Vineet Bhandari. – Abstract 138

Gastroenterology / Hematology - Oncology / Nephrology / Nutrition

4:15pm-5:45pm **Maestro B**

Moderator: Karla Au Yeung, MD

4:15pm **Acute Chest Syndrome with Respiratory Syncytial Virus and Seasonal Influenza in Children with Sickle Cell Disease**
Sara C. Sadreameli, John J. Strouse, James F. Casella. – Abstract 139

4:30pm **Prenatal Glycine Supplementation Improves Weight Gain and Endogenous Nitric Oxide (NO) Production in the Pulmonary Arteries (PA) of Intrauterine Growth Restricted (IUGR) Rats**
Melissa F. Carmen, Sylvia Gugino, Carmon Koenigsknecht, Satyan Lakshminrusimha, Daniel D. Swartz. – Abstract 140

4:45pm **Certain Developmental Stages May or May Not Be More Vulnerable to a High Fat Diet Exposure**
Maria del Mar Plata, Lyda Williams, Yoshinori Seki, Maureen Charron, Patricia M. Vuguin. – Abstract 141

5:00pm **Use of the Anti-CD20 Antibody Rituximab in the Treatment of Epstein-Barr Virus-Induced Hemophagocytic Lymphohistiocytosis**
Deepak Babu Chellapandian, Susan Wiener, Kristin Zelley, Kim E. Nichols. – Abstract 142

5:15pm **Prediction of Thrombocytopenia by Thromboelastography (TEG) in Newborn Infants at Risk for Coagulopathy**
Katie R. Forman, Edward Wong, Naomi Luban, Meanavy Gallagher, An N. Massaro. – Abstract 143

5:30pm **Attitudes of Renal Transplant Centers toward Safe Living Practices in Pediatric Transplant Patients**
Rasheda Z. Amin, Lauren A. Weintraub. – Abstract 144

Neonatology - Clinical Studies I

4:15pm-5:45pm **Concerto**

Moderator: Zubair H. Aghai, MD

4:15pm **Exploring the Gut Associated Microbiome of Breast Fed VLBW Infants in Relation to the Maternal Microbiome**
M. Susan LaTuga, J. Christopher Ellis, C. Michael Cotten, Ronald N. Goldberg, Robert B. Jackson, Patrick C. Seed. – Abstract 145

4:30pm **Polymorphisms in Oxidative Stress Production Pathway Associated with Necrotizing Enterocolitis**
Edward Hurley, Joseph Telliard, Divya Chhabra, Narendra R. Dereddy, Johanna M. Calo, Lance A. Parton. – Abstract 146

4:45pm **Release of Pro-Inflammatory Mediators by TA Cells from Premature Infants: Effects of Hyperoxia, Resveratrol and Caffeine**
Judy Saslow, Kartik Mody, Vishwanath Bhat, Kee Pyon, Suhita Gayen Nee Betal, Ursula Nawab, Janet Larson, Gary E. Stahl, Zubair H. Aghai. – Abstract 147

5:00pm **Antibiotic Prescribing for Hospital Acquired Pneumonia in Four Tertiary NICUs**
David A. Paul, Sameer Patel, Kelly Gray, Theo Zaoutis, Patricia DeLaMora, Yu-Hui Ferng, Lisa Saiman. – Abstract 148

5:15pm **Endotracheal Bacterial Cultures and Pneumatoceles in Infants in the Neonatal Intensive Care Unit: Is There an Association?**
Prem Arora, Vaneet Kalra, Girija Natarajan. – Abstract 149

5:30pm **Traumatic Lumbar Punctures in Infants Hospitalized in the NICU**
Lakshmi Srinivasan, Samir S. Shah, Soraya Abbasi, Lavanya Madhusudan, Michael A. Padula, Mary C. Harris. – Abstract 150

Neonatology - Epidemiology & Follow Up

4:15pm-5:45pm **Aria A**

Moderator: Lawrence Rhein, MD

4:15pm **Prepregnancy BMI, Race/Ethnicity and Prematurity**
Beatriz E. de Jongh, Julia D. Ryan, Robert Locke, Matthew Hoffman, David A. Paul. – Abstract 151

4:30pm **Ovulation Induction Is Associated with Small for Gestational Age Neonates**
Loren M. DeLuca, Nathan Fox, Robert S. Green, Annemarie Stroustrup, Matthew Harris, Kathleen Gibbs. – Abstract 152

4:45pm **Correlation of Outcomes among Twins: Implications for Inclusion of Multiple Births in Clinical Trials**
Lawrence Rhein, Al Ozonoff, Reese Clark. – Abstract 153

5:00pm **Preterm Twins: Is Twin B at Risk for Poorer Developmental Outcome Than Twin A?**
Alyssa Marshall, Nancy L. Brodsky, Hallam Hurt. – Abstract 154

5:15pm **Predicting Readmission for Premature NICU Graduates**
S. Schell, M. Grzybowski, J. Kase, B. Parvez, Y. Tong, S. Roy, H. Brumberg. – Abstract 155

5:30pm **Effect of Socioeconomic Status (SES) on Language Outcome of Preterm Infants at Toddler Age**
Katherine T. Wild, Nancy L. Brodsky, Laura M. Betancourt, Hallam Hurt. – Abstract 156

Neurobiology II

4:15pm-5:45pm **Maestro A**

Moderator: Ben Lee, MD

4:15pm **Neurogenesis in the Germinal Matrix and Cortical Subventricular Zone of Premature Infants**
Sabrina K. Malik, Praveen Ballabh. – Abstract 157

4:30pm **A Predictive Model for Preterm Infants To Target Indomethacin Therapy for Prevention of Intraventricular Hemorrhage**
Samuel V. Gorstein, Paul F. Visintainer, Frank Bednarek, Joseph H. Chou, Elisabeth C. McGowan, Rachana Singh. – Abstract 158

4:45pm **Correlations in Neurobehavioral Functioning as Measured by System Scoring of the Assessment of Preterm Infants' Behavior (APIB) with Infants 35-46 Weeks Post Conceptual Age (PCA)**
Gretchen Lawhon, Kee Pyon, Olayemi Ola, Nicole Kemble, Sonia Imaizumi, Gary Stahl. – Abstract 159

5:00pm **Neuromotor Outcome of Young Children Whose Mothers Reported Loss of Fetal Activity**
Andrew Adesman, Sarah A. Keim. – Abstract 160

5:15pm **Hyperthermia, Not Hyperoxia, Exacerbates Hypoxic-Ischemic Brain Injury in the Term-Equivalent Neonatal Rat**
Matthew A. Rainaldi, Susan J. Vannucci, Gillian Brennan, Shyama D. Patel, Jeffrey M. Perlman. – Abstract 161

5:30pm **Monitoring Cerebral Autoregulation in Neonatal HIE**
J. A. Howlett, F. J. Northington, M. M. Gilmore, J. M. Jennings, A. Tekes, T. A. Huisman, C. U. Lehmann, E. R. Jackson, C. M. Parkinson, A. C. Larson, J. L. Jamrogowicz, J. K. Lee. – Abstract 162

Pulmonary Injury

4:15pm-5:45pm **Overture**

Moderator: Christiane Dammann, MD

4:15pm **Inhibition of Stretch-Induced Lung Differentiation Via Transient In Utero Knockout (TIUKO) of the Cystic Fibrosis Conductance Regulator (ASCFTR) Alters Short-Term Lung Structure in Lungs of Sprague-Dawley Rat Pups Exposed to Birth Hyperoxia**
Alyssa Nastro, Rachael Grodick, J. Craig Cohen, Shetal Shah. – Abstract 163

4:30pm **Intra-Nasal Lipopolysaccharide (LPS) Alters Lung Cellular Differentiation (CD)14 and Toll-Like Receptor (TLR) 2 Levels in Three-Week Old Rats Exposed to Birth Hyperoxia without Affecting CD4 and CD8 Positive T Cells or TLR 4 Levels**
Surabhi Jain, Shetal Shah, Avinash Chander, Pavan Vasa. – Abstract 164

4:45pm **Circulating Muc1 as a Novel Biomarker for Tobacco Smoke (TS)-Induced Lung Injury**
J. Wu, T. L. Hubert, S. Baker, V. Zuluaga-Ramirez, K. C. Kim, M. R. Wolfson. – Abstract 165

5:00pm **Birth Hyperoxia Alters T-Cell Subsets in the Lungs of Sprague-Dawley Rat Pups Exposed to Transient In Utero Knockout of the Cystic Fibrosis Conductance Regulator Protein**
Eunice Hagen, Shetal Shah, Avinash Chander, Craig Cohen. – Abstract 166

5:15pm **Short Term Oxygen Exposure Soon after Birth ('Resuscitation') Alters Cell Cycle & DNA Repair Gene Expression in Adult Mice**
Vasanth H. Kumar, Huamei Wang, Lori Nielsen. – Abstract 167

5:30pm **High Flow Nasal Heliox Improves Work of Breathing and Attenuates Lung Injury in the Newborn Porcine Lung Injury Model**
Romal Sekhon, Haritha Vellanki, Yan Zhu, Anne Hesek, Jordan Wang, Maria Elena Rodriguez, Marla R. Wolfson, Thomas H. Shaffer. – Abstract 168

Poster Session II

Emergency Medicine

6:00pm-7:30pm **Symphony Ballroom**

1 **Emergency Department Visits for Bronchiolitis in the United States, 2006-2008**
Todd A. Florin, Katie L. Hayes, Sage R. Myers, Monika K. Goyal, Elizabeth R. Alpern. – Abstract 169

2 **General Pediatric and Emergency Medicine Providers' Self-Reported Practices and Attitudes Surrounding Concussion Management**
Mark R. Zonfrillo, Christina L. Master, Matthew F. Grady, Kristy B. Arbogast. – Abstract 170

3 **Retention of Pediatric Advanced Life Support (PALS) Course Concepts among Pediatric Health Care Providers**
Roy M. Vega, Adegbenga A. Olayemi, Babajide E. Faditan, Ariolis C. Grullon, Richard Neugebauer. – Abstract 171

4 **The Epidemiology of Pelvic Inflammatory Disease in a Pediatric Emergency Department**
Fran Balamuth, Katie Hayes, Cynthia Mollen, Monika Goyal . – Abstract 172

5 **An Effort To Cut down Excessive Use of Computer Tomography (CT) Scan in Patients with Closed Head Trauma in Pediatric Emergency Room (ER)**
Munmun Rawat, Soji Varghese, Sangita Trivedi, Sreenath Thati, Lewis W. Marshall, Jr., Myron Sokal, Praveen K. Chandrasekharan. – Abstract 173

6 **Acute Chest Syndrome: A Continued Concern in the Modern Era**
Charise L. Freundlich, Patricia L. Kavanagh, David H. Dorfman, Benjamin H. Taragin, Elizabeth McClure, Hnin Khine. – Abstract 174

7 **Ultrasound Findings of the Elbow Posterior Fat Pad in Children with Radial Head Subluxation**
Joni E. Rabiner, Hnin Khine, Jeffrey R. Avner, James W. Tsung. – Abstract 175

8 **Video Discharge Instructions for Fever and ED Recidivism**
Nina I. McFarlane-Johansson, Zoe Casey, Danielle Miano, Renee Silvis, Vladimir Rozvadovsky, Andrew Mikhalyuk, Sharon R. Smith. – Abstract 176

9 **Documenting Pediatric Sexual Abuse Screening in the Pediatric Emergency Department**
Nina I. McFarlane-Johansson, Danielle Miano, Renee Silvis, Sharon R. Smith. – Abstract 177

10 **Clinical Signs and Symptoms Associated with Intussusception in Young Children Undergoing Ultrasound in the Emergency Room**
Heather M. Territo, Brian Wrotniak, Paula Mazur, Kathleen Lillis. – Abstract 178

Endocrinology & Obesity

6:00pm-7:30pm **Symphony Ballroom**

11 **Weight Gain in the First Six Months of Life in Children Born to Mothers with Gestational Diabetes Mellitus Treated with Insulin, Glyburide or Diet**
Tommy Galanis, Fernanda Kupferman, Susana Rapaport, Kelly Cervellione, Shelly Soni, Judith Eng, Ekaterini Kokkali, Lily Q. Lew. – Abstract 179

12 **Effects of Two Novel Inactivating Glucokinase Mutations on Clinical Phenotypes and Enzymatic Activity**
Rosemary Peterson, Carol Buettger, Puja Patel, Nkecha Hughes, Franz Matschinsky, Diva D. De Leon. – Abstract 180

13 **Pituitary Volume Correlates with IGF-1 but Not with Peak Growth Hormone Response to Stimulation**
Molly O. Regelmann, Bradley Delman, Elizabeth Chacko, Evan Graber, Elizabeth Wallach, Dennis Chia, Michelle Klein, Rachel Annunziato, Robert Rapaport. – Abstract 181

14 **Glucocorticoid-Induced Hyperglycemia (GID) in Patients Admitted to a Children's Hospital over a 3 Year Period**
Ryan Housam, Kashif Hussain, Willi Steven, Sarah Ratcliffe. – Abstract 182

15 **The Effect of Visit Frequency and Glycated Hemoglobin Monitoring on Glycemic Control in Type I Diabetes**
Thao-Ly Phan, George Datto, Jobayer Hossain, Stephen Lawless, Lloyd Werk. – Abstract 183

16 **Neonatal Outcomes of Mothers Treated with Glyburide and Insulin for Gestational Diabetes**
Patricia Baile, Abegail Navarro, Meryl Grimaldi, David Rubin, Ronald Arevalo. – Abstract 184

17 **Maternal Pre-Pregnancy Body Mass Index Increases Admission to Neonatal Intensive Care Unit**
Julia D. Ryan, David A. Paul, Robert Locke, Amy B. Mackley, Matthew Hoffman. – Abstract 185

18 **Successful Treatment of Neonatal Severe Hyperparathyroidism with Cinacalcet Monotherapy**
Anthony W. Gannon, Michael A. Levine. – Abstract 186

19 **Vitamin D Status and Metabolic Risk Factors in a Cohort of Severely Obese Children and Adolescents**
Chelsea Gordner, Nancy Dunbar, Holley F. Allen, Paul Visintainer, Chrystal Wittcopp. – Abstract 187

20 **Papillary Thyroid Cancer Presenting with Subclinical Graves' Disease**
Emily Frydman, Chelsea Gordner, Holley F. Allen. – Abstract 188

21 **Fighting Obesity: A Call for Prevention**
Michelle Chien, Gary A. Emmett, Lauren M. Daley, Bonita Falkner, Samuel Gidding, Scott W. Keith. – Abstract 189

22 **Understanding the Association between Literacy and BMI in Overweight Children**
Jennifer Gittleman, Tara Ketterer, Iman Sharif. – Abstract 190

Gastroenterology / Nutrition / Hematology Oncology

6:00pm-7:30pm **Symphony Ballroom**

23 **Can a Questionnaire Be Used as a Screening Tool To Evaluate for Vitamin D Inadequacy?**
Charu Gupta, Fernanda Kupferman, Susana Rapaport, Lily Q. Lew. – Abstract 191

24 **Familial Haploidentical (FHI) T-Cell Depleted (TCD) Stem Cell Transplantation (SCT) in High-Risk Sickle Cell Disease (SCD) (IND 14359)**
Kavita Radhakrishnan, Julie-An Talano, Erin Morris, Mitchell S. Cairo. – Abstract 192

25 **Importance of Gastric Emptying Studies in Determining the Association between Failure to Thrive and Gastroparesis in Children**
Sinora Shrestha, Sravan Reddy Matta, Radha Nathan, Izabella Mullokandov. – Abstract 193

26 **20cal/oz vs 24 cal/oz Preterm Formula (PTF) Trophic Feeds in Very Low Birthweight (VLBW) Infants**
Ursula Nawab, Colleen Tsarnas, Emily Hiriak, Zubair Aghai, Janet Larson. – Abstract 194

27 **Association between Serum 25-Hydroxyvitamin D Levels and Blood Pressure in Young Children**
Charu Gupta, Susana Rapaport, Robert Woroniecki. – Abstract 195

General Pediatrics

6:00pm-7:30pm **Symphony Ballroom**

28 **Maternal Perception of Prenatal Stress and Its Relation with Autism Spectrum Disorder in Offspring**
Lavinia D. Ionescu, Fernanda Kupferman, Vanessa Camino, Louis Primavera, Susana Rapaport, Kanchana Roychoudhury. – Abstract 196

29 **Neuromuscular Development and Its Association with Growth and Feeding in Infants with Down Syndrome (DS)**
Elif E. Ince, Mary E. Pipan, Waynitra C. Hall, Virginia A. Stallings, Babette S. Zemel. – Abstract 197

30 **Neurobehavioral Maturation with Increasing Post Conceptual Age (PCA) as Measured by Serial Assessment of Preterm Infants' Behavior (APIB) System Scoring**
Kee Pyon, Gretchen Lawhon, Jaime Jump, Nicole Kemble, Gary Stahl, Sonia Imaizumi. – Abstract 198

31 **Functional Disability Following Inpatient Rehabilitation for Isolated Brain and Spinal Cord Injuries in Children**
Mark R. Zonfrillo, Flaura K. Winston, Dennis R. Durbin, Margaret G. Stineman. – Abstract 199

Neonatology

6:00pm-7:30pm **Symphony Ballroom**

32 **Children with Head Injury Triaged by a Pediatric After-Hours Call Center**
Kathryn C. Hall, Mark R. Zonfrillo, Christina L. Master, Anthony A. Luberti, Kristy B. Arbogast. – Abstract 200

33 **Domestic Violence Screening in a Resident Continuity Clinic Using Questionnaires**
Cynthia DeLago. – Abstract 201

34 **The Use of a Domestic Violence Screening Card To Improve Screening and Referral Rates for Domestic Violence in a Resident Continuity Clinic: A Quality Improvement Project**
Stacy B. Ellen, Mario Cruz, Ramona Peralta. – Abstract 202

35 **Unsafe Routes to School? Using GIS To Examine the Local Food Environment around Schools in an Inner City Minority Community**
Leigh Goldstein, Maida Galvez, Catherine Knuff, Kathleen McGovern, Susan Teitelbaum, Barbara Brenner. – Abstract 203

36 **A Comparison of Community-Acquired Methicillin-Resistant S. aureus Versus Community-Acquired MethicIlin-Sensitive S. aureus Disease in Hospitalized Children**
Lisa M. McAndrew, Molly C. Broder, Shira A. Friedman, Kathryn Scharbach. – Abstract 204

37 **Prevalence of Toxic Camphor Use in Children under 6 Years of Age**
Mary B. Palomaki, Wipanee Phupakdi, Mary J. Ward – Abstract 205

38 **Space and Temporal Cluster of Kawasaki Disease in Florida Panhandle**
James J. Burns, Grisset Rivera-Diaz, Tangra Broge, Salim Hommeida, Patricia Onuegbu, Raid Amin. – Abstract 206

39 **The Role of Caregiver Stress and Home Environment on Maternal Care-Seeking Patterns for Acute Child Illness in South Africa**
Omolara T. Uwemedimo, Shuaib Kauchali, Jane Kvalsig, Fatimatou Bah, Claude A. Mellins, Stephen M. Arpadi, Murray H. Craib, Leslie L. Davidson. – Abstract 207

40 **Hospitalization for Diarrhea in Children across the United States – Study from a Nationally Representative Sample**
Sravan Reddy Matta, Prabhu Viswanathan, Radha Nathan. – Abstract 208

41 **Contribution of the School Food Environment to Snacking Behaviors in NYC Children**
Catherine T. Knuff, Kathleen McGovern, Maida P. Galvez, Barbara Brenner, Susan Teitelbaum. – Abstract 209

42 **Improving Blood Pressure Screening: A Quality Improvement Project Using a Novel EHR Tool at a Multi-Center Academic Community-Based Health Network**
Jason Winkler, Steve Caddle, John Rausch, Laura Robbins-Milne, Minna Saslaw, Dana Sirota, David K. Vawdrey, Mariellen Lane. – Abstract 210

43 **Educational Intervention To Improve Knowledge of Pediatric Emergencies and Disaster Preparedness among Pediatric Practitioners**
Rochelle K. Kushner, Holley F. Allen. – Abstract 211

44 **A Clinical Prediction Rule To Identify Patients at High-Risk for Community-Acquired MRSA Cutaneous Abscesses**
Michael J. Alfonzo, J. Brittany Pardue, Nikhil B. Shah, Mary J. Ward. – Abstract 212

45 **Can Written Information Improve Factual Recall and Satisfaction Following the Prenatal Consult? A Randomized Controlled Trial**
Jennifer Kett, John Larsen, Hany Aly. – Abstract 213

46 **Impact of Physician Awarenessis on Diagnosis of Fetomaternal Hemorrhage**
Callie Plafkin, Annemarie Stroustrup. – Abstract 214

47 **Maternal Predictors of Large for Gestational Age (LGA) Infants**
Beatriz E. de Jongh, Robert Locke, Matthew Hoffman, David A. Paul. – Abstract 215

48 **Rapid Cycle Quality Improvement Leads to Increased Admission Temperature in Preterm Infants**
Stephen A. Pearlman, Haritha Vellanki, Barbara Dean, Tammy Search, Rachel Baldwin, David A. Paul. – Abstract 216

49 **Delivery Room Management of Extremely Low Birth Weight Infants: A Quality Improvement Study**
Sara B. DeMauro, Emily Douglas, Kelley Karp, Michael Posencheg. – Abstract 217

50 **Factors Responsible for Change in the Physiologic Status of Very Low Birth Weight Infants during Transport**
Prem Arora, Vaneet K. Kalra, Marwan Zidan, Monika Bajaj. – Abstract 218

51 **Hypothermia in Well Appearing Newborns Triaged to Well Baby Nursery (WBN) Is Common and Is Associated with an Increased Length of Stay (LOS)**
Anne Russo, Susan Miller, Jeffrey Perlman. – Abstract 219

52 **Initial Temperature (TEMP) in the Neonatal Intensive Care Unit (NICU) Following Delivery Influences Early Neonatal Morbidity: Positive Impact of a Practice Plan (PP)**
Morgan Deacon, Anne Russo, Jeffrey Perlman. – Abstract 220

53 **Early Initiation of Caffeine Therapy within 48 Hours of Life in Extremely Low Birth Weight Newborns: Can It Improve Outcome?**
Zeeshan Khan, Prem Arora, Vaneet K. Kalra, Eshmam Saif, Mirjana Lulic-Botica, Marwan Zidan, Nitin S. Chouthai. – Abstract 221

54 **Unplanned Extubations in the NICU – Attempts at Reduction with a Commercial Endotracheal Tube Holder**
Rebecca Hoban, Elisabeth McGowan. – Abstract 222

55 **Safety of Chlorhexidine Gluconate (CHG) Use in Preterm Infants in the First 2 Weeks of Life**
Alison Chapman, Susan Aucott, Maureen Gilmore, Sonali Advani, William Clarke, Aaron Milstone. – Abstract 223

56 **Neonatal Complications of Obesity in Women with Gestational Diabetes**
Avishai Alkalay, Melissa Vega, Melissa Hudson, Arthur Blank, Galina Umanski, Wendy Hosinking, Ellen Landsberger, Mamta Fuloria. – Abstract 224

57 **Implementation of Feeding Guidelines Reduces Central Line Utilization**
Kate Tauber, Pauline Graziano, Theresa Loomis, Eileen Graffunder, Michael Horgan. – Abstract 225

58 **Change in Blood Transfusion Practices in the NICU Following a QI Project**
Rakesh Roshan D'Souza, Imeline Troncales, Felipe Bautista, Agnes Salvador. – Abstract 226

59 **Use and Misuse of Soy Protein-Based Formula in the Newborn Nursery – Physicians', Nurses' and Parents' Perspectives**
Waed Jarjous, Sandeep Sadashiv, Shalome D'Souza, Christian Shaw, Agnes Salvador. – Abstract 227

60 **Correlation of Trends in Transcutaneous Bilirubinometer with Serum Bilirubin in Premature Infants**
Felix K. Quist, Roopali Bapat, Helen K. Kuch-Kunich, Kanayo Ezeanolue, Nitin S. Chouthai. – Abstract 228

61 **Early Enteral Feeding Does Not Prevent Hypoglycemia in SGA Neonates**
Jennifer Bragg, Robert Green, Ian Holzman. – Abstract 229

62 **Perceptions of Palliative Care in the NICU**
Sheela Moorthy, Brenda Hussey-Gardner, Christy Sampson-Kelly, David Harness, Alison Falck. – Abstract 230

63 **The Effect of Nurse-Staffing on Outcomes in the Neonatal Intensive Care Unit: A Systematic Review**
Michael Sherenian, Jochen Profit, Barbara Schmidt, Sanghee Suh, Rui Xiao, John Zupancic, Sara B. DeMauro. – Abstract 231

64 **Predicting Respiratory Physiology in Upright Positioning during Infant Car Seat Challenges: Role of Baseline Supine Respiratory Status**
Natalie Davis, Mary Lucia Gregory, Wenyang Mao, Lawrence Rhein. – Abstract 232

65 **Epidemiology of Failure of the Infant Car Seat Challenge**
Natalie Davis, Audrey Uong, Freeman Condon, Lawrence Rhein. – Abstract 233

66 **Predicting Readmissions for Full Term NICU Graduates**
S. Schell, J. Kase, M. Grzybowski, B. Parvez, Y. Tong, S. Roy, H. Brumberg. – Abstract 234

Sunday, April 1, 2012

Plenary Session III: Presentation of Young Investigator Awards

8:30am-9:30am **Overture**

8:30am **Presentation of The Young Investigator Awards**

8:40am **Plenary Lecture - "Polycystic Kidney Disease: Clinical Practice, Research Advances, and New Therapeutic Strategies"**
Lisa M. Guay-Woodford, MD, George Washington University, Washington, DC

9:30 **Break**

Cardiopulmonary Development

9:45am-12:00pm **Aria A**

Moderator: Alvin J. Chin, MD

9:45am **Vitamin D Stimulates In Utero Lung Development**
Jody L. Zisk, Erin C. Killeen, Janet E. Larson. – Abstract 236

10:00am **ErbB4 Isoform-Specific Function in Type II Cells**
Aikaterini Pringa, Christiane E. Dammann, Heber C. Nielsen. – Abstract 237

10:15am **Do Androgen and Oxygen Combine To Affect Type II Cell Development?**
Lucia D. Pham, Matt K. Lee, Susan M. Smith, Heber C. Nielsen. – Abstract 238

10:30am **EC-SOD Overexpression Preserving Pulmonary Angiogenesis Inhibited by Oxidative Stress**
Shahana Perveen, Hardik Patel, Arslan Arif, Champa Codipilly, Mohamed Ahmed. – Abstract 239

10:45am **miR-221 and miR-130a Control of Neovascularization during Lung Branching Morphogenesis**
Sana Mujahid, Heber C. Nielsen, MaryAnn V. Volpe. – Abstract 240

11:00am **Heme Oxygenase-1 Modulates NrF2 Activation in Hyperoxia**
Guang Yang, Chhanda Biswas, Ping La, Amal P. Fernando, Alexandra Selby, Phyllis A. Dennery. – Abstract 241

11:15am **Vascular Endothelial Growth Factor (VEGF) Attenuates Hyperoxia Via Neuropilin-1 (Nrp)-Protein Kinase C (PKC) Dependent Pathway in Endothelial Cells of Explanted Embryonic Lung**
Americo Esquibies. – Abstract 242

11:30am **Novel Method To Quantify Expression of Site Specific Mutants in Transgenic Mice: Application to Troponin I Transgenic Mice**
Thomas E. Rappold, Pingbo E. Zhang, Anne Murphy. – Abstract 243

11:45am **Mechanisms That Control the Function of the Mitochondrial Permeability Transition Pore during Cardiac Myocyte Differentiation**
Jennifer R. Hom, George A. Porter. – Abstract 244

Emergency Medicine

9:45am-12:00pm **Maestro A**

Moderator: Steven C. Rogers, MD

9:45am **Predictive Value of Initial Glasgow Coma Scale in Pediatric Trauma Patients**
Mark X. Cicero, Keith P. Cross. – Abstract 245

10:00am **Creation and Delphi-Method Refinement of Prehospital Pediatric Disaster Triage Simulations**
Mark Cicero, Linda Brown, Frank Overly, Jorge Yarzebski, Garth Meckler, Susan Fuchs, Sarita Chung, Andrew Garrett, Daniel Fagbuyi, Kathleen Adelgais, Ran Goldman, James Parker, Marc Auerbach, Antonio Riera, David Cone , Carl Baum. – Abstract 246

10:15am **Disparities in Pediatric Injury Outcome by Insurance Status**
Sage R. Myers, Charles C. Branas, Benjamin French, Michael L. Nance, Brendan G. Carr. – Abstract 247

10:30am **Accuracy of Point-of-Care Ultrasound for Diagnosis of Elbow Fractures in Children**
Joni E. Rabiner, Hnin Khine, Jeffrey R. Avner, James W. Tsung. – Abstract 248

10:45am **Comparison of GlideScope® Videolaryngoscopy to Miller Direct Laryngoscopy for Intubation of a Pediatric Simulator by Novice Physicians**
Joni E. Rabiner, Marc Auerbach, Jeffrey R. Avner, Dina Daswani, Hnin Khine. – Abstract 249

11:00am **Obstacles to Pediatric Disaster Triage Performance: A Qualitative Investigation**
Mark X. Cicero, Jeannette Koziel, Garth R. Meckler, Linda Brown. – Abstract 250

11:15am **A Randomized Trial of Nebulized Hypertonic Saline for Bronchiolitis in the Emergency Department**
Todd A. Florin, Marlena Kittick, Kathy N. Shaw, Joseph J. Zorc. – Abstract 251

11:30am **Prescription Filling Practices after an Acute Emergency Department Visit for Asthma**
Margaret Wolff, Mary Ann Mazer, Joseph Zorc, Esther M. Sampayo. – Abstract 252

11:45am **Influenza (IV) Infection and Respiratory Syncytial Viral (RSV) Infection Can Be Distinguished Clinically in the Emergency Room**
Brian P. Wood, Howard Faden, Kathy Lillis, Haiping Qiao, Brian Wrotniak. – Abstract 253

Endocrinology & Obesity

9:45am-12:00pm **Minuet**

Moderator: Michael A. Levine, MD

9:45am **Ablation of Sim1 Neurons Causes Hyperphagia, Reduced Energy Expenditure and Obesity**
Dong Xi, Nilay Gandhi, Meizan Lai, Bassil Kublaoui – Abstract 254

10:00am **Addressing Obesity in Pediatric Inpatients: The Role of Electronic Medical Records**
Stephen DeMeo, David I. Rappaport. – Abstract 255

10:15am **Association of OGTT and Thyroid Function in Obese Adolescents**
Karen Estrella, Leslie Lam. – Abstract 256

10:30am **Sweet Surprise: The Impact of High Fructose Corn Syrup Ingestion during Childhood on the Development of Adult Obesity**
Shazia F. Bhat, Rebecca A. Simmons. – Abstract 257

10:45am **Racial and Insurance Disparities in Metabolic Control and Pump Starts for T1DM Children within Two Years of Diagnosis**
Thomas L. Wadzinski, Chris Jasinski, Paul Visintainer, Holley F. Allen, Ksenia N. Tonyushkina. – Abstract 258

11:00am **Hypertrophic Cardiomyopathy in Neonates with Congenital Hyperinsulinism**
Tingting Huang, Andrea Kelly, Susan Becker, Meryl Cohen, Charles Stanely. – Abstract 259

11:15am **Partial Nicotinic Acetylcholine Receptor Agonists Alter Epinephrine Responsiveness to Recurrent Insulin-Induced Hypoglycemic Stress: A Possible Translational Therapy for Diabetics**
Necla Kirtok, Bistra Nankova, Edmund F. La Gamma. – Abstract 260

11:30am **Age Modulates Parathyroid Hormone Levels in Obese Adolescents Regardless of 25OHD and BMI**
Emily Frydman, Chrystal Wittcopp, Holley F. Allen, Paul Visintainer, Nancy S. Dunbar. – Abstract 261

11:45am **Arginine and Levo-Dopa Stimulation in Children: Timing of Peak Growth Hormone Response and Correlation with Body Mass Index in Children**
Elizabeth M. Chacko, Evan Graber, Elizabeth Wallach, Molly Regelmann, Rachel Annunziato, Michelle Klein, Dennis Chia, Robert Rapaport. – Abstract 262

General Pediatrics II

9:45am-12:00pm **Concerto**

Moderator: Murli Purswani, MBChB

9:45am **Can a Home-Based Asthma Intervention Improve Parental Metered-Dose Inhaler Technique?**
Marina Reznik, Ellen J. Silver, Judith Wylie-Rosett. – Abstract 263

10:00am **Clinical Severity Scores for Bronchiolitis Lack Validity, Reliability and Responsiveness: A Systematic Review**
Nana A. Asabere, Todd A. Florin, Joseph J. Zorc. – Abstract 264

10:15am **Premature Infants and Respiratory Syncytial Virus: A Failure To Protect**
Robert W. Grundmeier, Annique K. Hogan, Dean J. Karavite, Lihai Song, Mark J. Ramos, James J. Massey, Russell Localio, Alexander G. Fiks. – Abstract 265

10:30am **Housestaff as a Vector: Bronchiolitis Management Guidelines Impact across Services and Disciplines**
Tamar Lubell, Ilyssa Goodman, Benard Dreyer, Elizabeth Fiorino, Gabrielle Gold-Von Simson, Sol Zimmerman, Bret A. Rudy, Shira A. Gertz, Rebecca E. Rosenberg. – Abstract 266

10:45am **Primary Care Screening for Sleep-Disordered Breathing in Children 4-17 Years**
Cecilia Godoy, Fanny Granse, Daniel Erichsen, John Axelsson. – Abstract 267

11:00am **Effectiveness of Forward Facing Child Restraint Systems**
Mark R. Zonfrillo, Kristy B. Arbogast, Michael J. Kallan, Dennis R. Durbin. – Abstract 268

11:15am **Comparing the Effectiveness of Automated Decision Support for Families, Clinicians, or Both on Human Papillomavirus (HPV) Vaccination Rates for Girls**
Alexander Fiks, Robert Grundmeier, Kristen Feemster, Dean Karavite, Stephanie Mayne, Lihai Song, Cayce Hughes, Jim Massey, Ron Keren, Louis Bell, Richard Wasserman, Russell Localio. – Abstract 269

11:30am **Empiric Antibiotics and Outcomes of Children Hospitalized with Eczema Herpeticum**
Paul L. Aronson, Albert C. Yan, Manoj K. Mittal, Zeinab Mohamad, Samir S. Shah. – Abstract 270

11:45am **HIV Testing Behavior in High-Risk Adolescents: Are Characteristics of the Sex Partner Relationship More Important Than Characteristics of the Individual?**
Hina J. Talib, Ellen J. Silver, Laurie J. Bauman, Susan M. Coupey. – Abstract 271

General Pediatrics - Medical Education & Quality Improvement

9:45am-12:00pm **Maestro B**

Moderator: Andrew D. Racine, MD, PhD

9:45am **Geographic Variation in Pediatric Hospital Costs**
Annemarie Stroustrup, Leonardo Trasande. – Abstract 272

10:00am **Resource Utilization for Observation-Status Stays at Children's Hospitals**
E. Fieldston, S. Shah, M. Hall, P. Hain, E. Alpern, M. Del Beccaro, J. Harding, M. Macy. – Abstract 273

10:15am **Attitudes, Practices, and Knowledge Regarding Pain Management in Patients with Intellectual Disabilities among Pediatric Residents and Pediatricians**
Carolina Cuba-Bustinza, Fernanda Kupferman, Elizabeth Cruz, Susana Rapaport, Louis Primavera, Jose Serruya. – Abstract 274

10:30am **Using the EMR To Examine the Impact of Possible Co-Morbid Conditions on Diagnosis of ADHD**
Lauren M. Daley, Steven K. Reader, Jennifer S. Pendley, Lloyd Werk. – Abstract 275

10:45am **"Helping Babies Breathe" Training Increases Neonatal Resuscitation Knowledge among Master Trainer Candidates in Ethiopia**
Rebecca Hoban, Ida Neuman, Minghua Chen, Sherri Bucher, Jonathan Spector. – Abstract 276

11:00am **Impact of a Community Violence Module on the Knowledge, Attitudes, and Behaviors of Pediatric Interns**
Mario Cruz, Daniel R. Taylor. – Abstract 277

11:15am **Pediatric Attending & Resident Knowledge of Hospital Finances for Inpatient Care**
T. Rock, R. Xiao, E. Fieldston. – Abstract 278

11:30am **Bronchiolitis Management in the Inpatient Setting: Are Pediatric Hospitalists Following the AAP Guideline?**
Marie-Astrid Lefebvre, JoAnna Leyenaar, Elisabeth Schainker. – Abstract 279

11:45am **Perceptions of Educational Experience and Inpatient Workload among Pediatric Residents**
D. Haferbecker, S. Medina, O. Fakeye, E. Fieldston. – Abstract 280

Neonatology - Clinical Studies II

9:45am-12:00pm **Overture**

Moderator: Vasanth H. Kumar, MD

9:45am **Pre-Oxygenation with 100% Oxygen Does Not Impact Time to Asystole in Newborn Piglets**
Bobby Mathew, Daniel D. Swartz, Jayasree Nair, Sylvia F. Gugino, Melissa F. Carmen, Lori Nielsen, Satyan Lakshminrusimha. – Abstract 281

10:00am **Do Valid Film Decision-Aids Inform Parents on Potential Outcomes of Extreme Prematurity without Creating Stress?**
Ursula Guillen, Sanghee Suh, Eileen Wang, Veronica Stickleman, Haresh Kirpalani. – Abstract 282

10:15am **Potential Alcohol Exposure from Inhalation in Low Birth Weight Infants**
Shiv Kapoor, Cynthia Bearer, Bruce Lippy, Leonard Burrelli. – Abstract 283

10:30am **Early Treated Hypotension and the Risk of Hearing Loss among Extremely Low Birth Weight Infants**
Semsa Gogcu, Lisa Washburn, Michael O'Shea. – Abstract 284

10:45am **EC-SOD Overexpression Protects Against Retinopathy of Prematurity (ROP) in Neonatal Mice**
Nahla Zaghloul, John Catanzaro, Hardick Patel, Arslan Arif, Champa Codipilly, Nasim Mansoor, Mohamed Ahmed. – Abstract 285

11:00am **Evaluation of the New Generation Dual-Lumen Catheter for ECMO**
Mariam M. Said, Oswaldo Rivera, Mikesell T. Gerald, Khodayar Rais-Bahrami. – Abstract 286

11:15am **Outcomes of Peripherally Inserted Central Catheters Related to Tip Location in Newborn Infants**
Jeanne Rorke, Laura Folk, Pam Kilcullen, Jayashree Ramasethu. – Abstract 287

11:30am **Quantitative Analysis of Endothelial Progenitor Cells (EPCs) in Very Low Birth Weight Newborns (VLBW) at Risk of Retinopathy of Prematurity (ROP)**
Kanayo Ezeanolue, Ranjan Monga, Felix K. Quist, Steven Buck, NItin S. Chouthai. – Abstract 288

11:45am **A View in the Vascular Endothelial Growth Factor (VEGF) in Preterm Neonates and Their Complications**
Victoria Lima, Maria de la Luz Sanchez-Tirado, Miguel Ramirez-Elias, Luzmila Martinez-Gonzalez, Angel Alpuche-Solis, Carolina Villegas-Alvarez, Francisco Javier Gonzalez. – Abstract 289

Poster Session Facilitators

Cardiovascular & Critical Care and Neurobiology:
Kate G. Ackerman and Jane E. McGowan

General Pediatrics and Infectious Diseases & Immunology:
Maida P. Galvez, Marietta Vasquez

Neonatology:
Lance A. Parton and David A. Paul

Emergency Medicine and Endocrinology & Obesity:
Kirsten Bechtel and Iraj Rezvani

General Pediatrics II and Gastroenterology/Hematology - Oncology/Nephrology/Nutrition:
Mariana Reznik and Ian Holzman

Neonatology:
Satyan Lakshminrusimha and Heather L. Brumberg

2011 ESPR Abstracts

Poster Session I

Cardiovascular & Critical Care

Friday, March 30, 2012
6:00pm-7:30pm

1

House Officer

Discrepant ECGs in the Pediatric Emergency Department

Danielle P. Federico, Katherine Miciak, Niket Shah, Ralynne Maitland, Marvin C. Culbertson, Harris Leopold, Sharon R. Smith.
Pediatrics, Connecticut Children's Medical Center, Hartford, CT; Molecular and Cell Biology, University of Connecticut, Storrs, CT.

BACKGROUND: Electrocardiograms (ECGs) are frequently performed in the pediatric Emergency Department (ED). An ED physician interprets the ECG in real time, and later an official cardiology interpretation is completed.

OBJECTIVE: To determine the frequency of discrepancies between ED and cardiology interpretations, and the incidence of significantly abnormal ECG findings requiring follow-up.

DESIGN/METHODS: A retrospective chart review of pediatric ED patients was conducted for all patients with an ECG ordered from 1/1/2010 to 12/31/2010. The study population included patients from birth until their 19th birthday. Data analyzed included chief complaint, discharge diagnosis, patient demographics, past medical history, and ED/Cardiology ECG interpretations. Discrepant ECG interpretations were reviewed by a pediatric Cardiologist, blinded to study objective, to determine if the patient required hospitalization, follow-up with a cardiologist, follow-up with a primary care physician or the patient did not require follow-up.

RESULTS: A total of 902 ED charts were audited, 5 were excluded for age, 10 did not include an image of the ECG, and 62 charts (6.9%) had no ECG interpretation. Children had a mean age of 11.8 years (SD 4.7). Of the charts reviewed, 55% patients were female, 46% Caucasian, 28% Hispanic, and 17% African American. Insurance status was 4.8% self-pay, 53.5% public insurance, and 41.7% private insurance. Most frequent chief complaints were syncope (23.9%) and chest pain (22.1%). Congenital cardiac history was noted in 9.5% of patients, acquired cardiac history was noted in 2.5%, and significant cardiovascular family history was in less than 1%. Of the 897 children, abnormalities were seen in 17.2% of ECGs (154) and discrepancies between the ED and cardiologist interpretation occurred in 4.6%. Significant discrepancies were found in 3.3% (30). The most common discrepancies were ED "normal" but with an abnormal cardiologist interpretation (56.7%), QTc prolongation (46.7%), and abnormal voltages/RVH/LVH (40.0%). No patient with a significant discrepancy required emergent evaluation. A positive cardiovascular history or an abnormal ED ECG interpretation was a significant predictor for discrepant ECG interpretations between ED physicians and cardiologists ($P<0.05$).

CONCLUSIONS: Discrepancies between ED and cardiology interpretations of pediatric ECGs were low (<5%) and significant abnormalities were even lower (3.3%).

2

Corticosteroid Therapy in Critically Ill Pediatric Asthmatic Patients

John S. Giuliano, Jr., E. Vincent S. Faustino, Simon S. Li, Matthew G. Pinto, Michael S. Canarie, Christopher L. Carroll.
Pediatrics, Yale University School of Medicine, New Haven, CT; Pediatrics, New York Medical College, Valhalla, NY; Pediatrics, Tufts School of Medicine, Springfield, MA; Pediatrics, Connecticut Children's Medical Center, Hartford, CT.

BACKGROUND: The 2007 National Heart, Blood, Lung Institute (NHBLI) guidelines recommended using an oral corticosteroid dose of 1-2 mg/kg/day in 2 divided doses to treat hospitalized children with asthma. However, there were no specific recommendations made pertaining to patients admitted to the pediatric intensive care unit (PICU).

OBJECTIVE: To determine current asthma corticosteroid dosing preferences in PICUs within North America.

DESIGN/METHODS: We conducted a cross-sectional self-administered survey of pediatric intensivists working in the United States and Canada. Surveys were sent to PICU clinical directors or section heads and forwarded to their respective staff.

RESULTS: A total of 104 intensivists completed the survey. Of these, 70% worked in the United States, 67% attended in PICUs with at most 20 beds, and 79% had more than 10 years of PICU experience. The majority of asthmatics were admitted to PICUs based on clinical asthma exam/score or because the patient was receiving continuous albuterol. Of those who responded, 73% stated that they were aware of the NHBLI guidelines. Intravenous methylprednisolone is prescribed by the large majority of intensivists (96%) compared to 4% who use other corticosteroids. Of those who prescribe methylprednisolone, 65% use a starting dose of 4 mg/kg/day, whereas 32% use a starting dose of 2 mg/kg/day, and only 3% use 1 mg/kg/day. The large majority of respondents (84%) use "clinical experience" as their rationale for this dosage. Fewer identified "literature review" (23%) or "unit policy" (7%) as the source of this dosage. In multivariate logistic regression analysis, only knowledge of the NHBLI guidelines was an independent predictor of prescribing an initial corticosteroid starting dose of 4 mg/kg/day (OR 3.69, CI 1.26-10.80; p=0.017). Country of practice, years of experience and size of PICU were not associated with corticosteroid dosing preference.

CONCLUSIONS: Most intensivists administer methylprednisolone to critically ill asthmatics at a dose 2-4 times higher than recommended by the NHBLI guidelines. The rationale for these decisions is likely multifactorial, but in this relatively large cohort of experienced intensivists and in the absence of evidence-based data, most cite clinical experience as their deciding factor. Clearly, future research is needed to determine the most appropriate corticosteroid dosage in this critically ill patient population.

3

Undergraduate Student

Reliability of Left Ventricular Hypertrophy by EKG Criteria in Children with Syncope: Do the Criteria Need To Be Revised?

Maalika M. Banerjee, V. Ramesh Iyer, Victoria Vetter, Anirban Banerjee.
Cardiology, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: In out-patient setting or in Emergency department, children who present with syncope routinely undergo electrocardiograms (EKG). It is accepted clinical practice that, in setting of syncope if EKG manifests left ventricular hypertrophy (LVH), an echocardiogram (echo) is invariably performed, to rule out conditions causing causing LVH (e.g. hypertrophic cardiomyopathy).

OBJECTIVE: Our goal was to evaluate need for echo, in children with syncope as well as LVH diagnosed by EKG. We hypothesised that Davignon criteria for EKG interpretation, overestimate LVH & an echo may be unnecessary.

DESIGN/METHODS: A retrospective analysis of database of Children's Hospital of Philadelphia, between 2002-2011 was performed. Children between 10-18 years, who presented with syncope, had LVH by EKG & also underwent an echo, were included. Criteria for LVH were, R wave in V6(RV6) or S wave in V1(SV1) or Q wave in V6, exceeding 98th percentile of Davignon criteria. Exclusion criteria: presence of ST-T wave changes & prolongation of QTc interval in EKG. Linear regressions between EKG & echo parameters of LVH were performed.

RESULTS: 121 patients were identified, 70 caucasians, 43 African-Americans and 8 were of other races. Median age was 13.1 years, 45% were males. None of 121 patients manifested evidence of left ventricular hypertrophy (including hypertrophic cardiomyopathy)by echo. The average z score of ventricular septum was -0.5±1.5 & that of LV posterior wall was -0.7±1.4. LV mass indexed for height $^{2.7}$ was comparable to normal pediatric population (34.1±11.3 g/m). The correlations between RV6 and LV mass indexed for height$^{2.7}$ and LV mass indexed for body surface area, were very poor (R^2= 0.0048 and R^2= 0.0163 respectively). Correlations between RV6+SV1 and measures of indexed LV mass were equally poor.

CONCLUSIONS: Davignon criteria for LVH in children are not sensitive & tend to overdiagnose LVH. We conclude that yield of screening echocardiograms in patients with syncope and clear-cut EKG evidence of LVH, is low and failed to detect any serious cardiac condition in this group of patient. We propose that Davignon criteria for interpreting LVH in children tends to overestimate degree of hypertrophy and present day tendency to perform echocardiograms in this group of patients is not justified. The EKG criteria for LVH needs revisiting in order for EKG to be a cost-effective, reliable screening tool for syncope.

4

House Officer

Accuracy of Prenatal Echocardiograms in Predicting Coarctation of the Aorta

Joanne S. Chiu, Daniela Y. Rafii, Mary J. Ward, Sheila J. Carroll.
Komansky Center for Children's Health, New York Presbyterian Hospital, New York, NY; Department of Pediatrics, Weill Cornell Medical College, New York, NY; Pediatrics, Maimonides Infants and Children's Hospital of Brooklyn, Brooklyn, NY.

BACKGROUND: Prenatal diagnosis of isolated coarctation of the aorta is fraught with a high false positive rate. False positives cause undue stress on families, but a missed diagnosis of coarctation can have catastrophic consequences. For these cases, data on specificity and sensitivity of echocardiographic measurements in diagnosing prenatal coarctation of the aorta are limited.

OBJECTIVE: Assess the accuracy of fetal echocardiograms in diagnosing coarctation of the aorta.

DESIGN/METHODS: A retrospective chart review was conducted of subjects with a prenatal echocardiogram from April 2007 to July 2009. Indication for echo, gestational age and finding of each prenatal echo, and postnatal diagnosis based on echo were recorded. Classification of 3 grades of prenatal diagnosis was made, as outlined in the table below.

RESULTS: 1415 charts were reviewed yielding 46 qualifying subjects with documented suspicion of isolated coarctation of the aorta in the echo report. Subjects lost to clinical follow-up (n=4) were excluded. Five pregnancies were terminated and there was 1 fetal and 1 neonatal demise. 35 subjects received postnatal diagnoses.

	Postnatal Outcome	
Prenatal Category	No Coarctation (n=32)	Coarctation (n=3)
Grade 1 - Very Low suspicion (n=22)	22	0
Grade 2 - Moderate Suspicion (n=9)	8	1
Grade 3 - High Suspicion (n=5)	2	2

Grade 1 and 2 vs. Grade 3: OR = 30.0, $p < .05$

Subjects classified as Grade 1 and 2 based on echo reports were significantly less likely (30 of 31 cases: 97%) to have coarctation of the aorta compared to those in the Grade 3 category (2 of 4: 50%). The specificity and negative predictive value of prenatal echo classification were high: 97% and 97%, respectively. The sensitivity and positive predictive value were lower: 67% and 50%, respectively, given the low number of postnatal cases. Outcome showed no correlation with gestational age of first prenatal echo.

CONCLUSIONS: Prenatal echocardiograms classifiied Grade 1 (low-risk) were accurate predictors of no coarctation of the aorta. Conversely, echocardiograms classified Grade 3 were associated

with postnatal diagnoses of coarctation of the aorta. These data suggest that echocardiographic measurements and methodology currently used in prenatal identification of coarctation are relatively effective in predicting postnatal diagnosis of coarctation. Additional research should identify the specificity and sensitivity of detailed prenatal echocardiographic parameters for postnatal coarctation of the aorta.

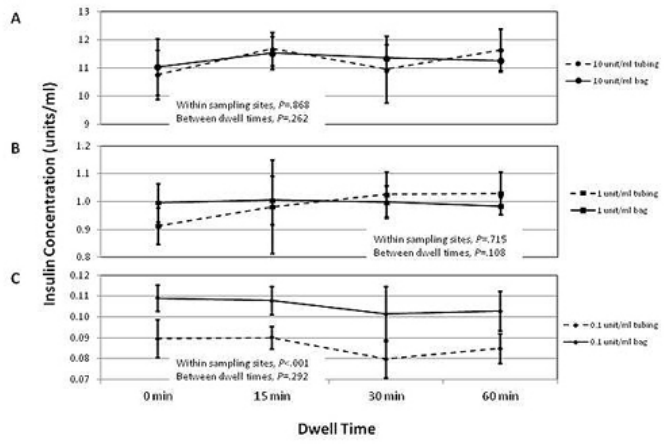
5

Fellow in Training

Effect of Dwell Time on Insulin Infusion Delivery

Cecilia D. Thompson, Jessica Vital-Carona, E. Vincent S. Faustino.
Department of Pediatrics, Yale University School of Medicine, New Haven, CT; Department of Pharmacy, Yale New Haven Hospital, New Haven, CT.

BACKGROUND: Insulin adsorbs to polypropylene tubing. Dwelling insulin in tubing before initiating an infusion decreases adsorption. The lack of data on the effect of dwell time results in wide variability of practice, wastes time in infusion preparation, and delays treatment initiation.
OBJECTIVE: Determine the effect of dwell time on insulin adsorption in polypropylene infusion sets.
DESIGN/METHODS: In this *in vitro* study, we prepared insulin solutions with concentrations of 0.1unit/mL, 1 unit/mL and 10 unit/mL. Separate polypropylene infusion sets were used for each dwell. Each solution dwelled in tubing for 0, 15, 30 and 60 minutes. After the allotted dwell, we flushed 20 mL of solution through the tubing and then simultaneously collected 1 mL samples from the tubing and solution bag. Insulin concentration was measured using double antibody radioimmunoassay. We repeated each insulin concentration-dwell time combination 5 times. Comparisons were performed using 2-way ANOVA with repeated measures.
RESULTS: The mean insulin concentration from the solution bags was similar across dwell times and closely approximated the desired concentrations.



Relationship of insulin concentration and dwell time. Panel A 10 unit/ml, Panel B 1 unit/ml, Panel C 0.1 unit/ml

The trajectories of the insulin concentration from the tubing were different. For insulin at 0.1 unit/ml, the mean tubing concentration was approximately 82±5% of the bag at all time points. For insulin at 1 unit/ml, the mean tubing concentration was 92±10% at 0 minutes, 97±12% at 15 minutes and 103±9% at 30 minutes. The difference in tubing concentrations between dwell times was not significant (P=.108). For insulin at 10 unit/ml, the mean tubing concentration was 100±9% for all time points.
CONCLUSIONS: At each concentration tested, dwell time did not affect insulin adsorption in polypropylene infusion sets. Following a 20 ml flush, we recommend no dwell time prior to initiating insulin infusions. We did not test concentrations between 0.1 and 1 unit/ml. Based on trajectories, dwell times may be important for solutions between these concentrations. Clinically, concentrations between 0.1 and 1 unit/ml are not commonly used.

Poster Session I
General Pediatrics

Friday, March 30, 2012
6:00pm-7:30pm

6

Correlates of Depressive Symptoms in Urban Latino Adolescents

John Rausch, Patricia Hametz, Rachel Zuckerbrot, Karen Soren.
Pediatrics, Division of Child and Adolescent Health, Columbia University Medical Center, New York, NY; Psychiatry, Division of Child and Adolescent Psychiatry, Columbia University Medical Center/New York State Psychiatric Institute, New York, NY; Department of Population and Family Health, Mailman School of Public Health, New York, NY.

BACKGROUND: There is limited data on adolescent depression in Latino populations. The few studies that have been conducted have shown variable prevalence rates.
OBJECTIVE: To examine prevalence of and socio-demographic variables associated with depressive symptoms in Latino adolescents.
DESIGN/METHODS: A depression screening study was conducted at a large academic medical center which serves a mostly Latino, Dominican community. The Columbia Depression Scale (CDS) was used to provide a measurement of depressive symptoms. It includes 21 yes/no items with each yes answer contributing 1 point to the total score. An individual scoring ≥12 likely has depression. We conducted bivariate linear regression models with CDS as a continuous variable and assessed the impact of gender, age, ethnicity, language spoken, provider, site, visit type (sick vs. well,) previous mental health care, and having past or present thoughts of death or suicide. We constructed a multivariate linear regression model with all factors that were significant on bivariate analysis.
RESULTS: There were 636 participants who were mostly Latino and publicly insured with 8% of patients having a CDS 12. On bivariate analyses, a history of past mental health treatment, speaking English, female gender, and answering yes to any question regarding death or suicide were all significantly associated with increasing CDS score. All the previous listed factors remained significantly associated with depressive symptoms in the multivariate model (Table 1).

Table 1: Linear Regression Model of CDS Score

	Adjusted Odds Ratio	95% Confidence Interval
Female	2.4	1.5-3.8
Spanish-Speaking	0.3	0.1-0.8
History of Past Mental Health Treatment	14.0	1.4-134.1
Answering Yes to ANY Question Regarding Death or Suicide	102.2	5.0-2,085

CONCLUSIONS: In our mostly Latino, Dominican population, we found that females, those mentioning previous or current thoughts of death, and those previously in mental health care were more likely to report higher levels of depression symptoms, highlighting the importance of closely screening these groups for depression. Also, we noted that adolescents who spoke Spanish had a significantly lower rate of depressive symptoms than English speakers. These Spanish speakers were more likely to be recent immigrants. Further studies are needed to see if this represent truly lower rates of depression or might indicate that different screening tools may be required in this population.

7

Fellow in Training

Cyclopedia: Empowering Urban Adolescents through Community-Based Programming (Pilot)

Cappy Collins, Marc Lavender, Shawn Brown, C. Andrew Aligne.
Preventive Medicine, Mount Sinai School of Medicine, New York, NY; Medicine, University of Rochester, Rochester, NY; Rochester Boys and Girls Club, Rochester, NY; Pediatrics, University of Rochester, Rochester, NY.

BACKGROUND: Urban, low-income and minority populations are disproportionally affected by numerous serious preventable diseases. For example, urban adolescents manifest poorer school performance and higher rates of obesity. Effective community-based positive youth development (PYD) initiatives prevent multiple problems by addressing their psychosocial root causes. However little is known on how to cost-effectively initiate and sustain such interventions.
OBJECTIVE: To determine the feasibility of a bicycling-focused PYD program partnering academic and community stakeholders.
DESIGN/METHODS: Cyclopedia's core partnership is between the University of Rochester's pediatric resident advocacy program (PLC/CARE) and the Boys and Girls Club of Rochester, NY. Content is structured around a PYD strategy that combines physical activity, team-building, education and creative self-expression in a 12 week program of rides.
RESULTS: In two years Cyclopedia has expanded from 18 to 30 participants (comprising boys and girls groups and a separate program for younger children). Participants have generated hundreds of photographs and written reflections in the process of riding over 1800 miles across more than 180 hours of programming time spent learning about their community. New partnerships are with local businesses, community organizations, educators and advocacy groups, along with community volunteers. Program costs are small with about $75 spent per participant/year. Participants' creative output can be viewed at www.cyclo-pedia.org; qualitative analysis reveals increased geographic awareness, physical activity and confidence.
CONCLUSIONS: Delivery of PYD content to an under-served adolescent population through partnership between academic and community stakeholders appears feasible and affordable. Bicycling, as a programmatic vehicle, appears to engage participants as demonstrated by increasing enrollment and volume of creative output and may increase empowerment by qualitative measures. Phase two of Cyclopedia will be an investigation of the program's efficacy in improving adolescent health through evaluation of metrics relating to physical fitness, obesity, school performance and social connectivity, as compared to controls.
Cyclopedia was funded in part by an AAP resident CATCH grant.

8

House Officer

Parental Perception of the Utility of the PEDS Questionnaire

Claudia G. Lares, Lina Huerta-Saenz, Michelle King, Michael J. Janeczko.
Pediatrics, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: The Parental Evaluation of Developmental Status (PEDS) questionnaire is a validated 10-item questionnaire that elicits parental concerns in multiple developmental areas. Little is known about how caretakers in minority populations perceive this tool to assess normal development.
OBJECTIVE: To survey caretaker's perceptions about the usefulness of the PEDS questionnaire to assess child development and self-evaluation regarding child development knowledge.
DESIGN/METHODS: We conducted a cross-sectional survey of a convenience sample at a resident's continuity clinic at an academic community center in Philadelphia, PA. Inclusion criteria were: 1) Caretaker aged ≥18years 2) Child aged 2m-8years 3) Caretaker completed at least one PEDS survey at a previous visit. Data were analyzed with Pearson Chi-square. The study was approved for exempt status by the IRB.
RESULTS: A total of 421 caretakers were approached, 269 met criteria, 231 were enrolled and 38 refused. Most caretakers felt confident with their level of knowledge about child development (36% average, 51% enough, 5% experts). The educational level of the caretakers was significantly associated with their self-assessment of child development knowledge (p=0.006). The majority (79%) reported the purpose of the PEDS was explained to them, and 78% felt that completing the PEDS form was easy/ very easy. Two thirds (65%) felt the PEDS was helpful to identify problems in their child's development and 30% felt it was somewhat helpful. Half (53%) reported concerns in the PEDS, but a third (29%) of these reported the concerns were not addressed by the provider.

Most (74%) caretakers were satisfied with the PEDS. Many parents commented that "the PEDS questions were too broad and should be age specific". The majority (90%) agreed that, in addition to PEDS, a checklist could be helpful in understanding their child's development.
CONCLUSIONS: Overall caretakers felt the PEDS was an easy tool to assess child development. However, a third felt the PEDS alone was not enough to identify problems in their child's development and another third felt that their concerns had not been adequately addressed. These findings should encourage healthcare providers to address parental developmental concerns and provide additional tools to improve parental understanding about normal development. An additional developmental checklist may help address this need.

9

House Officer

Breastfeeding among Inner City Women: From Intention before Delivery to Breastfeeding at Hospital Discharge

Shilpa G. Hundalani, Matilde Irigoyen, Ramesh Matam, Stefan Mandakovic-Falconi.
Pediatric & Adolescent Medicine, Albert Einstein Medical Center, Philadelphia, PA.
BACKGROUND: Studies have examined the relationship between intention to breastfeed and actual breastfeeding at one week of age. However, little is known about breastfeeding patterns - from intention to actual practice - in the immediate postpartum period, the most vulnerable period of breastfeeding initiation.
OBJECTIVE: To assess the degree to which a woman's intention to breastfeed prior to delivery translates to actual breastfeeding at the time of hospital discharge and to investigate predictors of breastfeeding in a minority inner city population.
DESIGN/METHODS: Retrospective cohort study of consecutive mother-infant dyads born 7/10-9/10 and discharged from the nursery at an academic community hospital in Philadelphia, PA. We used a multivariable ordinal logistic regression model with the outcome variable having 3 ranks: formula feeding (no breastfeeding), breastfeeding plus formula, and breastfeeding exclusively.
RESULTS: 578 women participated: mean age 25.3 years (SD 6.1), 61% African American, 18% Latina; 85% Medicaid, average postpartum hospital length of stay 2.3 days. Overall 60% of women expressed an intention to breastfeed prior to delivery (exclusively or with formula) but only 50% were breastfeeding at discharge. Of the women intending to breastfeed (exclusively or with formula), 75% were breastfeeding at discharge compared to 11% of women intending to bottle feed. Of the women intending to *exclusively* breastfeed, 40% were doing so at discharge. In multivariable analysis, older mothers and those with lower parity (both $p<0.001$) were more likely to breastfeed at discharge and also to breastfeed exclusively, controlling for ethnicity, *parity*, insurance, pregravida body mass index (BMI), and score on the Edinburgh Postpartum Depression Scale (EPDS), type of delivery, infant birth weight and gestational age.
CONCLUSIONS: In a minority inner city population, only three in four women with intention to breastfeed prior to delivery were breastfeeding at discharge from the hospital. However, one in ten women previously not intending to breastfeed did so. Strategies are needed to promote and strengthen women's intention to breastfeed and to provide professional and social support in the immediate postpartum period.

10

House Officer

Postpartum Depression and Breastfeeding in an Inner City Population

Shilpa G. Hundalani, Stefan Mandakovic-Falconi, Ramesh Matam, Matilde Irigoyen.
Pediatric & Adolescent Medicine, Albert Einstein Medical Center, Philadelphia, PA.
BACKGROUND: Rates of initiation of breastfeeding (BF) in minority inner city populations are in the 50% range, well below Healthy People 2020 goal of 82%. Maternal depression has been shown to adversely affect breastfeeding.
OBJECTIVE: To examine the association of a positive screen for postpartum depression with intention to breastfeed and actual breastfeeding at hospital discharge among minority inner city women.
DESIGN/METHODS: We conducted a retrospective cohort study of consecutive mother-infant dyads born July-September 2010 and discharged from the nursery at an academic community hospital in Philadelphia, PA. The mother's intent to breastfeed was ascertained prior to delivery. On day 2 postpartum, all women were screened for depression with the Edinburgh Postnatal Depression Scale (EPDS). An EPDS score >9 is considered a positive screen for depression. Outcome measures were intent to breastfeed and breastfeeding at discharge.
RESULTS: The study population included 657 mothers: 18% ≤19 yrs, 24% ≥30 yrs; 60% were African American, 18% Latina; 85% had Medicaid. Median EPDS score was 4; 12% screened positive for depression.

Intent to Breastfeed and Breastfeeding at Discharge

	All Women N=657	Screen Negative for Depression	Screen Positive for Depression
Intent to BF (any)	60%	62%	46%
Intent to BF Exclusively	48%	49%	36%
Intent to Breast + Formula	12%	13%	10%
BF at discharge	50%	51%	39%
BF Exclusively at discharge	21%	22%	13%
Breast + Formula at discharge	29%	29%	26%

26%Women who screened positive for depression had lower intent to breastfeed ($p=0.009$) and were less likely to breastfeed at discharge ($p= 0.034$). After controlling for ethnicity, age, parity, pregravida BMI, and insurance, screening positive for depression was no longer significant ($p=0.065$).
CONCLUSIONS: Strategies are needed to promote breastfeeding prenatally and postpartum for all women, regardless of their score in their postpartum depression screener.

11

House Officer

First Contact: Parental Knowledge and Attitudes Regarding Childhood Vaccines in the Newborn Nursery

Francisco J. Silva, Sandy Ricks, Brian Lurie, Ben H. Lee.
Pediatrics, Goryeb Children's Hospital, Atlantic Health System, Morristown, NJ; MidAtlantic Neonatology Associates, Goryeb Children's Hospital, Atlantic Health System, Morristown, NJ.
BACKGROUND: Despite the debunking of the vaccine-autism link, parental concern regarding childhood vaccines persist. General pediatricians (GPs) are increasingly challenged by increasing time needed to counsel parents as well as ensuring compliance with immunization schedules. The newborn nursery may provide a key intervention point for health care staff to improve parental knowledge and attitudes regarding childhood vaccinations.
OBJECTIVE: To assess the knowledge and attitudes of parents in the newborn nursery towards vaccine safety, vaccine effectiveness, and standard immunization schedules.
DESIGN/METHODS: Parents of newborn infants born between 12/1/10 and 5/1/11 at a single hospital were passively surveyed by an anonymous questionnaire distributed in the standard vaccine information/consent packet of the newborn nursery. Surveys were collected via drop box and the data abstracted for analysis. IRB approval was obtained for this study.
RESULTS: During the study period, 1424 mothers delivered infants admitted to the newborn nursery; 122 completed surveys were returned. Of the respondents, 43% were first time parents, 65% were white, 11% were hispanic, 8% were black, and 87% were college graduates.
Overall, 86% strongly agreed that vaccines "help to keep children healthy" but 8% denied that vaccine-preventable deaths occurred in the US. There was also a lack of knowledge of certain types of vaccines, particularly diarrheal (80%), meningococcal (33%), whooping cough (16%), and mumps (8%); 96% knew of the measles vaccine.
Approximately 40% expressed concerns regarding vaccines for their child and only 75% strongly agreed that vaccines were safe for their own child: 31% felt that vaccines could cause autism and 23% strongly felt that "too many" vaccines could overwhelm the immune system. Forty-four percent strongly felt that the immunization schedule should be flexible and 25% strongly agreed that ther GP should customize the schedule for their infant; only 20% strongly agreed that prolonging the schedule would increase the risk for childhood diseases.
CONCLUSIONS: In this educated population, parental knowledge of certain vaccines was poor and anxiety regarding vaccine safety remained high with a significant demand for customized, prolonged immunization schedules. Parental education in the newborn nursery will be increasingly important to address these concerns and prevent reduced compliance with immunization schedules.

12

House Officer

Post Partum Depression and Emergency Department Use in Young Infants

Amit Mukhia, Meyrick Sarmiento, Maheswari Ekambaram, Johelin DeFreitas Hernandez, Matilde Irigoyen.
Pediatric & Adolescent Medicine, Albert Einstein Medical Center, Philadelphia, PA.
BACKGROUND: Multiple studies have shown high rates of Emergency Department (ED) use in urban minority populations. Previous studies of national samples in the 1990's have shown infants of mothers with post partum depression (PPD) had increased ED visits. Little is known about this association in different population groups.
OBJECTIVE: To determine the association between maternal PPD, measured by postpartum EPDS, with ED use in an urban minority population.
DESIGN/METHODS: We conducted a retrospective cohort of mother – infant dyads of infants born 7/10 -9/10 and discharged from the term nursery at an academic community hospital in Philadelphia, PA. Mothers were screened for depression with the Edinburgh Post Partum Depression Screen (EPDS), a valid and reliable screener, prior to discharge. An EPDS score of >9 was deemed a positive screen. Mothers with a positive screen were referred for services. We collected information on ED visits in the first 3 months of life.
RESULTS: A total of 663 mother – infant dyads were included. The mothers' mean age was 25.3 years, 61 % were African American , 18% Latina, 12% White, 85% had Medicaid. The mean parity was 1.15, and 68% delivered vaginally. Infants' mean gestational age was 39 weeks and mean birth weight was 3194 grams. The mean EPDS screen was 4.7 (SD 4.1) and 11.9% (79/663) of women had a positive screen. Among mothers who made no ED visits the mean EPDS score was 4.7 compared to 4.6 among those with 1 visit and 5.4 with 2 or more visits ($p = 0.92$). Mothers with a positive screen had a lower use of the ED (5/79, 6.3%) for their infants compared to mothers with negative screen (55/584, 9.4%), but this difference was not statistically significant ($p=0.996$)
CONCLUSIONS: In this urban minority population we did not find a significant association between maternal post partum depression, measured by postpartum EPDS, with ED use among young infants. Scoring by EPDS does not predict ED use, other factors beyond maternal depression must be considered to identify dyads at risk.

13

House Officer

Maternal EPDS and Its Impact on Routine Primary Care for the Infant and Utilization of Outpatient Health Care Services

Meyrick Sarmiento, Amit Mukhia, Johelin De Freitas Hernandez, Maheswari Ekambaram, Matilde Irigoyen.
Pediatric & Adolescent Medicine, Albert Einstein Medical Center, Philadelphia, PA.
BACKGROUND: Post partum depression (PPD) is a frequently encountered complication, with a prevalence of 11-32%. Infants of mothers with PPD are at increased risk for poor preventive care.
OBJECTIVE: To determine the relationship between PPD, measured by post partum EPDS, with young infants' use of primary care and health outcomes in an urban minority population.

DESIGN/METHODS: We conducted a retrospective cohort of mother – infant dyads of infants born 7/10 – 9/10 who were discharged from the term nursery and followed up at the residents' continuity clinic at an academic community hospital in Philadelphia, PA. Mothers were screened for depression with the Edinburgh Post Partum Depression Screen (EPDS), a valid and reliable screener, prior to discharge. An EPDS score of >9 was considered a positive screen. Data was collected from the infants' charts for the first 3 months of life. The outcome measures were: 1) Well child care: ≥2 visits; 2) Timeliness of immunization: receipt of 1st vaccine series; 3) Infant growth: weight gain of ≥20grams/day; 4) Sick visits to the continuity clinic : Yes/No ; and 5) Parental developmental concerns, as per the Parents Evaluation of Developmental Status (PEDS): Yes/No.

RESULTS: A total of 127 out of 663 mother – infant dyads were eligible and included in the study. The mothers' mean age was 24 years, 84 % African American, 10% Latina, 4% White and 90% had Medicaid managed care and were capitated to the clinic. All infants were term. Of the study population 16.5% (21/127) had a positive EPDS screen.

Outcome Measures	Infant of mothers with positive EPDS	Infant of mother with negative EPDS	p = value
Well child care: ≥2 visits	80.9% (17/21)	78.3% (83/106)	0.72
Timeliness of immunization: received 1st vaccine series within 3 months of age	85.7% (18/21)	86.7% (92/106)	0.815
Infant growth: weight gain ≥ 20grams/day	85.7% (18/21)	92.4% (98/106)	0.316
Sick visits: Yes	47.6% (10/21)	38.6 (41/106)	0.445
Parental Concern on the PEDS: Yes	4.7% (1/21)	4.7% (5/106)	0.993

CONCLUSIONS: Our study did not show the anticipated relationship between post partum depression, measured by post partum EPDS, with young infants use of primary care and health outcomes in our population. Perhaps the thresholds for determining post partum depression by EPDS needs to be re-evaluated in high risk urban populations.

14

Pediatric Resident Perceptions of the 2011 RRC Proposed Guidelines

Anna Marie Carr, Ishminder Kaur, Matilde Irigoyen.

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BACKGROUND: In July 2011, the Pediatric RRC proposed new guidelines for pediatric residency training including an individualized 6 month curriculum, limitation of inpatient rotations, increase in emergency medicine (ED) rotations, greater flexibility in the number of critical care and elective rotations, and changes in procedural competency. The RRC has solicited feedback from residency programs.

OBJECTIVE: To assess the opinion of pediatric residents on the 2011 proposed RRC guidelines for residency training.

DESIGN/METHODS: Pediatric residents at an urban academic medical center were invited to participate in an anonymous on-line survey. We explored their opinion regarding the ideal number of rotations for inpatient, ED and critical care. In the area of procedural competency, we asked residents to rate the importance of newborn endotracheal intubation proficiency. We also asked them to rate options for developing an individualized curriculum. Responses used a 3-5-point Likert scale and open-ended formats.

RESULTS: 29/32 residents (91%) responded to the survey. Regarding inpatient rotations, 53% felt the proposed minimum of 10 was ideal, 42% favored the proposed maximum of 16, only 5% favored 20 rotations (above the RRC recommendation). Regarding NICU, half (53%) felt the 3 current rotations were ideal, 42% wanted 4, 5% wanted 5. Regarding ED rotations, 93% of residents favored the current guidelines of 2 ED rotations but 76% also favored a flexible combination of ED and ambulatory rotations based on resident choice and program resources. Regarding proposed changes in resident competency for newborn endotracheal intubation, nearly two thirds (62%) felt achieving proficiency, not just exposure, was highly important/critical and 32% felt exposure alone was adequate. Regarding the options for development of the 6 month individualized curriculum, nearly two thirds (63%) preferred choosing from specifically focused tracts, for example, neonatology, primary care or hospital medicine and one third (37%) preferred an individualized plan.

CONCLUSIONS: Overall residents were aligned with the proposed RRC changes to guidelines for residency training, with the exception of increasing ED rotations. A majority did not favor more inpatient or NICU months above the proposed guidelines. Regarding the 6 months individualized curriculum, an acceptable option appears to be offering specifically focused tracts.

15

Moved to Abstract 211

16

The General Pediatrician Subspecialist: A New Model for Improving Patient Access

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BACKGROUND: Access to pediatric gastroenterology (GI) care is a national challenge; patients seeking treatment for constipation, reflux, and chronic abdominal pain can wait months for new appointments. As part of an Access Initiative, beginning January 2011, we modified existing templates to preserve new "access" appointments to be scheduled within 5 days. Meetings among subspecialists, academic and community general pediatricians, and our family advisory council guided the development of a new Access Center. In September 2011, a general pediatrician began to see new access patients for a pre-established list of GI complaints.

OBJECTIVE: Test the impact of the GI Access Initiative on new patient 1) access; 2) satisfaction; 3) need for additional GI care.

DESIGN/METHODS: To measure access to new appointments, 2 "mystery shopper" calls were made monthly, beginning January 2011. Each caller presented 1 of 5 common GI new patient scenarios and recorded the number of days until the earliest offered appointment. Beginning October 2011, caregivers were asked to complete a 3-item survey after each access visit to assess: 1) overall satisfaction (Likert 1-5); 2) satisfaction with time with the provider; 3) open-ended feedback. A log was kept of all patients requiring further GI care.

RESULTS: Number of days to new appointment was 26 in January, peaked at 61 in June, and was 3 or fewer in August, September, and October. 148 new access patients were surveyed, 125 (84%) completed the survey. 97% were very satisfied; 3% were satisfied with the visit. 54% responded that more than enough/extra time was spent; 46% responded that appropriate/reasonable time was spent. Patient comments (n=72, 58%) addressed the following themes: general satisfaction ("everything was good;" n=48), satisfaction with wait time/time spent ("short wait, extensive time;" n=5), thoroughness of the evaluation ("answered all our questions thoroughly;" n=8), knowledge of the doctor ("doctor was knowledgeable and informative;" n=6), constructive feedback ("better robes;" n=5). Of the 291 new access patients seen by the pediatrician, 9 (3%) required subsequent GI subspecialist consultation and 22 (8%) required a procedure (endoscopy, breath test).

CONCLUSIONS: The GI Access Initiative improved patient access with high patient satisfaction and decreased the demand for GI subspecialist evaluation. This model of care is promising for institutions seeking to improve access to subspecialty care.

17

The Impact of Limited English Proficiency on Asthma Action Plan Use

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BACKGROUND: In the United States, Spanish speaking families with limited English proficiency (LEP) face health care disparities. For LEP caretakers of children with asthma, communication barriers contribute to disparate asthma care. There is a paucity of research on how language proficiency affects asthma action plan utilization by LEP caretakers of children with asthma.

OBJECTIVE: The goal of this study is to identify the asthma action plan use rates by Spanish speaking LEP caretakers and compare it to the use rates by English proficient (EP) caretakers.

DESIGN/METHODS: A cross-sectional survey study with prospective enrollment was carried out in an urban, pediatric emergency department (PED) at an academic children's hospital with an annual census of 35,000 visits. A convenience sample of caretakers with a child between the ages of 1-17 years and a known diagnosis of asthma were approached for participation. Participants completed an anonymous, self-administered survey if they were seeking care for an asthma related complaint. Using the standard criteria employed by the U.S. Census Bureau, LEP was defined as an individual's ability to speak English less than "very well". Additional demographic data was obtained including relationship to patient, race and ethnicity, type of health insurance, level of education and location of primary care provider. A sample asthma action plan was attached to the end of the survey for parents to review. Surveys were available in English and Spanish. Categorical data was analyzed with a 2x2 contingency table using a Fisher's exact test for small sample sizes.

RESULTS: To date, 91 subjects have been approached, enrolled and 91 surveys completed and analyzed. Surveys were completed by mothers (88%), fathers (9%) and other caretakers (3%). The median age of the children with asthma was 4 years (14 months - 16 years). A local primary care center was identified 96 % of the time. 36/91 of the respondents (40%) had some degree of LEP. Survey responses showed that 36/55 EP caretakers (65%) and 14/36 LEP caretakers (39%) utilize an asthma action plan for their child (p=0.02).

CONCLUSIONS: Our findings suggest that disparate rates of asthma action plan utilization exist for caretakers with LEP. We believe that qualitative research methods would help yield important insights at the caretaker and provider level and provide a deeper understanding of the facilitators and barriers to effective asthma action plan use by this vulnerable population.

18

Barriers to Physical Activity in Schoolchildren with Asthma: A Parent Perspective

Marina Reznik, Laurie J. Bauman.

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BACKGROUND: Physical activity (PA) levels are low in US youth and may even be lower in children with asthma. Barriers to PA have not been well-studied in inner-city, minority children with asthma. In preparation for developing a school-based intervention to improve PA levels of inner-city schoolchildren with asthma, we conducted a qualitative study to identify possible barriers to PA.

OBJECTIVE: To identify barriers to PA in inner-city schoolchildren with asthma.

DESIGN/METHODS: Qualitative semi-structured interviews with 23 parents of inner-city minority children with asthma (ages 8-10 yrs; 12 girls, 11 boys) from 10 Bronx, NY elementary schools. Sampling continued until theoretical saturation was reached. Interviews were recorded, transcribed and independently coded for common themes. Emerging themes were discussed and agreed upon by both investigators.

RESULTS: 23 parental interviews were completed (21 mothers, 2 fathers). Barriers to PA were identified at all levels of the Socioecologic Model (community, school, family and child). Several dominant themes emerged from the data. The most commonly mentioned barrier to PA was living in an unsafe neighborhood involving "drugs, violence, and shoot outs" (N=21). Although all parents mentioned having an available park in their neighborhood, most preferred to travel to a distant park out of the borough or the city due to the safety concerns. The second most commonly mentioned barrier was financial burden and the lack of free or affordable after-school physical activity programs (N=15). Other commonly identified barriers were: parental worry about occurrence of asthma attacks with PA (N=15); their child's preference for sedentary behaviors that involve TV and video games (N=11); infrequent or complete lack of physical education classes in schools (N=10); lack of trust in the ability of school personnel to manage acute asthma (N=10); their child's lack of symptom awareness and not knowing their limit during exercise (N=8); and child's PA incompetency (N=5).

CONCLUSIONS: Our results indicate a complex multi-level set of barriers to PA that include structural, financial and neighborhood concerns; the failure of schools to provide safe PA opportunities for children with asthma; parent fears about exercise-induced asthma; and child preference for sedentary vs. physical activities. Single-solution approaches to enhance PA in children with asthma are likely to have only limited impact on this pervasive problem.

19

Provider Practices and Barriers to Demonstrating and Assessing MDI-Spacer Technique

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BACKGROUND: The National Asthma Education and Prevention Program recommends that providers demonstrate and assess Metered-Dose Inhaler and Spacer (MDI-S) technique at each health encounter. Provider practices and barriers to demonstrating and assessing the technique in an outpatient setting have not been evaluated.
OBJECTIVE: To examine provider practice behaviors and barriers to demonstrating and assessing MDI-S technique.
DESIGN/METHODS: Cross-sectional anonymous survey of pediatric providers at an inner-city academic medical center. Participants were surveyed about their practices and barriers to demonstrating and assessing the MDI-S technique in a clinic setting. Differences in proportions were tested by Chi-square.
RESULTS: 99 providers participated (64 residents, 35 attendings). Of 80 (81%) providers who reported demonstrating MDI-S technique, 86% demonstrate the technique when they first prescribe an MDI-S, 58% when a patient/parent asks them, and 56% when a patient's asthma is not well-controlled. Only 5% of providers demonstrate the technique at every health encounter. When providers were asked how they demonstrate MDI-S technique to a patient, 52% verbally describe the technique, 32% use a sample MDI-S and 15% use a drawing. Of 63 (64%) providers who reported assessing the patient MDI-S technique, 70% assess the technique when they first prescribe an MDI-S and 65% when a patient's asthma is not well-controlled. Only 14% assess the technique at every visit. When providers were asked how they assess MDI-S technique, 73% of providers ask a patient for a verbal description, 19% ask for a demonstration if a patient brought the MDI-S to a visit, and 10% ask for a demonstration using a sample MDI-S. None of the providers used MDI-S checklist for the assessment. Attendings were more likely to demonstrate the use of MDI-S when patient's asthma was not well-controlled (71% vs. 47% of residents, p=.03) and use a drawing of MDI-S to demonstrate the technique (29% vs. 6%, p=.008). Providers identified the following barriers to demonstrating and assessing MDI-S technique: no access to MDI-S device (67%), lack of time (48%) and inadequate knowledge of MDI-S checklist (27%).
CONCLUSIONS: Few providers demonstrate and assess MDI-S technique at every visit as recommended by the national guidelines. Addressing the identified barriers may optimize outpatient asthma management.

20

Parental Fears about Asthma and Physical Activity in Inner-City Schoolchildren

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BACKGROUND: Recent reports suggest comorbidity of asthma and obesity in inner-city minority children. Lack of physical activity (PA) may contribute to the observed link between the two conditions. In preparation for implementing a randomized trial of a school-based intervention to improve PA levels of inner-city schoolchildren with asthma, we conducted a qualitative study to identify possible barriers to participation.
OBJECTIVE: To identify the types and intensity of parental fears about asthma and PA.
DESIGN/METHODS: Qualitative semi-structured interviews with 23 parents of inner-city minority children with asthma (ages 8-10 yrs; 12 girls, 11 boys) from 10 Bronx, NY elementary schools. Sampling continued until theoretical saturation was reached. Interviews were recorded, transcribed and independently coded for common themes. Emerging themes were discussed and agreed upon by both investigators.
RESULTS: 23 parental interviews were completed (21 mothers, 2 fathers). 17 parents either had asthma or a close family member with asthma. Nine different types of fears ranging from mild to profound were identified. All parents expressed fears about asthma. The most frequently expressed fear was about asthma and its symptoms (N=22), followed by profound fear of asthma-related death either specific to the child (N=10) or related to someone the parent knew/heard about who had died from asthma (N=8). Parents were concerned about child PA participation (N=15), particularly in sports that involve running. Parents had fears about side-effects and "addiction" to asthma medications (N=12) and mentioned their reservations about the child not being "normal" like peers (N=12). Parents had concerns about asthma school management (N=10) and the child's overweight status (N=10). Several parents felt helpless when the child had an acute asthma attack in the past (N=7). Parents of girls had more fears related to PA than parents of boys. All parents who expressed concerns about child's PA participation had positive attitudes to exercise.
CONCLUSIONS: Parents have many fears and concerns about asthma despite having personal or family experience with the disease. Most parents had reservations about child PA participation, yet expressed concern over child overweight and had positive attitudes to exercise. Interventions to increase PA levels of schoolchildren with asthma may fail unless they recognize and address parental fears as a potential barrier to participation.

21

House Officer

Does the Initial Pediatric Asthma Score Correlate with Need for and Duration of Hospitalization?

Sathish Adigopula, Fernanda Kupferman, Susana Rapaport, Louis Primavera, Dakshayani Guttal.
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BACKGROUND: Asthma is the most common chronic disease in childhood, affecting 8.2% of children in the U.S. It accounts for about 1.75 million emergency department (ED) visits each year. In adults, the correlation between objective measurement of asthma by spirometry and hospitalization has been shown in prior studies. No similar studies have been conducted in children. The Pediatric Asthma Score (PAS) has been used as a prognostic measurement in children admitted for asthma exacerbation (AE), but no studies have showed any correlation of PAS with the need of hospitalization.
OBJECTIVE: To assess if there is an association between the initial PAS measured at first encounter in the ED with the need for inpatient care and length of hospitalization (LOH).
DESIGN/METHODS: We retrospectively reviewed medical records of all children (2-18 yrs) who came to the ED in Flushing Hospital Medical Center (July 09-July 11) with AE. Children who had other confounding co-morbid conditions were excluded. We determined the PAS at the initial encounter and LOH of admitted children.

PAS

Score	1	2	3
Respiratory Rate 2-3 yrs 4-5 yrs 6-12 yrs >12 yrs	≤34 ≤30 ≤26 ≤23	35-39 31-35 27-30 24-27	≥40 ≥36 ≥31 ≥28
Oxygenation in room air	>90	85-90	<85
Auscultation	Normal-End expiratory wheeze	Expiratory wheeze	Inspiratory and expiratory wheezing to diminished breath sounds
Retractions	0-1 site	2 sites	>2 sites
Dyspnea	Speaks in sentence, coos and babbles	Speaks in partial sentence, short cry	Speaks in single words/ grunting

The total and individual PAS of the children who were admitted to the hospital were compared to those of the children not admitted using T-Test and Pearson's Correlation (Sig. 2-Tailed<0.05).
RESULTS: Of the 555 children reviewed, 97 (17.4%) were admitted. There was no statistically significant difference between the PAS (total and individual) of children who were admitted to the hospital and the children who were not (Sig. 2-Tailed >0.05). There was a weak correlation between the LOH for the admitted children and the dyspnea score at presentation (r=0.221, Sig. 2-Tailed=0.03). About 75% of the children who were not admitted had a total PAS of <7 and 76% of the children who were admitted had a total PAS of ≥7.
CONCLUSIONS: The PAS has limited predictive value to determine hospital admission for children presenting to the ED with exacerbation of asthma. Other methods of evaluating asthma in the ED setting need to be explored.

Poster Session I
Infectious Diseases & Immunology

Friday, March 30, 2012
6:00pm-7:30pm

22

Newborn and Adult Blood Monocytes Show Different Inflammatory Responses to Bacterial Infection: Studies of Regulatory Molecules

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BACKGROUND: The neonatal inflammatory response to microbial stimulation is associated with adverse outcome such as cerebral palsy and chronic lung disease. Our pilot experiments showed a more than 100-fold upregulation of TNFα mRNA expression in newborn monocytes (monos) treated with lipopolysaccharide (LPS, 0.1ng/ml) for 4 h, which was ~4-fold higher than in the adult monos. Elevated expression of proinflammatory factors and/or altered expression of regulatory proteins might play a role in eliciting a larger increase in TNFα in the newborns.
OBJECTIVE: To investigate the mRNA expression of regulatory intermediary factors of the toll-like receptor 4 (TLR4) pathway and nuclear factor Kappa B (NFκB) expression in the newborn and adult monos.
DESIGN/METHODS: Monocytes, purified from cord blood of 8 healthy term babies (C-section, no labor or chorioamnionitis) and peripheral blood of 7 healthy adults (no recent infection), were cultured for 90min and stimulated without or with low (0.1 ng/ml) or high (10 ng/ml) LPS for 4 or 24 h. Cells were harvested and RNA extracted. The mRNA expression was determined with real-time PCR. The mRNA levels were normalized to β2-microglobulin as the housekeeping gene. The results were analyzed by ANOVA and students t test and p≤0.05 was considered significant.
RESULTS: All results are discussed in comparison to the control values. At all concentrations, LPS decreased the expression of TLR4 at 4 or 24 hours in neonatal monos, but not in the adult monos. Both low and high LPS increased NFκB p65 expression in adult but not in newborn monos at 24 h. However, there was no change at 4 h in each group. Inhibitory factor Kappa B alpha (IκBα) expression was upregulated at 4 or 24 h of LPS stimulation at both the low or high concentrations in both the adult and neonatal monos. TOLLIP (Toll-interacting protein) expression with LPS stimulation in both neonatal and adult monos was lower after 4 h, but not at 24 h of LPS stimulation. The expression of IRAK3 (negative regulator of the TLR4 pathway) was elevated in the newborn at 4 and 24 h of LPS stimulation with both concentrations, but only at 24 h in the adult monos.
CONCLUSIONS: The gene expression profile of LPS-stimulated monos suggests increased expression of inhibitory regulatory molecules in the newborn in comparison to the adults. However, elevated inflammatory cytokines in the newborn would suggest alternate mechanisms of inflammation that require further investigations.

23

House Officer

Prevalence and Determinants of HIV Status Disclosure among HIV-Infected Children Enrolled in a Clinical Care Program in South India: Implications for Pediatric HIV Care Delivery and Support in Resource-Limited Settings

Rajitha Devadoss, Rochelle D. Yepthomi, Lakshmi Prasad, Suniti S. Solomon, Kenneth H. Mayer, Kartik K. Venkatesh.

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BACKGROUND: With widespread access to antiretroviral therapy (ART) in resource-limited settings, pediatric HIV disease has evolved into a chronic disease of childhood. HIV treatment programs have increasingly needed to address the question of when, why, and how to disclose a child's HIV status. The current cross-sectional study assesses the prevalence and determinants of HIV status disclosure among Indian children (age range 5 to 18) enrolled in care at YR Gaitonde Centre for AIDS Research and Education (YRGCARE), a large tertiary care program in south India.

OBJECTIVE: Assess and identify the patterns and prevalence of disclosure faced by parents/guardians (caregivers) of HIV positive children (age ≥ 5 years old) at a tertiary care program in south India.

DESIGN/METHODS: Fifty-five parent-child dyads were enrolled. Caregivers were administered a semi-structured questionnaire assessing demographics, disclosure status, and barriers and facilitators of disclosure.

RESULTS: All children had acquired HIV via mother-to-child transmission; 52% were receiving ART. Few HIV-infected children (13%) were aware of their positive serostatus per caregiver report. Among children who were unaware of their HIV status, over a third of the children (34%) had inquired about their illness, and nearly a third (29%) of caregivers intended to disclose the child's status in the future. The most common barriers to disclosure were: child immaturity (63%), child's ability to maintain confidentiality with regards to their own HIV status (60%), caregiver guilt about reporting HIV transmission to child (50%), and concern over child mental health (48%). Among children who were aware of their HIV status, 6/7 caregivers who had disclosed reported that the reason for disclosure was secondary to illness (i.e. medications, hospitalizations, frequency of visits).

CONCLUSIONS: The low prevalence of caregiver disclosure of child HIV status in this South Indian population highlights the need for more robust, structured mechanisms of HIV disclosure as part of pediatric HIV care delivery in resource-limited settings.

24

House Officer

Is Bathing an Important Factor in the Management of Atopic Dermatitis? A Prospective, Randomized, Case-Control Study

Ioannis Koutroulis, Won Baik-Han, Fernanda Kupferman, Kelly Cervellione, Susana Rapaport, Ashley Hiza.

Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Research, Jamaica Hospital Medical Center, Jamaica, NY.

BACKGROUND: Atopic dermatitis (AD) is a common condition encountered by primary care providers. Diagnosis is clinical, and the Scoring AD (SCORAD) system that assesses the extent, intensity and subjective symptoms of AD is a very reliable tool. To date, no studies have been conducted to determine if frequent bathing is beneficial and this recommendation is controversial.

OBJECTIVE: To evaluate the relationship between the frequency of bathing and the progression of AD.

DESIGN/METHODS: This was a prospective, randomized, case-control study of children with AD (6 months-10 years of age) seen in pediatric and allergy clinics at Flushing Hospital Medical Center and from a private office in Queens, NY from Aug-Oct 2011. Age, gender, history of asthma and allergies were recorded. An initial score (S1) using the SCORAD tool (0-24 mild, 25-49 moderate and 50-103 severe) was obtained for each subject. Subjects were then divided into Group 1 (G1) to bathe daily and Group 2 (G2) to bathe twice a week. Any medications given prior to our intervention remained unchanged. Subjects were re-examined and scored (S2) 2 weeks later. Descriptive data between groups were analyzed using frequencies and differences between S1 and S2 were calculated and analyzed by Chi-squares. ANOVA was conducted to determine whether there was a significant change in symptoms between time points and whether the degree of symptoms over time was similar between groups. SPSS software was used for statistical analyses ($p \leq 0.05$ was considered significant).

RESULTS: Twenty-eight subjects were enrolled in the study and randomly assigned to G1 (12) and G2 (16). There were no significant differences between groups with respect to age, gender and severity of AD but the presence of asthma was used as a covariate since this variable differed significantly between groups ($p=0.04$). Mean S1 was 33.7 (SD±10.9) in G1 and 35.4 (SD±9.5) in G2, while in the 2-week follow-up, mean S2 decreased to 29.2 (SD±8.4) in G1 and 29.7 (SD±7.1) in G2. Results showed a significant overall decrease in symptoms at follow-up as compared to baseline ($F=13.00$, $p=0.001$), but the differences in scores before and after our intervention were not statistically significant between the groups ($p>0.05$). The presence of asthma was not statistically significant ($F=0.30$, $p=0.59$).

CONCLUSIONS: Frequency of bathing did not play an important role in the management of AD.

25

House Officer

Appropriateness of Testing for Serious Bacterial Infection in Children Hospitalized with Bronchiolitis

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BACKGROUND: Children with bronchiolitis are at low risk for concurrent serious bacterial infection (SBI) including meningitis, bacteremia and urinary tract infection. The most common concurrent SBI is urinary tract infection (UTI). Despite this knowledge, provider practices vary regarding SBI evaluation in infants with bronchiolitis.

OBJECTIVE: To examine the practice of SBI evaluation in patients admitted with bronchiolitis and assess the impact of SBI testing on length of stay (LOS) and antibiotic use.

DESIGN/METHODS: A retrospective chart review of hospitalized patients between the ages of 1-24 months with discharge diagnosis of bronchiolitis from two separate study sites during 2007-2008 (post-2006 AAP Bronchiolitis practice guidelines). Patients were considered positive for UTI if cultures grew a single organism >10,000 cfu/mL or, in the absence of culture results, if urinalysis was positive for leukocyte esterase and/or nitrites with evidence of pyuria (>5WBCs/HPF). Patients were considered bacteremic if blood cultures were positive for a pathogen not deemed a contaminant in more then one set. Statistical analysis of categorical variables was performed by chi-square analysis; continuous variables by Mann-Whitney testing.

RESULTS: A total of 652 charts met inclusion criteria.The incidence of UTI in patients discharged with bronchiolitis who underwent urine testing was 2.9% (4/140 tested). There were no cases of bacteremia or meningitis. In total, 26.1% (170/652) of patients with bronchiolitis had a blood culture obtained and 18.4% (120/652) had a UA or urine culture obtained. Of the patients undergoing blood culture testing, only 55.1% (70/127) also had a UA or urine culture obtained. LOS for patients undergoing blood culture testing was 3.6 days, versus 2.3 days for those without blood cultures ($P< 0.001$). For patients undergoing urine testing alone, LOS was 3.5 days versus 2.4 days for those without urine cultures obtained ($P<0.001$). Of those patients who underwent SBI testing, 56.6% received antibiotics versus 24% who did not undergo SBI testing ($P<0.001$).

CONCLUSIONS: SBI is uncommon in children hospitalized for bronchiolitis, and UTI is the most common diagnosis. In the evaluation of SBI in bronchiolitis, providers more frequently obtain blood cultures than UA and/or urine cultures. Evaluation for SBI is associated with increased antibiotic use and increased LOS.

26

Medical Student

Neonatal Intensive Care Unit (NICU)-Based Administration of 23-Valent Pneumococcal Polysaccharide Vaccine (PPSV23) Vaccine to Parents Who Smoke and Referral to Smoking Cessation Quitlines

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BACKGROUND: Second hand smoke poses health risks to infants. PPSV23 administration to adult smokers is recommended to prevent pneumonia but faces barriers to implementation. Systems to refer parents to smoking cessation programs are inadequate. Prior studies demonstrate NICU-based, parental vaccination yields high immunization rates. We combined bedside parental PPSV23 immunization with a referral to a state-sponsored quitline and examined rates of vaccination & referral.

OBJECTIVE: To determine the feasibility of PPSV23 vaccination to parents in a Level III NICU, & assess short-term follow-up with smoking cessation services.

DESIGN/METHODS: For an 11-month period from Sept. 2010-Aug. 2011, all parents who smoked tobacco were informed of the risks and benefits of PPSV23 and the harm of second-hand smoke. Eligible parents included those who quit smoking during the pregnancy. Parents were screened, medically consented, & immunized. Parents were also referred to the New York State Smoking Quitline. Descriptive statistics & t-tests were used for analysis.

RESULTS: 156 parents (of 114 neonates) were eligible for vaccination. The average gestational age of these infants was 35 2/7 ± 4 2/7 weeks (Range 25 0/7 weeks to 42 2/7 weeks) with a mean birthweight of 2554.8 ± 999.6 grams (Range 600 grams to 4935 grams). Overall immunization rate was 92.3% (144 parents) reflecting 99.3% of the screened population.No differences in infant gestational age, birthweight, Apgar scores or hospital length of stay were seen parents who refused vaccination compared with those immunized.

No differences in infant gestational age, birthweight, Apgar scores or hospital length of stay were seen in parents who refused vaccine compared with those who both received vaccination and applied for smoking cessation.

Infants of parents who received vaccine & smoking cessation services had lower 1 and 5 minutes Apgar scores compared with those who received vaccination alone. ($p \leq 0.05$ for both).

113 parents (72.9%) parents (49 Fathers/ 64 Mothers) applied for smoking cessation services. Twenty-one (18.5%) were receiving nicotine replacement therapy or reportedly quit smoking. Thirty-eight (33.6%) were not ready to quit smoking, and 42 (37.2%) were lost to follow-up.

CONCLUSIONS: Administration of PPSV23 in the NICU is an effective means of increasing vaccination rates in parents who smoke & may facilitate referral to cessation systems.

Medical Student

Reduced Toxicity Conditioning (RTC) and Allogeneic Stem Cell Transplantation (ALLOSCT) for Recessive Dystrophic Epidermolysis Bullosa (RDEB)

Kavita Radhakrishnan, Mark B. Geyer, Angela Ricci, Sandra Foley, Erin Morris, Angela M. Christiano, Mitchell S. Cairo.

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BACKGROUND: RDEB is a severe blistering disorder characterized by basement membrane defects due to a recessive mutation in the collagen 7 gene (COL7A1) (Christiano, Nature Genetics,1993). Children demonstrate chronic dermal blistering, mucocutaneous ulcerations, scarring, a high incidence of squamous cell carcinoma, and a significantly shortened lifespan (20-30years). AlloSCT in RDEB mouse models has demonstrated healing of skin blisters and increased survival (Tolar/Christiano,Blood,2009). One small study (n=7) demonstrated that myeloablative conditioning and AlloSCT in pediatric RDEB patients is associated with decreased blistering and increased collagen 7 production, but two patients died of regimen-related mortality (RRM) (Wagner, NEJM, 2010). RTC prior to AlloSCT has resulted in lower RRM and long-term sustained donor chimerism(Satwani/Cairo, BBMT,2005) and may improve transplant outcomes in patients with RDEB.

OBJECTIVE: Pilot study to test the safety and efficacy of RTC and AlloSCT in patients with RDEB.

DESIGN/METHODS: RTC consisted of fludarabine 150mg/m2, busulfan 16mg/kg and alemtuzumab 54mg/m2 (Styczynski/Cairo,BMT,2011) followed by matched sibling donor AlloSCT. GVHD prophylaxis consisted of tacrolimus/MMF (Bhatia/Cairo,BBMT,2009).

RESULTS: 18 month-old boy with RDEB underwent RTC and AlloSCT from HLA-identical brother and engrafted neutrophils on day +31. Donor chimerism in whole blood was 99% on day +35 and 92% on day +365; donor chimerism in skin was 10% on day +365. COL7A1 mRNA levels increased from 5% of normal levels at day +30 to 12% at day +365. By three months post-transplant, increased re-epithelialization and reduction in formation of new blisters was observed, with healing of blisters appreciated throughout the body.

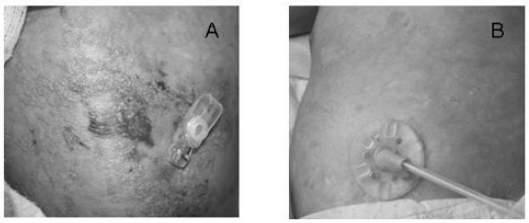

Figure 1. Photographs of abdomen on (A) day +8 and (B) day +151 showing interval healing of blistering

CONCLUSIONS: RTC followed by AlloSCT is a feasible strategy in children with RDEB.
*Denotes equal senior authorship

Poster Session I
Neonatology

Friday, March 30, 2012
6:00pm-7:30pm

28

House Officer

Does Thrombocytopenia Contribute to the Failure of Medical Management of Patent Ductus Arteriosus (PDA)?

Simon Lee, Prasoon Verma, Dan Wang, Mimi Kim, Melissa Vega, Mamta Fuloria.

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BACKGROUND: Approximately 30% of preterm infants with birth weight (BW) <1500 gms have a persistent PDA. In newborn mice, platelets appear to be crucial for PDA closure by promoting thrombotic sealing of the constricted PDA and supporting luminal remodeling. However, the association between thrombocytopenia and the persistence of PDA in preterm infants remains unclear.

OBJECTIVE: To determine whether thrombocytopenia is an independent risk factor for (1) the presence of a hemodynamically significant PDA (hs-PDA), and (2) the failure of medical management in closing a PDA.

DESIGN/METHODS: We performed a chart review of all neonates delivered at the Jack D. Weiler Hospital and admitted to our Neonatal Intensive Care Unit between 2004 and 2009 who had the following characteristics: gestational age (GA) <32 weeks, BW <1500 g, and a PDA requiring treatment. Medical records were reviewed and data abstracted for the following: maternal history (hypertension/pre-ecclampsia, chorioamnionitis, and mode of delivery) and neonatal factors (GA, BW, Apgar scores, presence of a hs-PDA, platelet count at the time of treatment, and response to indomethacin treatment). The Fisher's exact test or two-sample T-test were used to determine the bivariate associations of successful treatment of PDA with indomethacin with possible maternal and neonatal risk factors. Multivariable logistic regression was performed to study the independent effects of predictors of success of PDA treatment with indomethacin. A predictor was considered as a potential candidate for the final model if the Fisher's exact test or two-sample T-test had a p-value < 0.2 in bivariate analyses. The final multivariate logistic regression model included only those predictors which remained significant at the 0.05 level.

RESULTS: Between 2004-2009, 117/588 (20%) infants with GA <32 weeks and BW <1500 gms had a PDA requiring treatment. Thrombocytopenia, either at birth or at the time of treatment, was not associated with the presence of a hs-PDA. Lower GA (<0.001) and 5-minute Apgar score (0.049), a hs-PDA (p< 0.001) and thrombocytopenia (platelet count <100,000) at the time of indomethacin treatment (p=0.037) were all independent risk factors for the failure of medical management of PDA.

CONCLUSIONS: Lower GA, presence of a hs-PDA and a platelet count <100,000 at the time of treatment, but not at birth, are independent risk factors for the failure of medical management of PDA.

29

Screening Echocardiography for Diagnosis of Asymptomatic Patent Ductus Arteriosus (PDA) in Very Low Birth Weight (VLBW) Infants: A Randomized Trial

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University of Pennsylvania, Philadelphia, PA; The Children's Hospital of Philadelphia, Philadelphia, PA; Pennsylvania Hospital, Philadelphia, PA.

BACKGROUND: Routine screening for asymptomatic PDA in VLBW infants is common practice, yet the risks and benefits of this approach have not been sufficiently demonstrated.

OBJECTIVE: To evaluate the role of serial echocardiography in the diagnosis and management of PDA in VLBW infants. We hypothesized that routine screening echocardiography increases the rate of diagnosis and treatment of PDA. Further, we hypothesized that increased rate of PDA treatment is associated with adverse outcomes including poor early growth.

DESIGN/METHODS: We enrolled our target sample size of 88 VLBW infants in this 2 center pilot trial. Infants with birth weights ≤1250 grams and gestational age ≤30 weeks were randomly allocated to disclosure or non-disclosure of serial echocardiograms performed at 3-5 and 7-10 days of life. The primary outcome was time to regain birth weight. We used traditional bivariable tests to compare the groups. The primary outcome was analyzed with Poisson regression, adjusted for center.

RESULTS: Baseline characteristics of the two groups were similar (all p>0.20).

Selected Baseline Characteristics

	Disclosure (n=44)	Non-disclosure (n=44)
Gestational age (weeks)*	25.9±1.8	26.1±1.8
Birth weight (grams)*	797±199	824±211
Male	19 (43%)	25 (57%)
Antenatal steroids, ≥2 doses	29 (66%)	31 (70%)

* mean±SD

There was no difference in the mean time to regain birth weight (disclosure: 11±5 vs. non-disclosure: 10±4 days, Poisson regression p=0.32). There were no significant differences in rates of important neonatal outcomes, but disclosure of echo results was associated with trends toward increased rates of NEC and oxygen use at 28 days.

Selected Secondary Outcomes

	Disclosure	Non-disclosure	p-value
Drug or surgical treatment for PDA	48%	39%	0.39
NEC - confirmed or suspected	41%	25%	0.11
Days to full feeds, median [IQR]	24 [15, 36]	24 [16, 32]	0.87
Grade 3/4 IVH or PVL	11%	16%	0.53
ROP ≥ stage 3	16%	12%	0.59
Oxygen at 28 days	61%	52%	0.40
Death	9%	11%	0.99

CONCLUSIONS: This pilot trial showed that randomization to non-disclosure of the results of screening echocardiograms is feasible. Time to regain birth weight did not differ between the two groups. However, routine screening echocardiography appeared to be associated with risks rather than with benefits, possibly because of more frequent PDA treatment. These results warrant confirmation in a larger and more definitive trial.

30

House Officer

Epidemiology of Periventricular Echodensities in Very Low Birth Weight Infants

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Pediatrics, Goryeb Children's Hospital, Atlantic Health Systems, Morristown, NJ; Neonatology, MidAtlantic Neonatology Associates, Morristown, NJ.

BACKGROUND: Periventricular echodensities (PVE) are a common finding on cranial ultrasound (CUS) exams of very low birth weight (VLBW) infants during their NICU hospitalization. Whereas outcomes associated with intraventricular hemorrhage (IVH) and periventricular leukomalacia (PVL) are well described, descriptions of those associated with PVE have been limited.

OBJECTIVE: To describe the chronology (onset, duration) of PVE as detected by routine clinical neuroimaging and the association of PVE with PVL and neurodevelopemental outcomes (NDO).

DESIGN/METHODS: Infants born ≤1500g and ≤32.0weeks gestational age (GA) admitted to a Level III NICU between 1/1/05 to 12/31/10 were included in this study. Clinical data and neuroimaging results (CUS, MRI) were abstracted from medical records. Infants who died prior to 28 weeks corrected GA or in the first week of life were excluded from PVL analyses. IRB approval was obtained for this study.

RESULTS: A total of 568 infants met entry criteria. The characteristics of the study population were: 48% female; 68% white, 14% black, 9% hispanic; 27% vaginally delivered; 1015±286g at birth; 27.6±2.4 weeks GA at birth; 63% membranes ruptured at delivery; 10% membranes ruptured > 7 days; 2% early-onset sepsis, 14% late onset sepsis; 6% necrotizing enterocolitis; 9% Grades 3-4 IVH; 7% post-IVH hydrocephaly; 23% chronic lung disease; and 12% died prior to discharge. PVL occurred in 3%. PVE was diagnosed in 7%, detected at a median age of 7 days of life (IQR 4-9 days).

PVL was associated with PVE with an odds ratio (OR) of 2.6 (95% CI 1.6-3.7). PVL was more

likely to occur when PVE was detected in the first week of life (OR 9.8, 95% CI 1.04-92.70). When PVE was documented to have disappeared, it did so after a median of at least 14 days (IQR 7-18); however, there was no association between PVE duration and PVL. Although PVE was detected bilaterally in 60%, right only in 32%, and left only in 8%, there was no association of unilateral PVE with PVL (OR 3.2, 95% CI 0.6-16.0). There were no associations detected between PVE and post-IVH hydrocephaly. Analyses of NDO outcomes are pending.
CONCLUSIONS: In this study population, PVE was commonly diagnosed in VLBW infants born under 32 weeks GA, typically detected within the first 2 weeks of life and associated with PVL, particularly when occurring in the first week of life. Association of PVE with NDO outcomes are ongoing.

31

Even Low Dose Steriods for BPD Is Associated with Worse Neurodevelopmental Outcome

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BACKGROUND: Follow up studies have shown that the traditional dose of dexamethasone (0.5 mg/kg/dose) for treatment of BPD in the NICU is associated with adverse neurodevelopmental (ND) outcome. These findings prompted the joint statement by the AAP and CPS in 2002 discouraging routine use of steroids for BPD. If BPD management included the use of steroids, most NICUs have switched to using low dose steroids at 0.1-0.2 mg/kg/dose. ND follow up studies of infants treated with the lower dose steroids are not currently present in the literature.
OBJECTIVE: Assess whether low dose steroid treatment for BPD is associated with an adverse ND outcome.
DESIGN/METHODS: A retrospective NICU chart review was done of patients who developed BPD at our center from 1/2003-1/2008. Their ND assessments using Revised Gesell exam at 4-6 months of age were reviewed. The Revised Gesell was then converted to a score for both motor and cognitive on a scale of 1-3 with 1=normal, 2=mild-moderately abnormal (> 1.5 SD from mean), and 3=severely abnormal (> 2 SD from mean). Cases were defined as infants treated with low steroid dosing for BPD. Controls were infants meeting BPD criteria but not treated with steroids. Bivariate analyses conducted using chisquare and t-tests were appropriate. An adjusted analysis was conducted using ordinal logistic regression to estimate odds ratios while controlling for potential confounders. Statistical analyses were conducted using SAS version 9.2.
RESULTS: Infants treated with low dose steroids had abnormal ND exams when compared to control infants when adjusting for gestational age and birth weight with an odds ratio of 2.417 (1.198-4.876 95% CI).

Scoring of Neurodevelopmental Outcome

	Steroid Group, n=36	Control, n=255	P values
Revised Gesell Scoring			
1=normal	19 (52.8)	182 (71.4)	<0.001
2=mild-moderately abnormal	5 (13.8)	53 (20.7)	<0.001
3=severely abnormal	12 (33.3)	20 (7.8)	<0.001

The adjusted odds ratio was 2.417 (1.198-4.876 95% CI)

Statistical significance continued to be present when adjusted for GA, BW and gender with an odds ratio of 2.335 (1.151-4.735 95% CI). Demographic data showed the BPD infants treated with steroids to be smaller, younger (p<0.0001) and more likely to be male (p=0.01). These infants were also statistically more often treated for a PDA (p<0.001) and had a longer length of stay in the NICU (p<0.0001).
CONCLUSIONS: Infants who received low dose steroids for BPD had a worse ND outcome compared to controls. A prospective cohort study is planned.

32

House Officer

Developmental Outcome of Term Neonatal Intensive Care Unit Graduates at 48 to 60 Months of Age

Mohamed F. Ahamed, Fernanda Kupferman, Susana Rapaport, Richard Jack, Lourdes Cohen, Louis Primavera, Kanchana Roychoudhury, Romina M. Barros.
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BACKGROUND: Term infants (TI) represent a significant proportion of Neonatal Intensive Care Unit (NICU) admissions. Few studies have examined long term outcomes of TI who required admission to the NICU. One study demonstrated differences in domains of neurosensory, motor and learning/remembering in NICU TI at 42 months of age in comparison to healthy TI.
OBJECTIVE: To assess developmental outcomes of term NICU graduates in comparison to healthy TI at 48-60 months of age.
DESIGN/METHODS: This was a retrospective cohort study conducted at the Behavior and Development Clinic at Flushing Hospital Medical Center from Aug-Oct 2011. After obtaining informed consent from parents, cases(term NICU graduates) were enrolled along with equal numbers of controls(healthy TI) and matched for maternal level of schooling, receipt of early intervention services and type of insurance. The developmental performance of both groups was scored using the Brigance Preschool Screen II measuring performance in 6 domains: Basic assessment, language, motor, academics, social-emotional and self-help skills. Raw scores were obtained in each domain for each child and converted into standard and percentile scores. Means were calculated and compared between groups, using t-test for statistical analysis (p-value <0.05 considered significant).
RESULTS: Of 15 cases and 15 controls tested, 57% were females and 40% from English-speaking families. The mean standard scores for cases and controls in each domain were within average range. There were no statistically significant differences between the two groups in any of the 6 domains tested (p>0.05). In the self-help skills, the difference was approaching statistical significance(p=0.053).

Mean Standard Scores in each domain(n=15)

Testing Domain	Cases(M±SD)	Controls(M±SD)	p Value
Basic Assessment	95.5±10.7	92.6±13.0	0.676
Language	85.6±10.3	88.4±10.9	0.754
Motor	98.0±17.0	96.9±21.7	0.192
Academics	97.7±11.2	92.6±12.5	0.808
Self Help	100.2±4.8	103.8±8.9	0.053
Social Emotional	103.9±8.0	104.2±10.6	0.226

CONCLUSIONS: There is no difference in overall developmental performance of term NICU graduates when compared to healthy TI. Due to the lower score in self-help skills in NICU graduates found in this study, further study with larger sample size is needed to determine if there is a need for better follow up of term NICU graduates in this domain.

33

House Officer

Is Lumbar Puncture Required in Asymptomatic Newborns with Maternal Intrapartum Fever?

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BACKGROUND: As a hospital serving the low socioeconomic status population with very poor prenatal care and obstetric follow up, lumbar puncture (LP) was routinely done in asymptomatic babies born to mothers with intrapartum fever on day one of life. We wanted to evaluate other parameters which would be helpful in avoiding LP.
OBJECTIVE: 1) To determine if lumbar puncture is required in asymptomatic term babies born to mothers with intrapartum fever on first day of life.
2) To determine if sepsis score / rise in inflammatory markers would predict the need for LP.
DESIGN/METHODS: Retrospective chart review of asymptomatic babies born between 7/1/08 to 9/30/10 to mothers with intrapartum fever who had LP on the first day of life to rule out meningitis was done. Preterms, babies with low Apgars, symptomatic babies, and babies whose mother had proven maternal chorioaminionitis were excluded.
Neonate's white blood cell count (WBC), immature to total neutrophil ratio (ITR), c-reactive protein (CRP), blood culture, cerebrospinal fluid (CSF) analysis and culture were analyzed. Maternal obstetric follow up, mode of delivery, premature rupture of membrane (PROM), maternal Group B Streptococcus status (GBS), adequate treatment for GBS and maternal WBC were also obtained.
RESULTS: Total cases were 144 out of which CSF culture was positive for 2 babies. In both cases it was a bloody tap and blood culture was also positive and grew the same bacterial species. The repeat CSF culture within 24 hours in these two cases was negative.
There is a significant relationship between neonate's WBC of >15 or <5 and CRP>1.5 (p value of 0.016).
There is a significant relationship between ITR>0.2 and CRP>1.5 (p value of 0.001).
No statistical significances were obtained for maternal fever with maternal WBC, PROM and GBS status.
CONCLUSIONS: Our study reflects that serial WBC, ITR, CRP (sepsis score) with clinical correlation would help to decide on performing a LP on asymptomatic term neonates with maternal fever.
Perhaps the only way to answer the question is to conduct multicenteric Randomized controlled trial to look at both short term and long term outcomes.

34

Resident

Utility of Sepsis Evaluations in Term Infants Born of Mothers Diagnosed with Chorioamnionitis

Michelle Quirk, Kabir M. Abubakar.
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BACKGROUND: Early onset sepsis (EOS) is an important cause of morbidity and mortality in infants. Chorioamnionitis is associated with higher risk of EOS in newborns. It is standard of care to evaluate infants of mothers with chorioamnionitis for sepsis and initiate antibiotic therapy, but meta-analysis of prophylactic versus selective antibiotics for term infants of mothers with risk factors for EOS showed there are insufficient data from randomized trials to guide clinical practice. The utility of complete blood count and C-reactive protein (CRP) to evaluate the asymptomatic newborn for sepsis are inconclusive. Ability to identify infants at lower risk of EOS could shorten duration of antibiotic therapy, hospital stay and exposure to antibiotics.
OBJECTIVE: To evaluate patient characteristics, laboratory and outcome data in term infants born to mothers with chorioamnionitis that could help identify infants less likely to have EOS and limit duration of antibiotic therapy.
DESIGN/METHODS: Term infants born to mothers with chorioamnionitis admitted to Georgetown University Hospital from 1/2008 to 3/2011 were identified from the NICU database. Maternal and infant demographic data, symptoms and treatments, laboratory data, clinical course, and duration of antibiotic therapy were extracted and analyzed using descriptive statistics, t-test and Chi square.
RESULTS: Data from 87 infants were analyzed. Fifty-one received antibiotics for 48 hours, and 36 were treated for ≥7 days. There were no differences in gestational age, birth weight, maternal age, GBS status, mode of delivery, meconium stained amniotic fluid, placental funisitis or positive placental culture between groups. Admission temperature, respiratory rate, hypoglycemia, I:T ratio, and CSF pleocytosis were similar between groups. No infant had a positive blood or CSF culture.

	48 Hour Group (n=51)	7 Day Group (n=36)
1 min. APGAR ≤5	7 (14%)	12 (33%)*
5 min. APGAR ≤7	3 (6%)	9 (25%)*
ROM >18 hrs	12 (26%)	12 (33%)
Abnormal fetal Heart Rate	20 (39%)	14 (39%)
Respiratory support	1 (2%)	10 (28%)*
Intravenous nutrition	18 (35%)	33 (92%)*
Thermal support	18 (35%)	18 (50%)*
Apnea, bradycardia, or desaturation	0 (0%)	11 (31%)*
Abnormal CXR	3/12 (25%)	9/19 (47%)*
CRP >2	1/50 (2%)	7/33 (21%)*

* p<0.05

CONCLUSIONS: Infants with low Apgar scores, abnormal CXR, elevated CRP, apnea and bradycardia, need for respiratory, thermal or intravenous nutritional support are more likely to be treated for presumed sepsis with ≥7 days of antibiotics in the NICU.

35

Fellow in Training

Congenital Tuberculosis in Five Neonates Conceived by In Vitro Fertilization

John Flibotte, Grace E. Lee, Genevieve Buser, Sarbattama Sen, Shakuntala Chandra, Elizabeth P. Baorto, Kristina N. Feja, Robert W. Tolan, George D. McSherry, Sheila M. Nolan, Huayan Zhang.
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BACKGROUND: Congenital tuberculosis (TB) is a rare disease with nonspecific clinical manifestations. It is not commonly considered in infants presenting with respiratory insufficiency or sepsis.

OBJECTIVE: To summarize our recent experience with infants diagnosed with congenital TB.

DESIGN/METHODS: Case series.

RESULTS: We report five neonates, from three Indian mothers, who presented at 3-4 weeks of age and were diagnosed with congenital TB (see table). All infants were conceived via in vitro fertilization at separate centers, and none of the mothers was properly evaluated for genitourinary (GU) TB as a cause of infertility. Diagnosis was delayed in all infants, resulting in severe cardiorespiratory failure in three and death in one.

Summary of Cases

	Mother	Sex	Estimated gestational age (weeks)	Age at presentation (days)	Clinical manifestations	Positive specimens	Outcome
Baby (1)	1	M	32	24	Lethargy, mild respiratory distress; late-onset sepsis-like illness progressing to respiratory failure	Blood, gastric aspirate, tracheal aspirate; mother's endometrial biopsy; Mycobacterium tuberculosis complex	Recovered
Twin A (2)	2	F	35	29	Fever, mild respiratory distress, pneumonia (miliary)	Gastric aspirate; mother's endometrial biopsy (histology and smear positive) and sputum (smear negative, but culture positive); M. tuberculosis complex	Recovered
Twin B (3)	2	M	35	29	Fever, mild respiratory distress, pneumonia	Twin's gastric aspirate; mother's endometrial biopsy (histology and smear positive) and sputum (smear negative, but culture positive); M. tuberculosis complex	Recovered
Twin A (4)	3	M	31	19	Respiratory distress, late-onset sepsis-like illness progressing to intractable respiratory failure	Lungs and pleura at autopsy; mother's endometrial biopsy; M. africanum	Deceased
Twin B (5)	3	F	31	33	Apnea and bradycardia with mild respiratory distress	Mother's endometrial biopsy; twin's autopsy specimens; M. africanum	Recovered

CONCLUSIONS: These cases illustrate that early diagnosis of TB in neonates is difficult and delayed recognition of the disease can have detrimental effects. In this increasingly global community, and as assisted reproductive technology is more widely applied, a high index of suspicion and timely management for TB in both neonates and mothers from high risk populations could be life saving.

36

Fellow in Training

Detection of C-Reactive Protein in Neonatal Saliva and Its Correlation to Serum Levels

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BACKGROUND: C-Reactive Protein (CRP) is a commonly followed inflammatory marker in neonates that requires serial blood draws from an already hemodynamically compromised patient population. Developing a noninvasive assay to monitor CRP levels could significantly improve care. To date, there are no published data regarding the presence of CRP in neonatal saliva or its relationship to serum concentration levels.

OBJECTIVE: To determine if CRP is detectable in neonatal saliva and representative of serum concentrations.

DESIGN/METHODS: Neonatal salivary samples (n=18; post-conceptual ages: 32 - 50 weeks; weight: 1.0 - 4.7 kg) were collected within 4 hours of clinically indicated blood sampling for the measurement of serum CRP levels. Saliva samples were stabilized in 50 uL of a 1:10 dilution of a protease inhibitor (SigmaFAST™) in RNAprotect saliva (QIAGEN™). All salivary samples were briefly vortexed and stored at – 80°C pending further analysis. Salivary CRP levels were calculated with the MesoScale Discovery™ CRP electrochemiluminescence immunoassay. Resulting concentrations were normalized based upon starting total protein levels in each sample. Serum CRP concentrations were determined by hospital laboratory protocol. Statistical analysis included Pearson correlation coefficient to measure the association between salivary and serum CRP concentrations.

RESULTS: Salivary volumes ranged from 5 to 10 uL with starting total protein concentrations ranging from 0.53 to 6.32 mg/mL. CRP was detected in 17/18 (94%) of salivary samples. Mean CRP concentration levels for normalized saliva and serum were 0.14mg/L and 103 mg/L, respectively. The correlation coefficient between serum and salivary CRP concentrations was 0.44 ($p = 0.065$).

CONCLUSIONS: CRP is readily detectable in small volumes of neonatal saliva through a noninvasive assessment procedure. This study provides preliminary evidence suggesting that neonatal salivary CRP and serum CRP levels are correlated. Future studies are warranted to determine if the measurement of salivary CRP levels represent an accurate alternative method to frequent blood sampling in the clinically fragile neonatal population.

37

Fellow in Training

Should All Neutropenic Extremely Low Birth Weight Infants Receive Empiric Antibiotics at Birth?

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BACKGROUND: Early Onset Sepsis (EOS) in neonates is often associated with neutropenia. Early neutropenia is common in Extremely Low Birth Weight (ELBW, weight ≤ 1000g) infants, particularly in infants born to mothers with hypertension (HTN). The risk of EOS in these neutropenic ELBW infants has not been specifically evaluated.

OBJECTIVE: To compare the incidence of EOS in ELBW infants born to mothers with and without HTN, and characterize the relationship to neutropenia in both groups.

DESIGN/METHODS: Retrospective analysis of all ELBW infants born at Georgetown University Hospital from 2004 to 2011 was performed. Mothers with HTN included: chronic or gestational hypertension, preeclampsia and HELLP (Hypertension, Elevated Liver enzymes, Low Platelets) syndrome. Neutropenia was defined as absolute neutrophil count (ANC) ≤1000/mm ^{3}on day 1 of life. EOS was classified as 'Confirmed' if blood or cerebrospinal fluid (CSF) cultures ≤ 72 hours of life were positive, 'Presumed ' if cultures were negative but antibiotic coverage was ≥ 5 days, and 'Ruled-out' if cultures were negative and antibiotics were discontinued ≤ 72 hours. Statistical tests included Fisher's exact test and Student's t-test.

RESULTS: Analysis of 178 ELBW infants is shown.

Early Onset Sepsis in Extremely Low Birth Weight Infants

	ELBW N = 178 BW 750 ±167 GA 26 ± 2			
	Maternal HTN N= 58 BW 790 ±166 GA 27 ± 2		No HTN N=120 BW 745 ±153 GA 26 ± 2	
	Neutropenic N = 25 * BW 702 ±177 * GA 27 ± 2 *	Non Neutropenic N = 33 BW 803 ±143 * GA 27 ± 2	Neutropenic N = 29 * BW 724 ±170 GA 26 ± 2 *	Non Neutropenic N = 91 BW 752 ±148 GA 26 ± 2
Maternal Conditions				
Chorioamnionitis	0 *	1 (3%)	10 (34%) *	32 (36%)
Urinary tract infection	3 (12%)	2 (6%)	5 (17%)	6 (6%)
Early Onset Sepsis				
Confirmed	0	1 (3%)	4 (14%)	3 (3%)
Presumed	19 (76%)	14 (42%)	22 (76%)	68 (75%)
Ruled-out	3 (12%)	13 (40%)	2 (7%)	13 (14%)
None	3 (12%)	2 (6%)	1 (3%)	7 (8%)

Birth weight (BW) in grams and gestational age (GA) in weeks are shown as means ± SD
* p < 0.05

Neutropenia was more common in infants born to mothers with HTN (25/58) than in infants born to mothers without HTN (29/120) ($p < 0.05$). Chorioamnionitis was more common in mothers without HTN (42/120 vs 1/58) (OR 30.7, 95% CI 4.3-617.3). 'Confirmed' EOS was diagnosed in none of the 25 ELBW infants with neutropenia born to mothers with HTN and in 4 of 29 (13.7%) infants born to mothers without HTN. There was no difference in the rates of diagnosis of 'Presumed' sepsis in neutropenic ELBW infants born to mothers with or without HTN.

CONCLUSIONS: Neutropenia may not be a significant indicator of EOS in ELBW infants born to mothers with HTN. The use of empiric antibiotics for 'Presumed' sepsis in this setting, in the absence of other risk factors for EOS, must be evaluated in a larger study.

38

Fellow in Training

Feeding Intolerance and NEC Are Associated with Increased Markers of Nitrosative and Oxidative Stress in Stool of VLBW Infants

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BACKGROUND: Necrotizing Enterocolitis (NEC) is a major cause of morbidity and mortality in premature infants. Early diagnosis is difficult and often confused with feeding intolerance. It is associated with the start of enteral feeding in over 90% of cases. Identification of infants who may develop NEC will lead to earlier institution of supportive care and cessation of feeding regimens to minimize long-term sequelae. The pathophysiology of NEC involves inflammation and cell death at the epithelial surface of the intestine where oxidative stress and aberrant nitric oxide metabolism occurs. Markers of nitrosative and oxidative injury include 3-nitrotyrosine and F_2-isoprostanes. The detection of these compounds in stool will lead to the development of a diagnostic test for this disorder, which would aid clinicians in making a more timely diagnosis of NEC.

OBJECTIVE: We hypothesize that infants who develop feeding intolerance or NEC will have evidence of nitrosative and oxidative injury to the epithelium in their stool in the form of elevated 3-nitrotyrosine and F_2-isoprostanes, when compared to control infants.
DESIGN/METHODS: This is a nested case-control study. Data and samples were collected prospectively from a cohort of preterm infants < 1500g who have developed feeding intolerance, or NEC. Stool samples were collected at specified time points postnatally, as well as with episodes of NEC or feeding intolerance. Samples were fractionated into an aqueous and organic phase, and analyzed for protein content. The organic fraction was analyzed for total nitrogen oxides (NOx), markers of nitrosative stress, via differential chemical reduction chemiluminescence and F2-isoprostanes, markers of oxidative stress, via ELISA.
RESULTS: 147 infants were enrolled. 8 infants developed feeding intolerance and 10 infants were diagnosed with NEC. Stool samples collected during and after the episode of feeding intolerance had a mean fold-increase in F2-isoprostane of 6.42 (p=0.007) and a mean fold-increase of NOx of 2.78 (p=0.009) when compared to the sample collected prior to the episode. The samples collected during NEC still need to be analyzed.
CONCLUSIONS: Feeding intolerance, thought to be clinically benign, may be associated with increased inflammation manifested by elevated markers of nitrosative and oxidative injury to the epithelium. This may lead to the progression of NEC. Further data still needs to be analyzed.

39

Similarities among Neonates from Different Institutions Diagnosed with Transfusion Related Acute Gut Injury (TRAGI) Reported in an Online Registry: www.tragiregistry.com

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BACKGROUND: TRAGI is documented in multiple reports where proposed etiologies include: extreme prematurity, permissive anemia, feeding during transfusion, disrupted angiogenesis, blood storage lesion & dysregulated immunologic barrier defense (*J Ped*; 158:403, 2011). All recent reports are retrospective & limited by small numbers of affected neonates at one center. A Users' Group met at the 2011 PAS Denver meeting & was attended by >50 clinicians who concluded that a multicenter database was needed to better characterize TRAGI and to help foster a clincial trial targeted at prevention; the group will reconvene in Boston 2012.
OBJECTIVE: An online database, **www.tragiregistry.com,** was established to: i) capture data from a diverse group of institutions with different clinical practices and ii) identify clinicians interested in a future multicenter trial.
DESIGN/METHODS: We asked neonatologists to submit cases they encountered. TRAGI is defined as the development of necrotizing enterocolitis (pneumatosis intestinalis) <48h after a PRBC transfusion.
RESULTS:

TRAGI cases reported on www.tragiregistry.com

Mean ± SEM (Median, Minimum-Maximum)	TRAGI N=8
Birth weight (grams)	1014 ± 182 (855,590-2200)
Gestational age (weeks)	28 ± 1 (28,24-34)
Age at onset of NEC (days)	34 ± 5 (35,9-61)
Postconceptual age at onset of NEC (weeks)	32 ± 1 (32,26-38)
History of prior transfusion	100%
Full feeds at onset of NEC	75%
Hematocrit before NEC	25 ± 2 (24,20-36)
Made NPO for transfusion	38%
Hrs after PRBCs to 1st signs of NEC	20 ± 5 (15,16-41)
Majority of feeds breast milk prior to onset of NEC	50%
Interested in a future trial	88%

Since the registry debut in Oct 2011, HIPAA-compliant, de-identified demographic and clinical data was collected from TRAGI patients from eight institutions. As we and others previously reported, TRAGI cases were generally characterized by prematurity, LBW, significant anemia, older than 2 weeks, history of ≥1 prior transfusion often from the same donor, and a curious centering of disease around 32 wks PCA. The role of breast milk and NPO status during transfusion did not appear related to the pathogenesis of TRAGI.
CONCLUSIONS: This online database will allow clinicians with different practices to compare their experiences and be useful for hypotheses formation (see *e-J of Neo Res 1(3):152, 2011*). Clinicians are self-identifying to participate in a future, prospective, multicenter trial aimed at disease prevention.

40

Fellow in Training

Single Nucleotide Polymorphisms of the Platelet Activating Factor Acetyl Hydrolase Gene in ELBW Infants with Necrotizing Enterocolitis

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Division of Newborn Medicine, Department of Pediatrics, Maria Fareri Children's Hospital, New york Medical College, Valhalla, NY.

BACKGROUND: Necrotizing enterocolitis (NEC) is an inflammatory bowel disease of neonates with significant morbidity and mortality. The exact etiology of NEC and why it selectively targets a subset of premature infants remains elusive. Platelet activating factor (PAF)-an inflammatory and vasoactive mediator-plays a central role in the final inflammatory pathway leading to NEC. The platelet activating factor-acetylhydrolase (PAF-AH) is an enzyme which catalyzes the degradation of PAF and thereby the termination of its action. Single nucleotide polymorphism (SNP) I198T and A379V of the PAF-AH gene decreases the PAFAH enzyme affinity towards PAF and thereby prolongs the activity of PAF.
OBJECTIVE: To test the hypothesis that SNPs, A379V and I198T of the PAF-AH gene are associated with NEC in ELBW infants.
DESIGN/METHODS: DNA was isolated from buccal mucosal swabs. 31 ELBW infants who developed NEC were compared with 69 ELBW infants without NEC. Allelic discrimination was performed using specific probes for PAF-AH (SNP I198T and A379V) with real-time PCR.
RESULTS: There was no difference in the mean birth weight, gestational age, sex and racial distribution between the two groups.There was no difference in the incidence of BPD between the two groups, however the NEC group had a higher incidence of ROP, sepsis and severe IVH.

Demographic Data

	Controls (n=69)	NEC (n=31)	p value
Birth Weight	776±140	750±152	0.8
Gestation	25±1.5	25±1.3	0.4
Gender (Male)	48%	45%	0.7
Race			0.9
Caucasian	32%	26%	
Black	19%	19%	
Hispanic	46%	52%	
Others	3%	3%	
Mod-Severe BPD	62%	61%	0.9
ROP	22%	45%	0.03
Sepsis	10%	51%	0.001
IVH (Grade 3/4)	7%	22%	0.06
PDA	92%	68%	0.003

The frequency of minor allele for I198T was higher in the NEC group compared to the controls (22% vs. 13%, $p = 0.18$). The distribution of minor allele for A379V was similar in the two groups (20%).

Genotype Distribution for I198T

	Controls(n=69)	**NEC(n=31)**
TT	60	24
TC	7	6
CC	2	1
Any C†	9 (13%)	7 (22%)

†p= 0.18

CONCLUSIONS: In this pilot study, the SNP I198T of the PAF-AH gene, which reduces the enzyme's substrate affinity for PAF resulting in longer half life of PAF, was present at a higher frequency in neonates who developed NEC compared to those who did not, although it did not reach statistical significance. A sample size of 150 patients in each group would be needed to detect a statistically significant difference between the two groups (α=0.05 and β=0.8).

41

House Officer

Optical Imaging of Ischemia in Necrotizing Enterocolitis (NEC)

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BACKGROUND: NEC develops in 7% of infants with birth weight <1500 g, and 90% of NEC cases are premature infants with feeding. Since NEC is heterogeneous disease resulting from multiple contributing factors, an early detection is an essential for the medical management.
OBJECTIVE: Our objective of pilot study is to test whether the newly developed tissue perfusion monitor can detect early stages of NEC in neonates.
DESIGN/METHODS: This is a phase 1 observational feasibility pilot study to detect early stages of NEC in preterm infants using broadband oximetry monitoring device (Spectros Corporation). An optical probe is placed over neonate's abdomen in four quadrants (RU, LU, LL, RL). Measurement in each quadrant was recorded for 1 minute over two cycles. Inclusion criteria: Birth weight less than 1500 grams or GA<34 weeks who were diagnosed of NEC by Bell's classification. These subjects were compared with normal preterm babies (matched controls). Eligible neonates were enrolled in first 24 hours of life. Clinical data on patient characteristics, illness severity and outcomes from medical records of enrolled neonates was collected.
RESULTS: Four preterm infants were studied. GA: 30-32 wk, BW: 1270-1825 g and Day of life: 11-20th day. Two babies had NEC with bloody stools and two had no NEC (controls).

Tissue Total Hemoglobin in Four Quadrants

Subject	RU	LU	LL	RL
Control 1	26±5.7	28±4.4	26±4.6	21±4.3
NEC 1	39±9.5	76±27.6	63±12.5	32±4.8
Control 2	36±3.4	38±5.4	42±13.0	20±2.8
NEC 2	20±2.4	29±5.1	15±4.3	18±2.4

Tissue Oxygen Saturation in Four Quadrants

Subject	RU	LU	LL	RL
Control 1	93	98	94	90
NEC 1	84	84	83	83
Control 2	92	93	87	80
NEC 2	90	92	78	82

NEC case 1 showed significant increase in total tissue hemoglobin and tissue O_2 saturation compared to matched control. This increase in tissue total hemoglobin is an indication of local inflammatory reaction or tissue/venous congestion in the bowel leading to NEC. NEC case 2 showed decrease in total tissue hemoglobin and tissue O_2 saturation compared to matched control. Furthermore, this variation in tissue oxygen saturation between the two babies with NEC might be due to the different phases of the disease.
CONCLUSIONS: We found broadband oximetry monitoring device can detect NEC at its early stage and prevent the cascade that leads to bowel necrosis. Our future goal is to screen a large number of infants in order to determine the diagnostic power of Spectros device.

Fellow in Training

Utility of Regional Splanchnic Oxygenation (rSO2) Using Near-Infrared Spectroscopy (NIRS) in Very Low Birth Weight Infants (VLBWI) with Abdominal Distension

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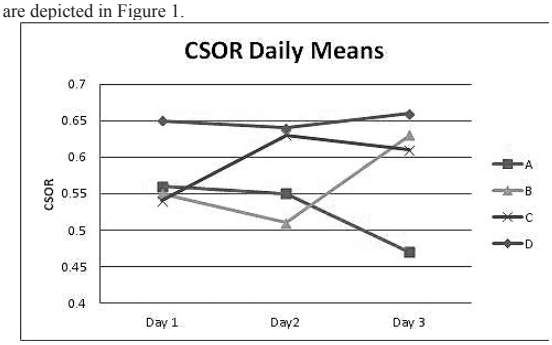
BACKGROUND: The feasibility and safety of using NIRS in preterm neonates to monitor rSO2 after feeding and its ability to detect changes in splanchnic oxygen delivery during apnea and surgically proven splanchnic ischemia has previously been reported. However, differentiating early necrotizing enterocolitis (NEC) from benign causes of abdominal distension in VLBWI remains a challenge.

OBJECTIVE: To determine whether rSO2 values obtained by NIRS can be used to differentiate NEC from benign causes of abdominal distension in VLBWI.

DESIGN/METHODS: This is a prospective, observational, non-interventional study of VLBWI with BW of 500-1500g presenting with abdominal distension. NIRS (INVOS 5100, Covidien, Troy, MI) data were collected for splanchnic and cerebral oxygenation (rSO2 & rCO2) for 72 hours. A ratio of rSO2 to rCO2 (CSOR) was determined from hourly and daily means of rSO2 & rCO2. Infants were categorized into 4 groups: NEC (A), suspected sepsis (B), CPAP belly (C) and healthy VLBWI tolerating feeds (D). We evaluated average CSOR as well as area under the curve (AUC) for each subject and then compared the means of these values across groups with ANOVA.

RESULTS: Preliminary data on daily CSOR means for each group {(A) n=6, (B) n=4, (C) n=6, (D) n=10} are depicted in Figure 1.



The mean differences of AUC for CSOR are presented in Table 1.

CSOR AUC

Mean (SE) AUC				
A	B	C	D	p ANOVA
34.1 (5)	39.2 (8)	41.2 (6.4)	44 (2.4)	0.5

All infants with abdominal distension showed initial lower CSOR values compared to controls (group D). Patients with NEC had lower CSOR values which were still decreasing on day 3. CSOR values in group C reached control values on the 2nd day of observation, whereas group B did so on day 3.

CONCLUSIONS: There appears to be a trend towards lower CSOR values in the NEC group compared to the other 3 groups. We speculate that NIRS may be useful in distinguishing NEC from benign causes of abdominal distension in VLBWI.

43

Are eNOS Gene Polymorphisms Associated with Exhaled Nitric Oxide Levels in Extremely Low Birth Weight Infants?

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BACKGROUND: Endogenous nitric oxide is an important mediator of pulmonary vascularization and reactivity. Single nucleotide polymorphisms (SNPs) of eNOS have previously been shown to decrease basal NO production. We investigate the association of SNPs of eNOS and exhaled nitric oxide (FE_{NO}) levels in ELBW infants.

OBJECTIVE: We tested the hypothesis that SNPs of eNOS correlate with FE_{NO} in ELBW infants.

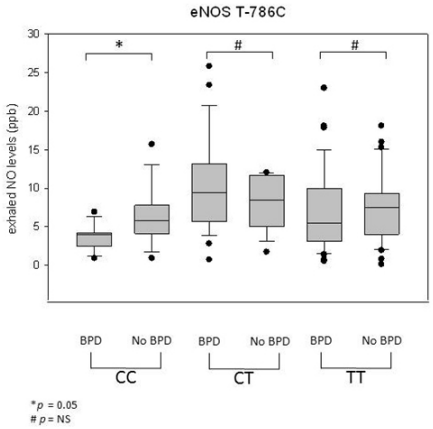
DESIGN/METHODS: ELBW infants (N=55) were enrolled in this study following informed parental consent. Repeated replicate FE_{NO} measurements were made offline as described in the 2005 ATS/ERS recommendations after collection into NO-inert mylar bags. DNA was isolated from buccal swabs and allelic discrimination was determined by real-time PCR using specific probes for eNOS (T-786C, G894T). ANOVA, Chi-square analysis and t-test were performed with p<0.05 denoting statistical significance.

RESULTS: Patients in the BPD group were smaller at birth ($p = 0.004$) and were born at a younger gestational age ($p = 0.02$) than the patients in the no BPD group.

Demographic Data

	BPD (N=32)	No BPD (N=23)	P value
Birthweight ± SD	719 ± 151	839 ± 115	0.004
GA ± SD	25.3 ± 1.7	26.2 ± 1.5	0.025
Race			0.213
Caucasian	11	10	
Black	12	7	
Hispanic	8	6	
Other	2	0	

Exhaled nitric oxide levels were lower ($p = 0.05$) for BPD infants with the CC genotype (eNOS T-786C SNP) compared to infants with no BPD.



CONCLUSIONS: ELBW infants who progress to BPD and who have the CC genotype of this eNOS SNP have decreased levels of exhaled NO production compared to non-BPD infants. This is consistent with previous findings that this T-786C eNOS promoter SNP decreases eNOS gene activity thereby reducing endothelial NO synthesis. We speculate that decreased vascular endothelial production of endogenous NO forms a genetic foundation, which, when coupled with extreme prematurity and environmental pressures, increases the susceptibility to BPD.

44

eNOS Gene Polymorphisms Are Associated with Bronchopulmonary Dysplasia in Extremely Low Birthweight Infants

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BACKGROUND: Bronchopulmonary dysplasia (BPD) is a common morbidity in premature infants. Multiple factors contribute to the development of BPD including barotrauma and volutrauma from mechanical ventilation, infection, and oxidative stress, among others. Nitric oxide (NO) plays an important physiologic role in lung development; it mediates vasodilation and bronchodilation through smooth muscle relaxation. NO is also a critical regulator of angiogenic agents like vascular endothelial growth factor (VEGF) and also plays a major role in postnatal angiogenesis. Previous studies have shown that the T-786C polymorphism resulted in significant reduction in eNOS gene promoter activity, which suggests that this mutation reduces endothelial NO synthesis. The G894T polymorphism has also been shown to render the eNOS protein more susceptible to intracellular cleavage thus impairing NO production, decreasing eNOS activity, and reducing NO levels or activity.

OBJECTIVE: We tested the hypothesis that SNPs of eNOS were associated with the development of BPD in ELBW infants.

DESIGN/METHODS: Infants with birthweight <1 kg (N=55) were enrolled after obtaining informed parental consent. Infants with chromosomal abnormalities or known congenital anomalies were excluded from the study. DNA was isolated from buccal swabs of ELBW infants and allelic discrimination was performed by real-time PCR using specific probes for eNOS (T-786C, G894T). ANOVA, Chi suqare analysis and t-test were performed with a P value of <0.05 denoting statistical significance.

RESULTS: Infants in the BPD group were smaller at birth (p<0.05) and were born at a younger gestational age (p<0.05) than the patients in the no BPD group.

Demographic Data

	BPD (N=32)	**No BPD (N=23)**	**P value**
Birthweight ± SD	719 ± 151	839 ± 115	0.004
GA ± SD	25.3 ± 1.7	26.3 ± 1.5	0.025
Race			0.2
Caucasian	11	10	
Black	12	7	
Hispanic	8	6	
Other	2	0	

The GG phenotype of SNP G894T was associated with BPD in ELBW infants (p<0.05).

G894T

	GG	GT	TT
BPD	22	9	0
no BPD	8	7	3

p <0.05

CONCLUSIONS: Our results show that SNP G894T was associated with BPD in ELBW infants. This SNP has previously been shown to decrease NO production by increasing intracellular cleavage of the eNOS protein thereby impairing eNOS activity. We speculate that infants with this polymorphism are more susceptible to the development of BPD due to decreased basal NO production.

45

Fellow in Training

Single Nucleotide Polymorphism of MUC5B Gene and Bronchopulmonary Dysplasia in ELBW Infants

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BACKGROUND: MUC5B is a mucin protein expressed in airway and lung. Its expression is upregulated by oxdative stress as well as by the variant allele of MUC5B (rs35705950), a single nucleotide polymorphism (SNP) in the promoter region. Up-regulated expression of MUC5B is implicated in the pathogenesis of pulmonary fibrosis in adults. BPD is a complex disease with multifactorial etiology derived from the interaction of a susceptible preterm host with a multitude of external risk factors. As a consequence of repeated injuries to the developing premature lung, various degree of interstitial fibrosis may develop during the process of healing.

OBJECTIVE: We tested the hypothesis that a SNP of MUC5B gene is associated with the development of BPD in ELBW infants.

DESIGN/METHODS: Informed parental consent was obtained for infants weighing <1kg at birth, who did not have congenital or chromosomal abnormalities. BPD is defined by the need for oxygen at 36 weeks PMA. DNA was isolated from buccal mucosal swabs. Allelic discrimination was performed using specific probes for MUC5B (rs35705950) with real-time PCR. 65 ELBW infants with BPD were compared with 55 ELBW infants without BPD. t-test or chi-square test were performed with $p<0.05$ denoting statistical significance.

RESULTS:

Results

		No BPD	BPD	p value
Gestational age (mean± SD)		25.6 ±1.4	25.6 ±1.7	0.9
Birth weight (mean± SD)		803.4 ±130	762 ±118	0.07
Male Gender		25 (45%)	28 (43%)	0.9
Race	Hispanic	12 (22%)	25 (38%)	0.3
	Caucasian	17 (31%)	18 (28%)	
	Black	21 (38%)	18 (28%)	
	Other	5 (9%)	4 (6%)	
rs35705950				
	GG	52	57	0.3
	Gt	3	8	

There were no statistically significant differences in birth weight, gestational age, gender or racial distribution between the infants with or without BPD. There was no significant difference in genotype distribution ($p=0.33$) of the MUC5B SNP (rs35705950) between the two groups.

CONCLUSIONS: In this pilot study, a SNP of MUC5B gene was present at a higher frequency in ELBW infants with BPD compared to those without, although it did not reach statistical significance. The allele frequencies in both groups were less than those present in the previous study of familial interstitial pulmonary fibrosis patients (adults) and hence a larger sample size is needed than we had initially estimated. Power analysis reveals that a sample size of 163 patients in each group would be needed to detect a statistically significant difference between the two groups (with $\alpha=0.05$ and $\beta=0.8$).

46

Graduate Student

The Effect of a Single Nucleotide Polymorphism in the Glucocorticoid Induced Transcript 1 (GCCLI1) Gene on the Development of Bronchopulmonary Dysplasia

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BACKGROUND: The underdevelopment of lung tissue and the inflammatory response are just two factors responsible for the development of BPD. The administration of antenatal steroids is a common treatment strategy to accelerate lung maturation for the fetus at risk of preterm delivery. A SNP in the glucocorticoid-induced transcript 1 (GLCCI1) gene has been associated with non-responsiveness in asthmatics following treatment with inhaled steroids. GLCCI1 is highly expressed in lung and lymph tissue in the presence of steroids; however, following treatment of GLCCI1 SNP patients with inhaled steroids, pulmonary function tests fail to show expected increases in FEV1.

OBJECTIVE: We hypothesized that the GLCCI1 SNP, which decreases transcription of GLCCI1, is associated with the progression of BPD in ELBW infants.

DESIGN/METHODS: Infants weighing <1 kg at birth were enrolled, excluding those with congenital and chromosomal anomalies. BPD was determined by oxygen dependence at 36 weeks PMA. DNA was isolated from buccal swabs and then subjected to allelic discrimination using specific probes for the GLCCI1 SNP. The genotypes of ELBW infants (N=99) who received antenatal steroids were stratified for the progression or lack of progression to BPD. A chi-square or t-test was performed for statistical significance using $p<0.05$ as the threshold for significance.

RESULTS: Infants with BPD were smaller at birth ($p<0.001$) and more immature ($p<0.001$) than infants with no BPD.

Demographics

		No BPD	BPD	P-Value
Gestational Age (wks) ± SD		26 ± 1.4	25 ± 1.6	p<0.001
Birth Weight (g) ± SD		835 ± 114	712 ± 140	p<0.001
Male Gender		17 (40%)	28 (49%)	p=0.5
Race	Caucasian	19 (47%)	15 (26%)	p=0.2
	Hispanic	10 (24%)	16 (28%)	
	Black	10 (24%)	20 (34%)	
	Other	2 (5%)	7 (12%)	

There was no statistical significance in the GLCCI1 SNP genotype distribution between ELBW infants treated with glucocorticoids who developed BPD and those who did not develop BPD.

Genotype Distribution

	No BPD	BPD	P-value
CC	22 (52%)	27 (47%)	0.6
Ct	15 (36%)	19 (33%)	
tt	5 (12%)	11 (19%)	
CC	22 (52%)	27 (47%)	0.8
Any t	20 (48%)	30 (53%)	

CONCLUSIONS: Treatment with antepartum maternal glucocorticoids was not associated with the GLCCI1 SNP genotypes in ELBW infants who progress to BPD. We speculate that the underlying GLCCI1 SNP of the preterm fetus does not influence the susceptibility to BPD, in those who receive antepartum maternal steroids.

47

Single Nucleotide Polymorphisms (SNPs) of the Toll Like Receptor (TLR)-4 in Extremely Low Birth Weight Infants with Bronchopulmonary Dysplasia

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BACKGROUND: TLRs are pattern recognition receptors that activate innate immunity. TLR-4 specifically interacts with LPS in the membrane of gram-negative bacteria. Two SNPs-Asp299Gly and Thr399Ile-in the TLR-4 ectodomain are associated with a TLR-4 hyporesponsive phenotype in airway epithelial cells, and hence increase susceptibility to gram negative bacterial infections. This increased susceptibility to infections and the accompanying pro-inflammatory response may place susceptible infants with these SNPs at a higher risk of developing BPD.

OBJECTIVE: We hypothesized that TLR-4 SNPs that results in LPS hyporesponsiveness are associated with an increased risk for BPD in ELBW infants.

DESIGN/METHODS: Informed parental consent was obtained for infants weighing <1kg at birth, who did not have congenital or chromosomal abnormalities. BPD is defined by need for oxygen supplementation at 36 weeks PMA. DNA was isolated from buccal mucosal swabs. Allelic discrimination was performed using specific probes for TLR-4 with real-time PCR. Chi square analyses and t-tests were performed with $p<0.05$ denoting statistical significance.

RESULTS: As expected, the BPD infants were more immature and lighter, needed more treatment for PDAs, and had more ROP compared to the controls. Racial distribution was similar.

Demographic Data

	No BPD	BPD	p value
Birth Weight (g)	824±122	711.3±145	0.01
Gestation (wks)	26.2±1.8	25.2±1.5	0.001
Race			0.5
Caucasian	38%	30%	
Black	35%	29%	
Hispanic	21%	33%	
Others	6%	8%	
PDA	54%	87%	0.001
Sepsis	5.8%	22.2%	0.07
NEC	5.7%	14.8%	0.3
Any IVH	20%	29.6%	0.4
IVH (Grade3/4)	2.8%	11%	0.3
ROP	17%	61%	0.0001

The distribution of polymorphism Asp299Gly was similar between both the groups, while 7.4% of babies with BPD had the Thr399Ile polymorphism compared to 2.7% of controls.

Genotype Distribution

Thr399Ile	No BPD	BPD
CC	35	50
Ct	1	4
tt	0	0
Any t	1	4

p value= 0.3

CONCLUSIONS: In this pilot study, the TLR-4 SNP Thr399Ile was present at a higher frequency in the BPD group compared to the control group, although it did not reach statistical significance. We speculate that LPS hyporesponsiveness results in increased pulmonary alveolar and epithelial inflammation from gram negative bacteria and hence increases susceptibility to BPD. Power analysis reveals a sample size of 190 in each group to show a statistically significant difference between the 2 groups ($\alpha=0.05$, $\beta=0.8$).

48

House Officer

Interleukin-1β Single Nucleotide Polymorphism and Susceptibility to Bronchopulmonary Dysplasia

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BACKGROUND: BPD results from the exposure of the susceptible preterm lung to environmental stressors, including inflammatory processes, in the presence of an underlying genetic foundation. The Interleukin-1β (IL-1β) cytokine functions as an important mediator of the inflammatory response and is also involved in cellular proliferation, differentiation, and apoptosis. Produced by activated macrophages, IL-1 stimulates thymocyte proliferation by inducing IL-2 release, B-cell maturation and proliferation, and FGF activity. IL-1 proteins are also involved in inflammatory responses as endogenous pyrogens, and stimulate release of prostaglandin and collagenase. Located on chromosome 2, IL-1β is implicated in necrosis, inflammation, acute phase reactants, and infection. Polymorphisms that increase IL-1β expression may influence the level of reactive oxygen and nitrogen species in the lung. We investigated whether IL-1β promoter single nucleotide polymorphism (SNP) (C-3737T) is associated with the progression of ELBW infants to BPD.

OBJECTIVE: We hypothesized that the IL-1β C-3737T SNP, which increases IL-1β expression, is

associated with an increased risk for BPD in ELBW infants.
DESIGN/METHODS: Informed parental consent was obtained from infants weighing <1 kg at birth, who did not have congenital or chromosomal abnormalities. BPD stratification was determined by oxygen requirements at 28 days and 36 weeks PMA. DNA was isolated from buccal mucosa from these infants (N=102), followed allelic discrimination for rs4848306 by real-time PCR. Data was analyzed by t-test or chi square analyses, with $p<0.05$ denoting statistical significance.
RESULTS:

Demographics

	No BPD	BPD	*P*
Gestational Age (wks)	26.2±1.5	25.1±1.7	≤0.001
Birth Weight (g)	832±120	706±144	≤0.001
Male	16 (36%)	29 (50%)	0.3
Race			0.5
Caucasian	15 (34%)	16 (28%)	
Black	13 (30%)	17 (21%)	
Hispanic	14 (32%)	17 (29%)	
Other	2 (4%)	8 (4%)	

Genotype Distribution

	No BPD	BPD
CC	25 (57%)	19 (33%)
Ct	15 (34%)	2 (47%)
tt	4 (9%)	12 (20%)
Any t	19 (43%)	39 (67%)

p=0.04

CONCLUSIONS: There is an association between the promoter IL-1β C-3737T SNP and BPD. We speculate that this promoter SNP of IL-1β may result in an increased expression of this pro-inflammatory mediator, amplifying the level of reactive oxygen and nitrogen species in the alveolar epithelial milieu and making the ELBW infant more susceptible to oxidant injury and subsequent progression to BPD.

49

Vitamin D Improves Pulmonary Function in Neonatal Rat Lung

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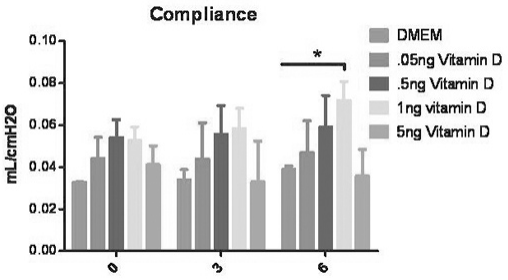
BACKGROUND: Vitamin D is known for its importance in regulating calcium. Recently it has become clear that receptors for vitamin D are present in a variety of cells, including pulmonary cells. Vitamin D has been shown to play a role in lung development. Vitamin D deficiency has been associated with childhood asthma as well as impairing lung function and increasing airway resistance in asthmatics.
OBJECTIVE: To determine the effect of vitamin D on neonatal lung physiology. Due to the immunological and calcium homeostasis properties of vitamin D, we hypothesized that vitamin D will improve lung function.
DESIGN/METHODS: Fetal Sprague-Dawley rats were injected with 4 doses of vitamin D (.05ng, .5ng, 5 ng, 1 ng) and control (Dulbecco's modified Eagle's medium; DMEM) directly into the amniotic sac at 16 days gestation. The animals delivered naturally and pulmonary function testing (PFT) was performed on day of life 10.
The animals underwent tracheotomy and were connected to a flexivent (SCIREQ; Montreal, Canada) computer controlled animal ventilator. PFTs were done at varying PEEPS (0, 3, 6).
Statistical analysis was performed using the Graphpad Prism version 5 software. The data was analyzed using unpaired t-test analysis.
RESULTS: 38 animals underwent PFTs. (8 per dose of vitamin D and 6 control).
We demonstrated a significant decrease in airway resistance at PEEP 3 when animals were exposed to .05 ng vitamin D (.33 ± .19 vs 2.45 ± .11; P<.001) and .5 ng vitamin D (.39 ± .47 vs 2.45 ± .11; P=0.01) as compared to control. Similar results were found at PEEP 6. Lung compliance was significantly improved when fetal rats were exposed to 1 ng of vitamin D as compared to control at Peep 6. (.071 ± .009 vs .039 ± .002; p=.01)



CONCLUSIONS: We demonstrated that in utero exposure to vitamin D was associated with an increase in lung compliance and a decrease in airway resistance. These findings suggest vitamin D may play a role in lung tissue remodeling causing a change in respiratory mechanics. It is possible these in utero changes in lung development could continue into childhood.

50

How Common Is Transient Tachypnea of the Newborn?

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BACKGROUND: Transient tachypnea of the newborn (TTN) is a "common" primary diagnosis of late preterm and term neonates. Associated with preterm birth and Cesarean section delivery, TTN is a self-limiting disease that nonetheless has significant implication to family bonding, initiation of breast feeding in the first days of life, and cost of the newborn hospitalization. There is also indication that TTN may predispose to asthma later in childhood. Supportive care remains the primary treatment for TTN. The actual incidence of TTN in the United States is unknown.
OBJECTIVE: To define the incidence of TTN in the United States.
DESIGN/METHODS: We undertook a dual-data source analysis of late preterm and term neonates diagnosed with TTN from 1993-2010. Two data sources were used: (A) manually abstracted medical records from neonates born at our institution and diagnosed with respiratory distress from 2001 through 2010, and (B) the Nationwide Inpatient Sample, a statistically balanced data source of hospital discharge information representing all hospitalizations in the United States from 1993 through 2008. Annual incidence of TTN in each data set was calculated. Univariable and multivariable logistic regression modeling was used to evaluate trends in diagnosis of TTN over time.
RESULTS: Data source (A) yielded 54,548 births during the study period. Of these, 1920 (3.5%) carried a discharge diagnosis of respiratory distress of which 952 (1.7% of births, 49.6% of cases of respiratory distress) were confirmed cases of TTN. Data source (B) yielded 67,483,350 births during the study period. Of these 2,204,332 (3.3%) carried a discharge diagnosis of respiratory distress of which 1,917,485 (2.8% of births, 87.0% of cases of respiratory distress) met criteria for TTN.
CONCLUSIONS: There is agreement between local, manually reviewed medical records and national discharge data sets about the overall incidence of TTN. This incidence remained relatively stable over the fifteen years examined, despite significant increases in both late preterm and Cesarean section birth. As TTN affects 1.7-2.8% of live births in the United States, effective prevention and treatments should be sought.

51

Recorded Pulse Oximetry Can Identify Oxygen Saturation Patterns in Premature Infants That Correlate with Longer Hospitalization

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BACKGROUND: Optimal oxygen saturation (O2sat) values for preterm infants remain uncertain. Recorded pulse oximetry allows detection and analysis of actual rather than target O2sat levels. Despite identical O2sat targets, extremely preterm infants may have distinct patterns of O2sat that predict later clinical outcomes.
OBJECTIVE: To identify distinct O2sat phenotypes in extremely preterm infants, and correlate these phenotypes with duration of NICU hospitalization.
DESIGN/METHODS: Over a 7 month period, we enrolled a convenience sample of infants born at Beth Israel Deaconess Medical Center, Boston MA, at <29 weeks gestation who remained in the NICU for at least 28 days. O2sat values were recorded once per minute from birthdate through day 28 and summarized, including mean and percent values below specified thresholds. Linear regression was used to estimate association of mean O2sat and percent of O2sat values < 85% with PMA at discharge. Variables to adjust for illness severity, including GA, 5-minute Apgar, need for ventilator on DOL#7, and BPD status at 36 wks, were included in the model.
RESULTS: We enrolled 26 infants.

Demographic Data (n=26)

Gestational age in wks (mean, SD)	26.7, 1.3
Female (n, %)	13, 50%
Race (n, %)	
Caucasian	15, 58%
Black	3, 11.5%
Ventilatory support on day 7 (n, %)	
None, NC, or CPAP	18, 69%
Mechanical ventilation	8, 31%
O2sat (mean, SD)	93.3, 2.5
% of sat < 85% (mean, SD)	6.7, 6.2

Number of O2sat values recorded per infant ranged from 37783 to 39742, reflecting 96.0 to 99.7% of all minutes.
Lower mean O2sat and increased percentage of time with O2sat <85% was associated with significantly greater PMA at discharge hospitalization, even after adjusting for severity of illness.

Longitudinal Regression Models

Mean O2sat Model			
	Coefficient	95% CI	p value
Mean O2sat	-5.17	-8.14, -2.21	0.002
GA	5.11	-0.21, 10.43	0.059
5-min Apgar	-1.43	-5.71, 2.85	0.490
Vent Status D7	15.15	-1.56, 31.87	0.073
BPD status	2.13	-11.54, 15.79	0.747
% Time Less Than 85% sat Model			
% of O2sat <85%	2.35	0.78, 3.92	0.006
GA	4.06	-1.50, 9.62	0.142
5-min Apgar	-0.92	-5.56, 3.72	0.681
Vent Status D7	5.16	-16.49, 26.81	0.621
BPD status	3.94	-10.47, 18.35	0.572

CONCLUSIONS: Recorded oximetry can distinguish infants based on O2sat patterns that may predict length of stay, even after adjustment for severity of illness. Better characterization of such O2sat phenotypes may be useful in predicting additional clinical outcomes.

52

Fellow in Training

Comparison of Postnatal Steriods (PNS) on Respiratory Severity Score (RSS) in Brochopulmonary Dysplasia (BPD)

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BACKGROUND: Steroids reduce RSS in infants with BPD. The comparative efficacy of dexamethasone (DEX), hydrocortisone (HC) and methylprednisolone (MP) in reducing RSS and facilitating extubation in infants with BPD is not known.
OBJECTIVE: We compared the effects of DEX, HC and MP on change in RSS(=MAP*FiO_2) in

BPD.
DESIGN/METHODS: From 2006-10, 350 infants received PNS; 200 were reviewed based on medical chart availability. Early(<7d, n=20); repeat(<14d since previous steroids, n=45) or steroid for other indications (hypotension, n=30;airway edema,n=35) were excluded; 70 infants were analyzed for change in RSS, and rate of extubation on d3 & d7 after starting PNS.
RESULTS: Infants received DEX (27%), HC (43%) or MP (30%) based on provider preference.

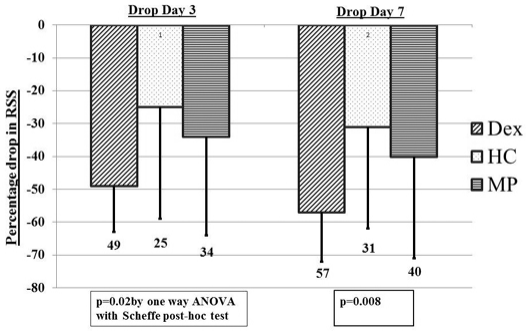
Baseline characteristics and response(mean±SD)

Steroid (N)	Total (70)	DEX (19)	HC (30)	MP (21)
GA wk	26±3	26±4	26±3	26±2
BW g	833±484	846±601	835±547	820±232
Age at steroids* (d)	26±16	32±17	27±16	20±11
Duration of steroids (days)	11±8	11±8	11±9	10±7
Starting dose (mg/kg/day)		0.23±0.1	3.3±1	2.4±0
Baseline RSS	6.1±3.2	6.6±3.8	5.3±2.5	6.7±3.4
Baseline FiO2	0.52±0.1	0.55±0.25	0.5±0.18	0.53±0.19
Baseline MAP	11±2.6	11.2±2.7	10.3±2.2	12±2.7
RSS on day 3**	3.8±2.4	3.2±1.9	4±2.8	4±2.3
RSS on day 7***	3.4±2.3	2.6±1.4	3.4±3.9	4±3.2

*P=0.04 b ANOVA (Dex vs. MP 0.04, post-hoc Scheffe); **P=0.51; ***P=0.16

Prior to PNS, all babies were on mechanical ventilation, 39% extubated by d3 & 49% by d7 (p ≤0.002 compared to baseline but not different by steroid type). RSS decreased significantly; both day of treatment and type of steroid were significant by two-way ANOVA. DEX had the greatest decrease in RSS.

Percentage drop in RSS D3,D7:Steroid Groups



All steroid doses were "converted" to HC equivalent dosing. Dose was not associated with change in RSS.
CONCLUSIONS: All three forms of PNS are effective in decreasing RSS facilitating extubation. DEX induced a greater percent decrease in RSS from baseline than HC. Prospective, randomized trials to evaluate the efficacy and neurodevelopmental outcome of DEX, HC and MP are needed.

53

Fellow in Training

Testing the Oxygen Area under the Curve Model in Newborn Mice Exposed to Hyperoxia

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BACKGROUND: Oxygen (O_2) as a drug is essential in the treatment and prevention of neonatal hypoxia. Its excessive use can lead to serious long lasting adverse sequelae in the lungs, eyes and the brain. In the lungs, it has been associated with airway hyper-reactivity and susceptibility to respiratory syncytial virus. However, levels of O_2 needed to maintain tissue oxygenation without tissue injury remains undefined. Quantifying O_2 exposure as an area under the curve (O_{AUC}) has been shown to be a stronger predictor of later respiratory symptoms in children born prematurely than the number of days of supplemental O_2. Here, we test the hypothesis that the O_{AUC} defined in human exposures can be used to accurately define levels of neonatal O_2 sufficient to permanently disrupt lung structure and function in adult mice.
OBJECTIVE: To determine whether lung structure and function are disrupted in neonatal mice exposed to 2 days O_2 and whether maintaining the same cumulative O_2 dose over varying lengths of time causes equivalent changes to adult lung structure and function.
DESIGN/METHODS: Newborn mice were exposed to room air (RA), 60% or 100% O_2 over 2 days or 4 days and recovered in RA until 8 weeks of age. Six mice each from different O_2 exposures (RA, 2 days of 60%, 4 days of 60%, 2 days of 100%) were sedated and ventilated to assess alveolar compliance, airway resistance and elastance. Lung sections of mice from varying O_2 exposures were stained with hematoxylin-eosin dye, and alveolar size visualized under the microscope.
RESULTS: There were no significant differences in lung functions of mice exposed to RA versus 60% O_2 for 2 days, 60% O_2 for 4 days or 100% O_2 for 2 days. Likewise, the alveolar sizes were not different.
CONCLUSIONS: While trend were noted, our findings suggest varying O_2 levels for short periods of time do not alter lung structure or function in a cumulative dose manner. Since these doses caused mild changes in lung development and function, more severe exposures are needed to test the O_{AUC} concept.

54

Does Humidified High Flow Nasal Cannula Improve Feeding Intolerance in Preterm Infants?

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BACKGROUND: Decisions regarding infant nutrition are often made based on the respiratory status of the very-low-birth-weight (VLBW) infant. Historically, VLBW infants ready for extubation have been placed on continuous positive airway pressure (CPAP) for continued respiratory support. The development of humidified high-flow-cannula (HFC) systems over the past decade, has afforded practitioners the opportunity for an alternative mode of respiratory support. To date, no studies have been conducted to evaluate differences in feeding intolerance among infants treated with these two modes of noninvasive respiratory support. We hypothesized that the infants treated with HFC would have less feeding intolerance than those treated with CPAP.
OBJECTIVE: To evaluate the differences in feeding intolerance between infants maintained on CPAP and those infants receiving CPAP and/or high-flow nasal cannula**.**
DESIGN/METHODS: Two groups of VLBW infants (birth weight;750-1500 grams) were compared based on respiratory support. 1) VLBW infants born between 2000-2004 treated with CPAP (Before HFC) and 2) VLBW infants born between 2005-2010 treated with either CPAP and/or HFC (After HFC). Feeding tolerance was defined as days to full enteral feedings and attainment of enteral feedings of 120 ml/kg/day. The two groups were compared for baseline demographics and feeding intolerance.
RESULTS: There were 473 infants who met inclusion criteria (185, before HFC and 288, after HFC). There were no significant differences in baseline demographics (birth weight, apgar scores, sex, race, days on mechanical ventilation and BPD) between the two groups. More infants in after HFC group received prenatal steroid, breast milk and had fewer episodes of sepsis and use of postnatal steroid. The infants in after HFC group required non-invasive support for longer duration of time. There was no significant difference in time of initiation of feedings, days to full feedings and time of initiation of PO feedings between the two groups. There was a trend towards longer time to reach full PO feedings with HFC use.

Feeding intolerance in two groups (median, range)

	Before HFC (n=185)	After HFC (n=288)	p
Feed Started (days)	3 (2-5)	3 (2-4)	0.2
Full feed	14 (9-24)	14 (9-23)	0.6
PO feed started	31 (21-40)	31 (21-44)	0.8
Full PO feed	39 (29-55)	44 (31-60)	0.053

CONCLUSIONS: The use of HFC does not improve feeding intolerance in VLBW infants receiving non-invasive respiratory support.

55

Fellow in Training

Improved Growth Velocity Associated with a Decreased Odds of Chronic Lung Disease

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Pediatrics/Neonatology, Christiana Care Health System, Newark, DE; Pediatrics, TJU/Jefferson Medical College, Philadelphia, PA.

BACKGROUND: Growth velocity has become an important focus in the NICU. Very low birth weight (VLBW) infants often have extrauterine growth restriction which may restrict lung growth and increase the risk of CLD, an important morbidity of prematurity. It is unclear if improved growth velocity plays a protective role in the development of CLD.
OBJECTIVE: To assess growth velocity over time and investigate the association of growth velocity and CLD in VLBW infants.
DESIGN/METHODS: Retrospective analysis of VLBW infants (<1500g) from 2000-2010 and examined changes in growth velocity and incidence of CLD in the entire patient population as well as two consecutive 5-year cohorts (Cohort 1:2000-2005 vs Cohort 2:2005-2010) at a large level 3 NICU. After excluding deaths and transfers, 1213 infants were included in the analysis. CLD defined as need for supplemental O_2 at 36 wks post-conceptional age. Illness severity at birth was determined using SNAP score. Statistical analysis included: one way ANOVA, Chi-square, Mann-Whitney U test, and multivariable logistic regression.
RESULTS: The mean growth velocity increased from cohort 1 to cohort 2. There were no differences in EGA, length of stay, use of mechanical ventilation or diagnosis of PDA between the study cohorts. There were fewer males, decreased use of postnatal steroids, decreased illness severity and higher discharge weight in cohort 2. There was no difference in CLD between cohorts.

Cohort	1 (7/1/2000 – 6/30/2005)	2 (7/1/2005 – 6/30/2010)	p
N	608	605	
Growth (g/day)	18.6 ± 4.3	19.5 ± 4.8	<0.001
Gestational age (wks.)	28.8 ± 3.5	28.7 ± 2.6	0.63
Male gender	50%	44%	0.04
PDA	30%	32%	0.31
Postnatal steroids	12%	8%	0.06
SNAP score	11.7 ± 6.6	10.9 ± 6.8	0.05
CLD	21%	22%	0.84
Length of Stay (days)	55.9 ± 26	56.6 ± 27	0.65
Discharge weight (g)	2149 ± 459	2236 ± 534	.002

After controlling for confounding variables including illness severity, mechanical ventilation, gestational age, postnatal steroids, and year of birth, improved growth velocity was associated with a decreased odds of CLD (Odds ratio: 0.92, 95% CI 0.89-0.95/per 1g/day increase in wt gain).
CONCLUSIONS: In our population of VLBW infants growth velocity improved over time between 2 cohorts. Increased growth velocity was independently associated with a decreased odds of CLD. The increase in growth was associated with an increase in discharge weight but no change in length of NICU stay. Our data suggest that a prospective study of nutritional supplementation to reduce CLD would be warranted.

56

BMP2 and eNOS Expression in HPAECs Exposed to Hyperoxia

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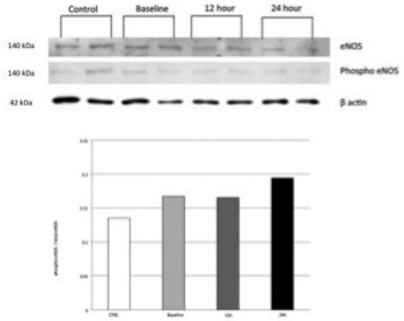
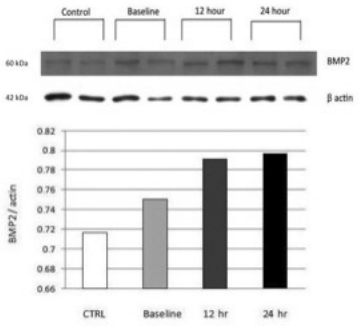
Division of Newborn Medicine, Westchester Medical Center, Valhalla, NY; Department of Biochemistry and Molecular Biology, New York Medical College, Valhalla, NY.

BACKGROUND: BPD is a common morbidity in premature infants. Multiple factors contribute to the development of BPD, oxidative stress being one. Our hypothesis is that increased BMP mediated nitric oxide synthase (NOS) expression plays a major role in hyperoxia induced lung injury. BMPs are currently considered to be pleiotropic cytokines that influence proliferation, growth, differentiation, and apoptosis of many different cell types while Nitric oxide (NO) plays an important physiologic role in lung development. Previous studies have shown that BMP2 and BMP4 may have a role in the phosphorylation and activity of NOS in bovine PAECs, ultimately regulating NO bioavailability.

OBJECTIVE: We sought to determine if BMP2 and eNOS expression were upregulated in HPAECs exposed to hyperoxia.
DESIGN/METHODS: HPAECs passages 5-6 were plated in 60 mm plates and exposed to hyperoxia (95% 02) and collected at 12, 24 and 48 hours. Antibodies to BMP2, phosphorylated eNOS and eNOS were used in Western blot assays to determine protein expression.
RESULTS: Preliminary results showed that eNOS phosphorylation increased by up to 25% in cells exposed to hyperoxia at 24h compared to control.



BMP2 expression also increased by 10% at 24 hrs, although these did not achieve statistical significance.



CONCLUSIONS: Our data demonstrated that BMP2 and eNOS expression was upregulated in hyperoxia. Based on previous published literature, BMPs may have a role in NOS phosphorylation through the BMPIIR, thereby increasing NO production. Thus, we speculate that upregulation of both BMP2 and eNOS may be a pathologic response of the vascular endothelium to oxidative stress.

Poster Session I
Neurobiology

Friday, March 30, 2012
6:00pm-7:30pm

58

House Officer

Long Term Effect of Src Kinase Inhibition on Caspase-9 Activation Following Hypoxia in the Newborn Piglet Brain

Aun Woon Soon, Angely Modestin, Maria Delivoria-Papadopoulos.
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BACKGROUND: Caspase-9 initiates cell death by activating caspase-3 which cleaves intracellular proteins and enzymes such as caspase-activated DNase (CAD) from its inhibitor of CAD. The activated CAD translocates from the cystol to the nucleus and results in fragmentation of nuclear DNA. We have previously shown that hypoxia results in increased activity and expression of caspase-9 and increased activation of Src kinase, a protein tyrosine kinase in the newborn piglet brain.
OBJECTIVE: The present study tests the hypothesis that inhibition of Src kinase will prevent the activation of caspase-9 following 1 and 14 days after hypoxia in the newborn piglet brain.
DESIGN/METHODS: Newborn piglets were divided into: normoxia, normoxia 1 and 14 days later (Nx, n=4, Nx-1D, n=4; Nx-14D, n=2), hypoxia, hypoxia 1 and 14 days later (Hx, n=4, Hx-1D, n=4; Hx-14D, n=2) and hypoxic-pretreated with a selective Src kinase inhibitor (4-amino-5-(4-chlorophenyl)-7-(dimethylethyl)pyrazolo[3,4-*d*] pyrimidine (PP2), 1 mg/kg i.v., 30 min prior to hypoxia, 1 day and 14 days later, Hx+PP2-1D, n=3; Hx+PP2-14D, n=2). Following 1 and 14 days after hypoxia, cytosolic fraction was isolated and caspase-9 activity determined spectrofluorometrically using a specific peptide substrate for caspase-9 (Ac-Leu-Glu-His-Asp-AFC).
RESULTS: Mean $Sp0_2$ in the hypoxic groups ranged from 5-9% activity of caspase-9 (nmoles/mg protein/hr) was 1.53±0.30 in normoxia and 1.91±0.14 in hypoxia ($p < 0.05$). During recovery, caspase-9 activity was 1.65±0.07 in Nx-1D, 2.60±0.04 in Hx-1D, and 1.9±0.01 in Hx+PP2-1D. Following 14 days, caspase-9 activity was 1.95±0.3 in Nx-14D, 1.4±0.15 in Hx-14D and 1.62±0.31 in Hx+PP2-14D. Following 1 day after hypoxia, caspase-9 activity was attenuated by the administration of Src kinase inhibitor. Following 14 days, caspase-9 activity was not significantly different between the treated and untreated hypoxic groups.
CONCLUSIONS: We conclude that the Src kinase mediated activation of caspase-9 following hypoxia in the cerebral cortex of newborn piglets persists for 1 day and 14 days. While the activity in Nx group was similar on day 1 and day 14, the activity decreased in the Hx group on day 14 as compared to day 1. In the hypoxic group the decrease in caspase-9 activity following 14 days is either due to caspase-9 initiated cell death, leading to cell loss or tyrosine phosphorylation-dependent activation by Src kinase is not sustained for 14 days. (NIH-HD 20337).

59

Fellow in Training

Mechanism of Increased Activation of Ca^{++}/Calmodulin-Dependent Protein Kinase IV (CaM Kinase IV) during Hypoxia in Neuronal Nuclei of the Cerebral Cortex of Newborn Piglets

Ronald K. Sallas, Qazi Ashraf, Angely Mondestin, Om P. Mishra, Maria Delivoria-Papadopoulos.
Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Previously, we have shown that hypoxia results in increased neuronal nuclear high affinity Ca^{++}-ATPase activity and increased nuclear Ca^{++}-influx resulting in increased activation of CaMK IV in neuronal nuclei of newborn piglets. CaMK IV initiates transcription of a number of proapoptotic proteins by phosphorylating cyclic AMP response element binding (CREB) protein at Ser^{133}. We have also shown that hypoxia results in increased activity of Src kinase in the cortex of piglets.
OBJECTIVE: The present study tests the hypothesis that the hypoxia-induced increased activation of CaM kinase IV in neuronal nuclei of the cerebral cortex of newborn piglets is mediated by Src kinase.
DESIGN/METHODS: Piglets were divided into: normoxic (Nx, n=4), hypoxic (Hx, n=4) and hypoxic-pretreated with a selective Src kinase inhibitor (PP2, 4-Amino-s-{4-chlorophenyl-7-(t-butyl) pyrazolol (3,4-d) pyrimidine}, 1 mg/kg, i.v., 30 min prior to hypoxia, Hx+Srci, n=4) groups. Hypoxia was induced by decreasing FiO_2 to 7% for 60 min. Tissue levels of ATP and phosphocreatine were determined. Nuclei were isolated and CaM Kinase IV activity was determined by ^{33}P-incorporation into syntyde-2 in a medium of 50 mM HEPES (pH 7.5), 2 mM DTT, 40 M syntide 2, 0.2 mM ^{33}P-ATP, 10 mM Mg acetate, 5 M PKI 5-24, 2 M PKC 19-36 inhibitor peptides, 1 M microcystine LR, 200 M SOV and either 1 mM EGTA or 0.8 mM $CaCl_2$.
RESULTS: ATP (µmoles/g brain) was 4.40±0.4 in Nx and 1.51±0.30 in Hx and 1.68 ± 0.4 in Hx +Srci. PCr (µmoles/g brain) was 3.5±0.2 in Nx, 1.3±0.3 in Hx and 1.2±0.3 in Hx+Srci. CaM kinase IV activity (pmoles/mg protein/min) increased from 390±25 in Nx to 1200±100 in Hx group ($p<0.05$). Activity in the Src inhibitor treated hypoxic group was 425± 27 (P =NS vs Nx). The data show that administration of Src kinase inhibitor PP2, prior to hypoxia, prevented the hypoxia-induced increased activity of CaM kinase IV in neuronal nuclei.
CONCLUSIONS: We conclude that the increased activation of CaMK IV during hypoxia is mediated by Src kinase. Since we have previously shown that hypoxia results in Tyr^{99} phosphorylation of calmodulin, an actiavtor of CaM kinase IV, we propose that Src kinase mediated increased tyrosine phosphorylation of calmodulin results in increased activation of CaM Kinase IV and leads to increased transcription of proapoptotic genes.(NIH-HD-20337).

60

Effect of Hyperoxia on Tyrosine Phosphorylation of Apaf-1 in the Cytosolic Fraction of the Cerebral Cortex of Newborn Piglets

Subhasri Sangam, Qazi Ashraf, Hien Pham, Om P. Mishra, Maria Delivoria-Papadopoulos.
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BACKGROUND: Apoptotic protease activating factor-1 (Apaf-1) binds with procaspase-9, and results in activation to active caspase-9. We have shown that hyperoxia results in increased activity of caspase-9 and increased DNA fragmentation. Administration of a high affinity Ca^{++}-ATPase inhibitor clonidine in piglets, prevents the hyperoxia-induced increased expression Apaf-1 protein, indicating that the expression is nuclear Ca^{++}-influx dependent. Apaf-1 phosphorylation may result in increased binding with procaspase 9 and result in increased caspase-9 activation.
OBJECTIVE: The present study aims to investigate the effect of hyperoxia on Tyrosine phosphorylation of Apaf-1 in the cytosolic fraction of the cerebral cortex of newborn piglets and tests the hypothesis that tyrosine phosphorylation of Apaf-1 during hyperoxia is Ca^{++} influx dependent.
DESIGN/METHODS: Studies were conducted in 16 newborn piglets, 5 normoxic (Nx), 6 hyperoxic (Hyx FiO_2 of 1.0 for 2 hr) and 5 clonidine-treated hyperoxic (Hyx+Clo) piglets. PaO_2 was maintained >400 mmHg for 120 min. Energy metabolism was documented by ATP and phosphocreatine (PCr) levels. Tyrosine phosphorylated Apaf-1 protein determined in cytosol by Western blot analysis using a specific anti- Apaf-1 antibody following immunoprecipitation with anti-phosphotyrosine antibody. Protein bands were detected, analyzed by densitometry and band density expressed as absorbance ($ODxmm^2$).
RESULTS: The density ($ODxmm^2$) of tyrosine phosphorylated Apaf-1 protein in the cytosolic fraction was 1908.81±180.68 in the normoxic group, 1231.87±104.62 in the hyperoxic group and 1803.83±104.62 in clonidine-treated hyperoxic (Hyx+Clo) group ($p< 0.05$ vs. Hx). The results show a decreased tyrosine phosphorylation of Apaf-1 protein in the cytosolic fraction of the cerebral cortex of hyperoxic piglets. Administration of high affinity Ca^{++}-ATPase inhibitor clonidine, prevented the hyperoxia-induced decrease in Apaf-1 phosphorylation.
CONCLUSIONS: We conclude that hyperoxia results in decreased tyrosine phosphorylation of Apaf-1 in the cytosolic compartment of the cerebral cortex of newborn piglets, and that the decrease in Apaf-1 phosphorylation during hyperoxia is nuclear Ca^{++}-influx dependent. We speculate that hyperoxia-induced decreased tyrosine phosphorylation of Apaf-1 protein in the cytosolic compartment is due to Ca^{++}-dependent cytosolic phosphatases. (NIH-HD-20337)

61

Fellow in Training

Mechanism of Hyperoxia Induced Inactivation of Protein Tyrosine Phosphatase Activity in the Newborn Brain

Ronald K. Sallas, Qazi Ashraf, Anli Zhu, Om P. Mishra, Maria Delivoria-Papadopoulos.

Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Protein tyrosine phosphatases (PTPs) regulate kinase-dependent signal transduction pathways by dephosphorylating phosphorylated proteins at tyrosine residues. PTPs activity is 100-1000 times higher than kinases to control phosphorylation. Previously we have shown hyperoxia results in decreased PTP activity and an increased tyrosine phosphorylation of anti-apoptotic proteins Bcl-2 and Bcl-xl in the cerebral cortex of newborn piglets. We have also shown that hyperoxia results in increased generation of nitric oxide (NO) free radicals and nitration of neuronal proteins.

OBJECTIVE: The present study tests the hypothesis that the hyperoxia-induced decrease in activity of protein tyrosine phosphatase (PTP) in cell membranes of the cerebral cortex of newborn piglets is mediated by NO derived from neuronal nitric oxide synthase (nNOS).

DESIGN/METHODS: Fourteen newborn piglets were assigned to: normoxic (Nx, n=3) exposed to FiO_2 of 0.21 for 2 hrs, hyperoxic (Hyx, FiO_2 = 1.0 for 120 min, pO_2 > 400 mmHg, n=6), and hyperoxic pre-treated with a selective inhibitor of nNOS, 7-nitro-indazole-sodium (Hyx+7-NINA, 1 mg/kg i.v. 30 min prior to hyperoxia, n=5). ATP and phosphocreatine (PCr) were measured biochemically to document cerebral energy status. PTP activity was determined spectrophotometrically using p-nitrophenyl phosphate (pNPP) as substrate and a highly selective inhibitor of PTP, bpV(phen){bis- peroxol (1,10phenan-throline) oxovanadate}. The phosphate was assyed by a highly sensitive malachite green assay. The activity was expressed as nmoles/mg protein/hr.

RESULTS: The activity of PTP (nmoles/mg protein/hr) was in 1.72±0.06 in Nx, 1.11±0.27 in Hyx ($p<0.05$ vs Nx), and 1.46±0.21 in Hyx+7-NINA ($p=$NS vs Nx). The data show that administration of a highly selective inhibitor of nNOS, prior to hyperoxia, prevented the hyperoxia-induced decreased PTP activity.

CONCLUSIONS: We conclude that hyperoxia-induced decreased PTP activity is mediated by NO derived from nNOS. Since all members of the PTP family possess a cysteine residue at their active site, NO generated from nNOS during hyperoxia will decrease PTP activity by oxidation of sulfhydryl (-SH) group of the cysteine residue in the active site domain. The decrease in PTP activity will lead to increased tyrosine phosphorylation of anti-apoptotic proteins and results in loss of anti-apoptotic potential of the hyperoxic neuronal cell. (Funded by NIH-HD-20337).

62

Effect of Hypoxia on Caspase-8 Expression during Development in the Cerebral Cortex of the Guinea Pig Fetus

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Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Caspase-8, a cysteine protease, is required for cell death receptor-mediated programmed cell death. Previously we have shown the guinea pig fetus response to hypoxia varies with gestational age. In previous studies we have also shown that hypoxia results in increased activation of caspase-8 in the cerebral cortex of newborn animal models.

OBJECTIVE: The present study tests the hypothesis that caspase-8 expression and activity increases following hypoxia as a function of gestational age in the cerebral cortex of fetal guinea pig.

DESIGN/METHODS: 16 pregnant guinea pigs 35 and 60 days gestation were divided into normoxic, (Nx, n=6) and hypoxic, (Hx, n=6), groups. Hypoxia was induced by exposing pregnant guinea pigs to FiO_2 of 0.07 for 1 hr. Hypoxia was documented by ATP and phosphocreatine (PCr) levels. Cytosol was isolated and expression of caspase-8 determined by Western Blot analysis using a specific caspase-8 antibody. Protein bands were analyzed by imaging densitometry and expressed as absorbance ($ODxmm^2$).

RESULTS: ATP (µmoles/g brain) was 4.42±0.34 in Nx (35d), 1.92±0.22 in Hx (35d) ($p<0.05$ vs Nx 35d), 4.66±0.33 in Nx (60d), 2.39±0.34 in Hx (60d) ($p<0.05$ vs Nx 60d). PCr (µmoles/g brain) was 3.81±0.35 in Nx (35d) and 1.52±0.22 in Hx (35d) ($p<0.05$ vs Nx35d), 3.50±0.74 in Nx (60d) and 1.56±0.66 in Hx (60d)($p<0.05$ vs Nx 60d). Expression of caspase-8 was 272.79±53.56 in Nx (35d), 560.18±26.31 in Hx (35d) ($p<0.001$ vs Nx 35d), 317.47±26.71 in Nx (60d) and 899.08±47.18 in Hx (60d) ($p<0.001$ vs Nx 60d). The data show that hypoxia resulted in increased expression of caspase-8 by 105% in preterm and 283% in term gestation.

CONCLUSIONS: We conclude that since hypoxia results in a higher increase in expression of caspase-8 at term as compared to mid gestation, term brain is more suceptible to caspase-8 mediated mechanisms following hypoxia. As shown previously, the hypoxia-induced increase of nuclear Ca^{++} influx was higher at term, as compared to preterm, we propose that Ca^{++}/Calmodulin dependent kinase IV-mediated phosphorylation of CREB transcription factor results in increase in caspase-8 expression. Post-transcriptional mechanisms including protein modification may further result in increased activation of caspase-8. Thus, both transcription and post-transcriptional mechanisms may lead to increased caspase-8 activation in the fetal brain at term as compared to mid-gestation.(NIH-HD-20337).

63

Pediatric Resident

Protective Factors Against the Development of Intraventricular Hemorrhage (IVH) in a Large Cohort of Neonates with Respiratory Distress Syndrome (RDS)

Harshit Doshi, Yogesh Moradiya, Philip Roth, Jonathan Blau.

Devision of Neonatology, Department of Pediatrics, Staten Island University Hospital, SUNY Downstate Medical Center, Staten Island, NY; Department of Neurology, SUNY Downstate Medical Center, Brooklyn, NY.

BACKGROUND: Premature newborns with RDS are at increased risk of developing IVH, causing significant morbidity and mortality. There are well known risk factors associated with the development of IVH in premature newborns with RDS. Conversely, further analysis is necessary to determine what characteristics might protect against the development of IVH in this high risk population.

OBJECTIVE: We aimed to determine what clinical or demographic factors are associated with protection against the development of IVH in a large cohort of neonates with RDS.

DESIGN/METHODS: We obtained data from the Nationwide Inpatient Sample (NIS) of the Healthcare Cost and Utilization Project from 2000-2009. This cohort includes 20 percent of all hospitalizations in the USA during this time period. By using ICD-9-CM codes, we obtained a large cohort of neonates with RDS. Multivariate logistic regression analysis was employed to identity potentially protective factors associated with a decreased risk of developing IVH.

RESULTS: Our cohort included 194,621 neonates with RDS. 20,386 (10.5%) of these neonates developed IVH. Consistent with prior studies, factors associated with a higher risk of developing IVH included male gender, lower birth weight (BW), lower gestational age (GA), markers of illness severity such as presence of chest tubes and umbilical catheters, and outborn neonates transferred to regional centers.

Odds ratios of factors protective against the development of IVH

	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Infant of diabetic mother	0.36 (0.31-0.41)	<0.001*	0.84 (0.71-0.98)	0.031*
Chromosomal abnormality	0.41 (0.32-0.54)	<0.001*	0.69 (0.49-0.97)	0.033*
Polycythemia	0.46 (0.34-0.62)	<0.001*	0.57 (0.37-0.87)	0.009*
Maternal hypertension	0.73 (0.63-0.84)	<0.001*	0.74 (0.62-0.88)	0.001*

*$p<0.05$ statistical significance

CONCLUSIONS: Similar to other cohorts, we found that male gender, lower BW, lower GA, and markers of severity of illness (pneumothorax, umbilical catheters) were significantly associated with IVH. However neonates with infant of diabetic mother (IDM) syndrome, maternal hypertension, chromosomal abnormality, and polycythemia were significantly less likely to develop IVH. Further analysis of these potentially protective characteristics is necessary to better understand why certain neonatal populations are protected against IVH, as well as difference in severity of IVH disease in affected neonates.

64

House Officer

Mechanism of CaMK IV Activation during Hyperoxia in the Cerebral Cortex of Newborn Piglets

M. Elisabeth Heal, Qazi Ashraf, Justin Buland, Om P. Mishra, Maria Delivoria-Papadopoulos.

Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: We have previously shown that free radical generation during hyperoxia results in increased nuclear membrane lipid peroxidation leading to increased nuclear Ca^{++}influx in the cerebral cortex of newborn piglets. We have also shown that hyperoxia results in activation of Ca^{++}/calmodulin-dependent protein kinase IV (CaMK IV) which initiates transcription of a number of proapoptotic proteins by phosphorylating cyclic AMP response element binding (CREB) protein.

OBJECTIVE: The present study tests the hypothesis that the increased activation of CaMK IV during hyperoxia is mediated by nirtic oxide (NO) derived from neuronal nitric oxide synthase (nNOS).

DESIGN/METHODS: Piglets were divided into normoxic (Nx, n=4), hyperoxic (Hyx, n=4) and hyperoxic-pretreated with a highly selective nNOS inhibitor 7-nitro-indazole monosodium (Hyx+7-NINA, 1mg/kg, i.v., 60 min prior to induction of hyperoxia, n=4) groups. Hyperoxia was induced by exposure to an FiO_2 of 1.0 to maintain PaO_2 >400mmHg for 120 min. Energy metabolism was determined by ATP and phosphocreatine (PCr) levels. CaMK IV activity was determined by ^{33}P-incorporation into syntide-2 in a medium containing 50 mM HEPES (pH 7.0), 2 mM DTT, 40 µM syntide-2, 0.2 mM ^{33}P-ATP, 10 mM magnesium acetate, 5 µM PKI_{5-24}, 2 µM PKC inhibitor peptides, 1 µM microcystine LR, 200 µM sodium ortho-vanadate and either 1 mM EGTA (for Ca^{++}/CaM-independent activity) or 0.8 mM $CaCl_2$ and 1 mM calmodulin (for total activity). CaMK IV activity = (Total-CaM independent) activity.

RESULTS: CaMK IV activity (pmoles/mg protein/min) was 1172.35±309.47 in the Nx group, 2001.93±703.93 in the Hyx group and 1132.14±347.24 in the Hyx+7-NINA ($p<0.05$ vs. Hx). group. The data show that hyperoxia results in increased CaMK IV activation in the cerebral cortex of newborn piglets and administration of a highly selective nNOS inhibitor significantly decreased CaM K IV activation.

CONCLUSIONS: The hyperoxia-induced increased activation of CaM kinase IV in the cerebral cortex of newborn piglets is mediated by NO derived from nNOS. We propose that NO generated during hyperoxia activates CaM kinase IV by modifying neuronal nuclear membrane high affinity Ca^{++}-ATPase, either by peroxidation or nitration. In addition, NO mediated activation of Src kinase leads to increased tyrosine phosphorylation of calmodulin, a CaM kinase IV activator, and results in increased activation of CaM kinase IV. (NIH-HD-20337).

65

Effect of Pre-Hypoxic Intervention with Src Kinase and EGFR Kinase Inhibitors on Long Term Neurobehavioral and Cognitive Functions in Newborn Piglets

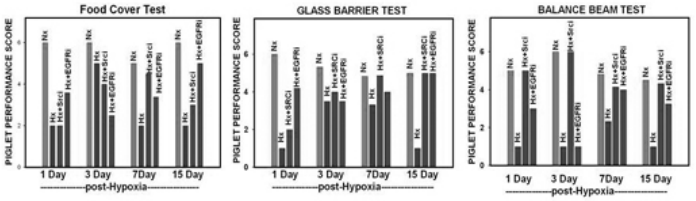
Waseem Akhter, Justin Buland, Badal J. Patel, Om P. Mishra, Maria Delivoria-Papadopoulos.

Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Hypoxia-ischemia induced brain injury in the newborn leads to brain dysfunction including mental retardation, long term learning and memory deficits. We are focusing on molecular mechanisms of cognitive dysfunction in the hypoxic brain by investigating specific enzymes Src kinase and EGFR kinase. We have shown that hypoxia results in increased activation of Src kinase and EGFR kinase in the cerebral cortex of newborn piglets.

OBJECTIVE: The present study aims to investigate the longitudinal effect of inhibiting the hypoxia-induced activation of specific enzymes Src kinase and EGFR kinase on cognitive

functions in newborn piglets.
DESIGN/METHODS: Studies were conducted on 3 days old piglets, to assess long-term functional performance in 3 normoxic (Nx), 3 hypoxic (Hx), 3 hypoxic-pretreated with a Src kinase inhibitor (Hx+Srci, PP2 1mg/kg i.v.) and EGFR kinase inhibitor (Hx+EGFRi, PD168393. 1mg/kg i.v.) group of piglets following 1, 3, 7, and 15 days recovery. Cerebral tissue hypoxia was determined by monitoring SpO_2. Functional performance was evaluated using glass barrier test to assess problem solving based on visual cues, food cover test to assess non-visual object discrimination learning and the balance beam test to assess motor performance. Each test was repeated six times on each animal. All the performance tests were recorded on a digital video camera.
RESULTS: Mean SpO_2 in the hypoxic groups for one hour ranged from 5-9%. Performance of hypoxic animals was poor in all three tests indicating impairment of long term functional performance in the hypoxic animals. On day 15 as compared to 3 & 7 days, treatment with inhibitors of either Src kinase or EGFR kinase attenuated the hypoxia-induced impairment in in all the three tests [Fig. 1].



CONCLUSIONS: We conclude that the hypoxia-induced cognitive deficit is mediated by Src Kinase and EGFR kinase and potentially depends on protein tyrosine phosphorylation. (NIH 20337).

66

Treating Migraine and Chronic Daily Headaches in Children with Gabapentin

Denise Lee, Francis J. DiMario.
Health Fellows Program, Trinity College, Hartford, CT; Pediatrics, CT Children's Medical Center, Hartford, CT.

BACKGROUND: Childhood migraine encompasses defined syndromes, intermittent frequencies and increase through adolescence. Chronic daily headaches occur ≥ 15 days per month and affect 4-5% of the general population. Treatment strategies for children with migraines includes both pharmacologic/nonpharmacologic measures acutely and/or preventatively.
OBJECTIVE: Gabapentin is an anticonvulsant drug (AED) that has been used for neuropathic pain and prophylaxis of migraine headaches. We designed an IRB approved retrospective review of medical records to examine our experience with the use of gabapentin compared to other anticonvulsant drugs in treating childhood migraines.
DESIGN/METHODS: Subjects were identified by ICD9 diagnostic codes (784.0, 346.21, 346.90, 346.91, 345.10) by IHS criteria from our clinical database. All consecutive patients initially evaluated from January 2008 to December 2010 and who were prescribed AEDs for childhood migraines were eligible. We divided subjects into two groups: those who received gabapentin and those who did not. Demographic, efficacy, and adverse effects data were collected and summarized.
RESULTS: Thirty-seven subjects satisfied inclusion criteria, n = 37 (43% boys), mean age 12.1 ± 3.6 years. Twenty-four (65%) of the subjects had a family history of migraine. Sixteen subjects were initially prescribed gabapentin while 18 subjects were initially prescribed other AEDs.
Migraine frequencies: 7 (19%) had < 5 migraine headache days/month and 27 (73%) had >15 migraine headache days/month. Twenty-two subjects (59%) had concurrent functional impairment due to headaches. Gabapentin initially treated subjects experienced no functional disturbance but 57% still experienced > 15 migraine headache days/month. In comparison, 69% subjects initially treated with other AEDs had no functional disturbance and 38% still experienced > 15 migraine headache days/month. Thirty-one percent of subjects on other AEDs as primary treatment had no improvement from their migraine headaches. The majority of subjects that were primarily on non-AEDs had no functional disturbances and < 10 migraine headache days/month, but none had complete improvement from their migraines. Five (31%) gabapentin initially treated subjects switched to another AED and 6 (38%) on other AEDs or non-anticonvulsant drugs switched to gabapentin with improvement.
CONCLUSIONS: This retrospective study suggested that gabapentin was effective in treating childhood migraine headaches when compared to other anticonvulsant drugs.

General Pediatrics I
Platform Session

Saturday, March 31, 2012
8:15am-10:30am

67

8:15am

Medical Student

Reproductive Health Experiences and Behaviors among Adolescent Females with Sickle Cell Disease Compared to Healthy Peers

Meera Shah, Emily Meier, Meredith Lynn, Lisa Tuchman.
Center for Clinical and Community Research, Children's National Medical Center, Washington, DC.

BACKGROUND: It is not well-understood how reproductive health experiences and behaviors differ among adolescents with and without sickle cell disease (SCD).
OBJECTIVE: The purpose of this study is to compare reproductive health experiences (i.e. menstrual history), and behaviors (i.e. onset of sexual activity, partner characteristics, history of sexually transmitted infections [STI] and contraceptive use) among female adolescents with SCD versus those without.
DESIGN/METHODS: Female adolescents aged 13-21 years were recruited from a comprehensive SCD treatment center and a dedicated Adolescent Health Center within an urban academic hospital presenting for routine care. A 10-item survey evaluating reproductive health history including reproductive health experiences and behaviors was administered in the clinical setting.
RESULTS: Thirty-one female adolescents with SCD (mean age 17.3 years ± 2.1) and 39 female healthy adolescents (mean age 17.3 years ± 2.2) were recruited. Ninety-seven percent (n = 30/31) of participants with SCD and 95% (n = 37/39) of healthy adolescents identified as African-American or black. Menarche occurred earlier among girls without SCD (11.8 yrs vs 12.8 yrs, p=0.02). Thirty-five percent of girls with SCD (n = 11/31) and 62% (n = 24/39) of healthy girls reported having ever had sex. Among those reporting history of sexual intercourse, participants with SCD reported later onset of coitarche when compared with their non-SCD peers (16.8 years vs 14.9 year, p=0.004). A fewer percentage of girls with SCD reported having been treated for an STI compared to girls without SCD (3% vs 28%, p=0.009). Among those that reported being sexually active there were no significant differences in number of sexual partners or contraceptive use among participants with and without SCD.
CONCLUSIONS: Female adolescents with SCD had a delayed onset of menarche and coitarche and were less likely to report having had an STI than healthy adolescents. Delayed sexual activity and maturation may have unique psychosocial and disease-specific implications in adolescents with SCD. Further research is needed to address whether older age of sex initiation in adolescents with SCD may be due to delayed pubertal maturation, disease severity, cultural values and/or other psychosocial factors.

68

8:30am

Long-Term Developmental Outcome of Children Whose Mothers Reported Loss of Fetal Activity during Pregnancy

Andrew Adesman, Sarah A. Keim.
Pediatrics, Cohen Children's Medical Center of NY, Lake Success, NY; Center for Biobehavioral Health, Nationwide Children's Hospital, Columbus, OH.

BACKGROUND: Loss of fetal activity during pregnancy is considered a potential red flag of obstetric complications and/or fetal compromise. Few analyses have examined the developmental consequences associated with this concern.
OBJECTIVE: Using data from the U.S. Collaborative Perinatal Project (CPP), a large, prospective cohort study of pregnancy and child health, our objective was to examine the long-term developmental outcome of children whose mothers reported loss of fetal activity.
DESIGN/METHODS: A multivariate statistical analysis was performed on 59,407 pregnancies from the CPP; we limited analyses to 29,979 pregnancies. Exclusions included: implausible gestational age estimate (>44 wks), multiple gestations, and women for whom fetal activity data was not collected or missing. Separate analyses were done for mothers who reported loss of fetal activity ≥1 time in the 2nd trimester (N=432) and ≥1 time in the 3rd trimester (N=1074) when queried at each prenatal visit. The primary outcome variables were APGAR scores, IQ scores at ages 4 (Stanford-Binet) and 7 (WISC), and psychologist ratings of inattention (IA), impulsivity (IMP) and hyperactivity (HA) during testing. Multivariate linear and logistic regression was performed; models were adjusted for gestational age, smoking, sex, SES, race, parity, and maternal age.
RESULTS: For each additional instance of loss of fetal activity in the 2nd trimester, APGAR scores decreased by 0.12 points (beta= -.12; p=.03), but there was no difference in IQ or ADHD symptoms at age 4 or 7. For reported loss of fetal activity in the 3rd trimester. there was no difference in APGAR. IQ score at age 4 was lower (Beta = -1.0; p<.05) but no IQ difference was noted at age 7. No difference in ADHD symptoms during testing were noted at age 4 or 7 years in relation to fetal activity in the third trimester.
CONCLUSIONS: Loss of fetal activity is frequently of concern to pregnant women and their physicians. Although a modestly lower APGAR score at birth and IQ at age 4 was associated with 2nd trimester loss of fetal activity by maternal report, no differences in IQ were noted at age 7. Likewise, there was no difference in psychologist ratings of IMP, HA, or IA at ages 4 or 7 years. Assuming there are no other neurolgical or congenital abnormalities, the long-term developmental outcome for babies with reported loss of fetal activity is quite favorable.

69

8:45am

Abnormal Neonatal Auditory Brainstem Response and 4 Month Arousal-Modulated Attention Are Jointly Associated with Autism Severity Scores in Childhood in NICU Graduates

Ira L. Cohen, Judith M. Gardner, Bernard Z. Karmel, Tina R. Gomez, Maripaz M. Gonzalez, Ha T.T. Phan, Phyllis M. Kittler, Elizabeth M. Lennon, Krishanthi Satchi, Santosh L. Parab, Anthony L. Barone.
Psychology, New York State Institute for Basic Research in DD, Staten Island, NY; Infant Development, New York State Institute for Basic Research in DD, Staten Island, NY; Neonatology, Richmond University Medical Center, Staten Island, NY.

BACKGROUND: We found early behavioral abnormalities more prevalent in Neonatal Intensive Care Unit (NICU) graduates later diagnosed with Autism Spectrum Disorder (ASD)(Karmel et al., 2010). One was a visual preference for high rates of stimulation when less aroused at 4 months post term age (PTA) (in our Arousal-Modulated-Attention (AMA) task); a preference seen in newborns. These data suggested problems with the brainstem attention/arousal system in ASD children. Therefore we examined whether auditory brainstem evoked response (ABR)also added to AMA in predicting later ASD behaviors.
OBJECTIVE: Evaluate neonatal ABRs and 4 month PTA AMA preferences as predictors of later ASD behaviors.
DESIGN/METHODS: As neonates, three CNS injury groups were defined based on ABR and cranial ultrasounds as described in Karmel et al. (2010): 1) No Detectable CNS Insult (n=27); 2) Initial Abnormal ABRs (n=28); and 3) Mild structural injury (n=22). Visual preference to checkerboard patterns flashing at 1, 3, or 8Hz were obtained at 4 months PTA. Autistic behavior scores were obtained at 3.4 (SD=1.2) years based on PDD Behavior Inventories (PDDBIs).

RESULTS: Visual preferences were highly correlated with 8/11 PDDBI scores (all p <.002) but only for group 2. Effects were for measures of social communication (rs -.64 to -.73), social pragmatic problems (r=0.63), and arousal modulation problems (r=.59). The greater the preference for higher rates at 4 months, the greater the social deficit at 3 years. There were no significant correlations between visual preference and performance IQ for any group. 10/14 children later diagnosed with ASD were in group 2; 7 of these had strong preferences for the fastest rates. By contrast, group 3 had 3 ASD cases and group 1 had 1 ASD child.
CONCLUSIONS: Findings indicate that the joint occurrences of abnormal neonatal ABRs and preference for more stimulation at 4 months PTA are markers for the development of autistic behaviors in this population; both indices of brainstem maturation problems. These effects appear to be independent. Since abnormal ABRs typically are related to CNS structural injury, the current finding for Group 2 may represent a different development mechanism rooted in very early fetal brainstem development.

70

9:00am

Inpatient Missed Opportunities for Screening Childhood Developmental Delays

Hai Jung H. Rhim, Katherine M. O'Connor, Joanne M. Nazif, Sheila K. Liewehr, Ruth E.K. Stein.
Pediatrics, Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Developmental delays are estimated to be present in 15-20% of young children. Screening to identify delays can lead to intervention early when chances for improvement are best. Current outpatient screening rates are low, especially in at-risk children. Children with sub-optimal primary care are more likely to be hospitalized and may miss the chance to be screened. Therefore, the inpatient setting may be an important opportunity for identifying delays.
OBJECTIVE: To determine the prevalence of developmental disabilities in children aged 1-33 months admitted to an inner city tertiary care children's hospital.
DESIGN/METHODS: Parents of pediatric patients aged 1-33 months hospitalized at the Children's Hospital at Montefiore were interviewed, and they completed the Ages and Stages Questionnaire, 3rd Edition (ASQ-3) in English or Spanish. The ASQ-3 is a validated, sensitive and specific developmental screening tool. Children with previously diagnosed delays or those already enrolled in therapy were excluded. Parents were not approached at the time of admission or when the child was unstable. All questions focused on the child's usual status prior to hospitalization. If a possible delay was detected, a referral to Early Intervention was made through the hospital social worker.
RESULTS: Complete data were available for 152 children. 37.5% (57) were found to be below cutoff (delayed) and 34.2% (52) were at risk as determined by an ASQ-3 score near the cutoff.

RESULTS

	Near Cutoff	Below Cutoff
Communication	19%	11.8%
Gross Motor	15.8%	13.8%
Fine Motor	17.2%	17.9%
Problem Solving	18.5%	19.8%
Personal-Social	15.8%	20.4%
Overall	34.2%	37.5%

Of those below cutoff, 64.9% (37) were delayed in 2 or more domains. Only 28% (16) of parents of children below cutoff had concerns about development.

CHARACTERISTICS OF CHILDREN BELOW CUTOFF (n=57)	
Mean age	9.7 months (range 1-30 months)
Prior hospitalization	36.8%
Previous EI referral	10.5%
DEMOGRAPHICS	
African-American/Black	35.1%
Hispanic	42.1%
English spoken at home	43.8%
Spanish spoken at home	15.8%
English and Spanish spoken at home	36.8%

CONCLUSIONS: Hospitalized children have higher rates of developmental delays than what is reported for the general population. Screening in the inpatient setting is an opportunity to detect delays in children who might otherwise be missed.

71

9:15am

Post Bac Pre Med Graduate

Youth with and without Gestational Cocaine Exposure (GCE): Academic Achievement at Age 18

Laura M. Betancourt, Katie L. Hatch, Nancy L. Brodsky, Elsa K. Malmud, Hallam Hurt.
Neonatology, Children's Hospital, Philadelphia, PA.

BACKGROUND: In our longitudinal follow-up study comparing GCE and control children (CON) at the end of 4th grade, groups were similar in poor school performance and standardized test scores. There are few reports, however, of performance on standardized measures of academic achievement (specifically reading, math, writing, and oral language skills) of GCE youth at age 18 years.
OBJECTIVE: To determine if GCE and CON differ in performance on a standardized academic achievement test.
DESIGN/METHODS: At age 18, the Wechsler Individual Achievement Test - Second Edition (WIAT-II) was individually administered by a licensed psychologist to assess reading, mathematics, written language, and oral language skills. High school graduation status was ascertained. Data were analyzed using Chi Square, t-tests and backward linear regression. Regressions examined effects of GCE, gender, foster care, other gestational exposures (alcohol, cigarettes and marijuana), and age 8 Home Observation Measurement of the Environment (HOME) on WIAT-II Composite Scores.
RESULTS: GCE presented first. 44 GCE (median days of exposure=99) and 55 CON participants born to mothers of low SES (age: 18.8 ± 0.6yrs vs 18.5±0.6 yrs; male: 50% vs 51%), completed the WIAT-II. Groups were similar in graduation status (diploma: 73% vs 78%; GED: 11% vs 6%; drop outs: 16% vs 16%; p=.56), and Total , Reading, Mathematics, Written Language, and Oral Language Composite Scores.

WIAT-II Composite Scores

	GCE	CON	p-value
Total	79.0±15.5	82.3±14.5	0.27
- Reading	81.1±17.6	83.0±17.5	0.60
- Mathematics	73.0±17.2	77.6±15.0	0.16
- Written Language	83.8±16.6	89.3±15.4	0.09
- Oral Language	86.5±14.5	88.9±14.9	0.41

Percent scoring >2 SD below the WIAT-II Total Composite Mean of 100±15 were also similar (25% vs 18%; p=.46). Regression showed: 1) Total, Reading, Oral Language, and Written Language Scores were lower for participants with lower HOME scores (p≤.034); 2) Written Language scores for GCE males were lower (group x gender interaction, p=.002; effect size=0.33); and 3) Mathematics Scores were lower for participants ever in foster care (p=.022).
CONCLUSIONS: In this inner-city cohort, both GCE and CON had similar poor academic skills and graduation rates at age 18. Early home and caregiver experiences showed a consistent influence on academic skills tested. GCE effects on writing skills need to be explored further.
Supported by NIDA RO1DA014129 and National Center for Research Resources Grant UL1RR024134.

72

9:30am

Development of an Instrument To Measure Parents' Preferences and Goals for ADHD Treatment

Alexander Fiks, Stephanie Mayne, Cayce Hughes, Elena DeBartolo, Carina Behrens, James Guevara, Thomas Power.
Children's Hospital, Philadelphia, PA.

BACKGROUND: The Institute of Medicine prioritized research to foster shared decision making in chronic illness. In ADHD, new national guidelines emphasize targeting treatment toward families' preferences and goals, a component of shared decision making, yet no tools exist to help in this process.
OBJECTIVE: To describe the development and validation of an instrument to measure parents' ADHD treatment preferences and goals.
DESIGN/METHODS: Parents of children 6-12 years diagnosed in the past 18 months were recruited from 8 primary care sites and an ADHD treatment center (children with autism excluded). A 16 item medication and 15 item behavior therapy preference scale as well as a 23 item goal scale were developed following literature review, 90 parent and clinician interviews, and with input from parent advocates and professional experts. Parent cognitive interviews confirmed item readability, clarity, content, and response range. We conducted an exploratory factor analysis and assessed internal consistency and 14 day test-retest reliability, and construct and concurrent validity.
RESULTS: We recruited 237 parents (mean age 8.1 years, 51% Black, 59% from primary care, 61% of children medication naive). Factor analysis identified 4 medication preference subscales: treatment acceptability, feasibility, stigma, and side effects (Cronbach's α 0.74 to 0.87), and three behavior therapy subscales: treatment acceptability, feasibility, and adverse effects (α 0.76 to 0.83). We idenitfied three goal subscales: academic achievement, behavioral compliance, and interpersonal relationships (α 0.83 to 0.86). The scales demonstrated construct validity: medication preference stronger for parents of children on medication, academic goals stronger for parents of children with school problems, behavioral goals stronger among parents of children with combined versus inattentive ADHD, and interpersonal goals stronger for parents of children with oppositionality ($p<0.001$). The scales demonstrated concurrent validity (r= 0.3-0.6) compared to the Treatment Acceptability Questionnaire and Impairment Rating Scale and moderate to excellent test-retest reliability (ICC= 0.7-0.9).
CONCLUSIONS: We developed a valid and reliable instrument for measuring preferences and goals for ADHD treatment. This tool may help clinicians more easily comply with new treatment guidelines while fostering shared decision making.

73

9:45am

Stimulant Diversion and Access in Households with Children on Stimulant Medication for ADHD

Andrew Adesman, Ruth Milanaik, Tova Rosen, Helen Papaioannou.
Pediatrics, Cohen Children's Medical Center of NY, Lake Success, NY.

BACKGROUND: Studies confirm that youth with ADHD give or sell their stimulant medication (SM) to peers. Although peer diversion is well documented, household diversion (HHD) -- medication being given to or taken by a person within the household (HH) without medical authorization -- has never been examined.
OBJECTIVE: 1. To assess the frequency of HHD of SM in homes with a child treated with SM for ADHD.
2. To evaluate SM storage and accessibility.
DESIGN/METHODS: 202 parents attending an ADHD lecture anonymously completed the Household Diversion Questionnaire (HDQ).The HDQ consists of 24 multiple-choice questions about SM diversion (actual and contemplated), SM storage, HH composition, and prior viewing of a *Desperate Housewives* episode (DHE) that depicted HHD of SM. The sample was 88% Caucasian, 80% college grads, & 76% mothers.
RESULTS: *Diversion:* 34 of the 202 respondents (16.8%) reported HHD of SM; some indicated >1 form of HHD. 21 (10.4%) previously tried their child's SM, 7 (3.5%) gave a SM to another HH child, 5 (2.5%) noted another HH adult diverted medicine to another child, and 12 (6%) noted another HH adult used a SM prescribed for another family member. Reasons for diversion to a sibling were: ADHD suspected, ran out of sib's ADHD medication, or wanted to try sib on a different SM. Self-diverting parents indicated they either routinely try medications prescribed for their child or they're self-medicating for suspected or diagnosed ADHD. 5 of the 21 self-diverters (24%) admitted they were "*curious to see if I could get a high or good feeling*". 27 additional respondents (13.3%) admitted being tempted to try their child's SM. Parents who saw the DHE (n=77) were more likely to report temptation to self-divert (32% vs. 15.7%; $X^2 = 7.6$, $p<.01$). A trend was noted between DHE viewing and self-diversion (15.6% vs. 7.4%; $X^2 = 3.3$; $p<.1$).
Medication Storage: 54 (27%) stored SM in plain sight, and 81 (40%) kept the SM out of sight but available to all. Parents who had suspected or noted SM missing were more likely to store their SM

in a hidden or locked location (53% vs. 28%; X^2= 4.19; p<.05). Report of missing SM pills was more common in households with teens or young adults (X^2 = 8; p<.01).
CONCLUSIONS: HHD may be at least as common as peer diversion. A lagre number of parents admitted they divert SM to themselves or to other children. SM is seldom stored securely -- likely contributing to HHD. Replication with a larger, more diverse sample is needed.

74
10:00am

House Officer

Positive Relationship between HEADSS Assessment and Abnormal Pediatric Symptoms Checklist (Y-PSC) Scores

Nam Nguyen, James Burns, Jennifer Panganiban, Raid Amin.
Pediatrics, Florida State University College of Medicine, Tallahassee, FL; Statistics, University of West Florida, Pensacola, FL.

BACKGROUND: HEADSS assessment and Y-PSC are recommended screening tools for biopsychosocial problems in children and adolescents. HEADSS is face to face interview with the patient about home, school, alcohol, tobacco, drugs, sexual activity, depression and suicidal ideation; Y-PSC is a valid questionnaire with internalizing, externalizing and attention subscores. There is scant information is seen on the clinical performance of HEADSS when compared to screening tools such as Y-PSC.
OBJECTIVE: The objective of our study is to determine the relationship between Y-PSC scores to HEADSS assessment results.
DESIGN/METHODS: A retrospective study was conducted of 207 consecutive annual health maintenance visits provided by the same board certified Adolescent Medicine physician for patients 12-20 years old at a Medicaid clinic. Each patient was screened with the Y-PSC and HEADSS. One-sided Fischer exact test was used for analysis of 2 x 2 cross-tabs in SPSS. Statistical significance level was set at p £ 0.005 to account for multiple analyses using the Bonferroni correction.
RESULTS: A positive relationship was found between having an abnormal Y-PSC score and poor performance in school (FET, p = 000), ever having used tobacco (FET, p = 0.005), alcohol (FET, p = 0.000), or marijuana (p = 0.003). No relationship was found between Y-PSC and problems at home, sexual activity, depression or suicide ideation. A strong positive relationship was found between the internalizing subscore of Y-PSC and depression (FET, p = 0.000). A positive Y-PSC was strongly associated with having any positive on the HEADSS (FET, p = 0.004); any positive on HEADSS and Y-PSC were concordant in 64.3% and discordant 35.7% of cases reviewed.

Cross-tab: Total Y-PSC vs. having any one component positive on HEADSS assessment

			Total Y-PSC	
		Abnormal	Normal	Total
Any HEADSS Positive	Yes Count/Expected	20/12.7	62/69.3	82/82
	No Count/Expected	12/19.3	113/105.7	125/125
	Total Count/Expected	32/32	175/175	207/207

Fischer Exact Test (one-sided), p = 0.004

CONCLUSIONS: Y-PSC was found to have a positive relationship with components of the HEADSS assessment. Y-PSC related to school problems, substance abuse issues and the internalizing subscore of the Y-PSC but not the total Y-PSC was associated with depression findings. The Y-PSC did not relate well to sexual activity or problems at home. It is recommended that both Y-PSC and HEADSS be used in mental health screening for youth 11 years and older.

75
10:15am

Observational Study of Shared Medical Decision Making in Pediatric Chronic Conditions

Tim Wysocki, Jennifer Blossom, Sandra Hassink, Pialee Roy, Vanessa Vigilante, Iman Sharif.
Nemours Children's Clinics, Jacksonville, FL; Nemours Children's Clinics, Wilmington, DE.

BACKGROUND: The measurement of Shared Medical Decision Making (SMDM) in pediatrics is complicated by the patient/caregiver/physician triad and the interplay of child development and family dynamics. We report a preliminary analysis of baseline data from a longitudinal study of SMDM amongst children with chronic conditions.
OBJECTIVE: We tested the hypotheses that 1) SMDM can be reliably measured during pediatric clinical encounters; 2) SMDM occurs more with older children, and higher socioeconomic status families; 3) More SMDM is associated with higher perceived quality of life and less parenting distress.
DESIGN/METHODS: We videotaped outpatient visits between 18 clinicians and their 5-17 year old patients with asthma, cancer, cystic fibrosis, type 1 diabetes, or obesity. Trained coders rated SMDM using the OPTION Scale (range 0-36). In addition to a demographic questionnaire, baseline (pre-visit) parent measures included the PedsQL(quality of life) and the Pediatric Inventory for Parents(PIP) to measure parenting distress.
Bivariate analyses compared OPTION and child age, parental education, and household income category. Linear regression was used to determine the association between adjusted OPTION scores and PedsQL and PIP.
RESULTS: We analyzed data on 84 encounters. OPTION scores were normally distributed (Mean = 14.8 ± 9.3; Median = 14; Cronbach's alpha = .81). Higher OPTION scores were associated positively with child age (r=0.23, p=0.05), but not parental education or household income (p>0.30).
On the PedsQL, higher OPTION correlated with a better psychosocial health summary score (r=0.32, p=0.007) and better physical health summary score (r=0.21, p=0.07). OPTION correlated negatively with frequency (r=-0.34, p=0.003) and difficulty (r=-0.28, p=0.02) subscales of the PIP.
Higher adjusted OPTION scores were associated significantly with more favorable parent-reported child quality of life (B=0.17, 95%CI 0.04, 0.30) and less parenting distress (B=-18.2, 95%CI -34, -2).
CONCLUSIONS: Ratings of SMDM during pediatric clinical encounters are reliable and sufficiently variable for analytic purposes. SMDM is associated with less parenting distress and better quality of life. Completion of this longitudinal study will provide additional valuable information about the relationship between SMDM and treatment alliance and treatment adherence.

Saturday, March 31, 2012
8:15am-10:30am

76
8:15am

Lang Youth: Impact of a Longitudinal Hospital-Based Science Enrichment and Mentoring Program

Marina Catallozzi, Monica A. Hidalgo, Ken Kitayama, Daniel H. Stephens, Mary McCord, José A. Luchsinger.
Pediatrics, Columbia University, NY, NY; Population and Family Health, Columbia University, NY, NY; Ambulatory Care Network, New York Presbyterian Hospital, NY, NY; Pediatrics, Medical College of Wisconsin, Milwaukee, WI; Medicine, Columbia University, NY, NY; Epidemiology, Columbia University, NY, NY.

BACKGROUND: Underrepresented minority (URM) youth are at high risk for not achieving their scholastic potential, less likely to pursue health sciences careers and more likely to engage in risky behaviors. The Lang Youth Medical Program (LY) of New York-Presbyterian/Columbia University Medical Center is a 6-year science enrichment, college preparatory, youth development mentoring program designed to address these disparities.
OBJECTIVE: Evaluate the impact of LY on students' (1) academic achievement; (2) interest in health sciences careers; (3) risk taking behavior.
DESIGN/METHODS: Each year URM middle school youth from Washington Heights/Inwood, a predominantly Latino community in NYC, are selected for LY, which meets at the medical center every Saturday during the academic year and weekdays in July. From Oct 2010 to Jul 2011 data collected included grades, high school placement, standardized test scores, Interest in Health Careers Survey, Hemingway Measure of Adolescent Connectedness, Adolescent Health Attitude and Behavior Survey, qualitative interviews and focus groups.
RESULTS: 61/63 (97%) LY students, ages 12-18, participated in the evaluation (65% female, 76% Hispanic, 72% received free/reduced lunch). Academic Achievement: students' academic average was 87%; 80% placed in their first high school choice; SAT scores: 1280-2200, median 1530. Interest in Health Sciences Careers: 90% were confident that they can be health professionals with strong interest in surgery (49%) medical specialties (46%) nursing (47%) and hospital administration (43%); 82% felt it is important to have a career serving their community. Adolescent Health Risk and Behavior: 80% did not have physical fights in the last 12 months; 88% were not sexually active; none reported using heavy drugs or smoking; in the last 30 days, 98% never had marijuana; 85% never drank alcohol. LY students had increased measures of connectedness. Qualitative data reflected an increased sense of responsibility, connection to the community and pride in LY.
CONCLUSIONS: LY is a novel program utilizing the resources of a medical center to help students perform better academically than neighborhood peers, increase their interest in careers in the health professions (a precursor to acceptance to graduate school for URMs) and to take less health risks compared to their NYC peers. LY deserves further study for possible dissemination.
NIH/NCMHD (3p60MD00020606S1).

77
8:30am

Fellow in Training

Barriers to Evaluation for Early Intervention Services

Manuel Jimenez, Frances Barg, James Guevara, Marsha Gerdes, Alexander Fiks.
Robert Wood Johnson Foundation Clinical Scholars Program, University of Pennsylvania, Philadelphia, Pa; Family Medicine and Community Health, University of Pennsylvania, Philadelphia, Pa; Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: The Individuals with Disabilities Education Act mandates early intervention(EI)for infants and toddlers with developmental delay. 13% of children have delays that qualify for EI but many eligible children do not seek services.
OBJECTIVE: To explore barriers to evaluation for EI services.
DESIGN/METHODS: We conducted semi-structured interviews with parents of children referred to EI and EI staff. We purposively sampled families based on whether they were evaluated by EI and EI employees. We recruited families from a randomized controlled trial testing developmental screening strategies. Parents completed demographic surveys and the Newest Vital Sign health literacy assessment. Interviews were recorded, transcribed, coded using NVIVO9 software, and continued until we reached thematic saturation(22 evaluated, 22 not, 14 staff). We identified themes within and across respondent groups using modified grounded theory.
RESULTS: Families were mostly African American(68%),with income <$33,000 (52%). 77% of families evaluated by EI had adequate health literacy compared to 50% of those not evaluated. We identified 5 primary themes:(1)Ineffective communication between pediatrician and parent contributed to incomplete evaluation. Parent perceptions of their child's development were often not addressed and the EI referral process was poorly explained, limiting parents' understanding of EI and how to get services. This lack of communication mattered since(2)parents' perception of their child's development influenced whether EI evaluations were completed. Many families felt their children were developmentally normal and did not follow through. In contrast, families concerned about specific diagnoses(e.g. autism) pursued evaluation.(3)For ambivalent parents, practical obstacles(e.g. missed phone calls) limited evaluation completion. Highly motivated parents overcame obstacles.(4)Families who felt they could address developmental problems without help were less likely to pursue evaluation.(5)EI staff felt that families mistake EI for child protective services and avoid evaluation but this theme was only endorsed by one parent.
CONCLUSIONS: Effective communication between pediatricians and families, including addressing practical logistics, families' perception of their child's development, and motivation

to address developmental concerns may improve referral completion. Whether limited parental health literacy is associated with incomplete EI evaluation warrants further study.

78

8:45am

Using Health Education Community Baby Showers To Bridge Disparities in Knowledge of Perinatal Health Factors

Amishi Shah, Cheryl Hunter-Grant, Heather Brumberg.
Pediatrics, New York Medical College, Valhalla, NY; Lower Hudson Valley Perinatal Network, Maria Fareri Children's Hospital, Valhalla, NY; Neonatology, Maria Fareri Children's Hospital, Valhalla, NY.

BACKGROUND: There are many perinatal health factors that impact both mothers and newborns, including gestational age (GA), delivery mode and breastfeeding. However, there is little information regarding awareness of these factors among pregnant women, and the efficacy of health education community baby showers (HECBS) as a strategy to increase knowledge about these issues.

OBJECTIVE: To evaluate HECBS as an educational tool for pregnant women addressing key perinatal health factors: breastfeeding, delivery mode and GA.

DESIGN/METHODS: Women were invited to attend HECBS where either lecture based or interactive Mother-to-Mother circle education sessions were held (in English and Spanish). Pre- and post-tests were completed by participants to collect demographics, baseline knowledge and to measure the effectiveness of the education. Analysis used paired t-test and ANOVA.

RESULTS: 263 women attended 11 different HECBS where 62% were Hispanic. Prior to the education session nearly 30% of participants did not know the correct definition of term GA and 59% were unaware that it was not a good idea to schedule delivery at 35-36 weeks. Only 66% of the women knew that cesarean deliveries were not safer than vaginal deliveries. Post-test scores were higher than pretest scores (71% vs. 56%, $p<0.001$). There were significant ethnic disparities in both pre- and post-test scores. Hispanic women had lower baseline knowledge than non-Hispanics ($p=0.04$) and despite substantial gains in scores, had lower post-test scores ($p=0.001$). A two-factor analysis of variance confirmed the significant effect of ethnicity on pre-test ($F=5.67$, $p=0.012$) and post-test scores ($F=7.28$, $p=0.008$), while level of schooling did not show a significant effect on either pre- or post-test scores ($p's>0.05$). The most significant knowledge gap between Hispanic and non-Hispanic women was regarding breastmilk (BM) vs. formula. Only 69% of Hispanic women recognized that BM and formula do not have the same nutritional value as opposed to 84% of non-Hispanics ($p=0.005$). After the educational sessions, this increased to 82% of Hispanic women ($p=0.002$). There were no significant differences in knowledge gains comparing the teaching styles, or whether participants had prior children.

CONCLUSIONS: HECBS are unique and effective means of increasing awareness in pregnant women regarding perinatal health factors and can bridge disparities in the knowledge of these factors among different ethnicities.

79

9:00am

Undergraduate Student

Are Some Disabilities More Handicapping Than Others? A Comparison of Teacher Grading of Children with Medical, Physical and Behavioral Disabilities

Brett Gossett, Ruth Milanaik, Alyson Kaplan, Suzanne Sunday, Andrew Adesman.
Pediatrics, Cohen Children's Medical Center, Lake Success, NY; Princeton University, Princeton, NJ; Psychiatry, Feinstein Institute for Biomedical Research, Manhasset, NY.

BACKGROUND: Many studies have demonstrated teacher bias against students who are in special education or have behavioral disorders such as Attention-deficit Hyperactivity Disorder (ADHD).

OBJECTIVE: To determine if there are differences in teacher grading for students with a physical disability, a chronic medical, condtion, or a behavioral disorder.

DESIGN/METHODS: 5184 middle school teachers nation-wide were asked to rank three essays for an essay contest in which children with disabilities were asked to write about overcoming their respective disabilities. Each teacher receivd an essay purportedly written by a student with cerebral palsy (CP), diabetes (DM), and ADHD. The essays were similar in length and readability and worded so that we could interchange disabilities across essays.

The primary endpoints were scores for grammar & syntax, spelling & punctuation, organization, writing style, emotional appeal, and overall score. A rank order was also requested. Repeated measures analyses of variance (rANOVAs) using a mixed model approach (PROC MIXED) were used for the Likert responses. Chi squares were used for the rankings (i.e. 1, 2 or 3).

RESULTS: The sample consisted of 557 respondents.

Essay content grading is shown in table 1.

Teacher Ratings of Essays by Disability Type

	ADHD	DM	CP	rANOVA	Significance (p)
Objective Criteria					
Grammar & Syntax	4.29	4.47	4.57	$F(2,543) = 2.66$	.07
Spelling & Punctuation	4.53	4.61	4.68	$F(2,543) = 2.83$	.076
Subjective Criteria					
Organization	4.24	4.35	4.55	$F(2,543) = 4.25$	.01
Writing Style	4.23	4.28	4.58	$F(2,541) = 4.17$	.02
Emotional Appeal	4.27	4.3	4.8	$F(2,542) = 8.68$	.0002
Overall Rating	5.2	5.32	5.64	$F(2,493) = 9.45$	<.0001

Teacher Grading was on a 7-point Likert scale from Poor (1) to Outstanding (7)

Rank order results are shown in table 2.

Ranking of Essay by Disability

	Rank 1	Rank 2	Rank 3
ADHD	116 (21%)	195 (35%)	240 (44%)
Diabetes	155 (28%)	186 (34%)	211 (38%)
CP	281 (51%)	169 (31%)	101 (18%)

$\chi 2=141.23$, $p<0.0001$

ADHD and DM essays were more likely to be ranked 3 and less likely to be ranked 1; CP essays were more likely to be ranked 1 and less likely to be ranked 3.

CONCLUSIONS: Teacher consistently graded essays written by students with CP hgher than those written by students with ADHD or diabetes. Teachers appear biased in favor of children with physical disabilities relative to medical or behavioral disorders.

80

9:15am

Pediatric Emergency Department Categorization and Access to Care in Pennsylvania and Wisconsin

Sage R. Myers, Rama A. Salhi, Brendan G. Carr.
School of Medicine, University of Pennsylvania, Philadelphia, PA; Division of Emergency Medicine, Children's Hospital, Philadelphia, PA; Department of Emergency Medicine, Hospital of the University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Available resources for the care of sick and injured children at emergency departments across the country are largely unknown. In order to create an appropriate system of care for time-sensitive conditions in children, these resources must be catalogued. Categorization can then be used to allow for accurate transport of patients and determination of access to care.

OBJECTIVE: Therefore, we aim to collect primary data from all EDs in PA and WI on available resources and to provide a categorization framework. We aim to describe access to ED care for the pediatric population of PA and WI.

DESIGN/METHODS: A mail-based survey was sent to all EDs in PA and WI. An ED categorization scheme was developed based on the recommendations put forth during the 2010 SAEM consensus conference. EDs were categorized based on available resources. Summary statistics were used to described EDs in each category. Population access was calculated using established methods based on block-group level population counts and pre-hospital air/drive speeds.

RESULTS: Overall response rate for ED survey was 83% (245/295) [PA–80%, WI–88%]. See tables.

Characteristics of Responding Hospitals (percentages)

	Pennsylvania n=136	Wisconsin n=107	Overall n=243
ED CATEGORY			
Ped Critical Care	1.5	1.9	1.7
Comprehensive	2.2	1.9	2.1
Advanced	26.5	35.5	30.5
Limited	58.8	34.6	48.2
Basic	11.0	26.2	17.7
TYPE OF ED			
ED in adult-only hospital	16.3	1.9	9.9
ED in children's hospital	2.2	0.9	1.7
ED in general hospital	80.0	97.2	87.6
Free-standing ED	1.5	0.0	0.8

Proportion of pediatric population with access to EDs of each level of care within 60 minutes by air or ground.*

	Pennsylvania		Wisconsin		Overall	
	Ground	Ground & Air	Ground	Ground & Air	Ground	Ground & Air
Ped Critical Care	19.7	77.5	26.7	61.7	22.0	72.4
Comprehensive	33.0	93.2	32.3	75.1	32.8	87.3
Advanced	77.4	97.6	77.3	94.6	77.4	96.6
Basic	94.3	100.0	92.5	98.9	93.7	99.6
Limited	94.8	100.0	98.6	99.5	96.1	99.8

*for each ED category, proportions reflect access to hospitals of that level or higher

CONCLUSIONS: Survey to determine available ED resources is feasible. We found 3.8% of all EDs in PA&WI deliver at least comprehensive level ED services to children, leading to 33% of children having access to these services by ground, and 87% by air. The proposed categorization scheme would help to inform the appropriate transport of pediatric patients, and to meet the larger goal of developing a comprehensive system of ED care which will maximize access to care for all children.

81

9:30am

House Officer

Can a Pediatric Homeless Shelter Clinic Reduce Low Acuity Emergency Department Visits by Homeless Children?

Stephen Sandelich, Mario Cruz.
St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Homelessness is an independent risk factor for frequent, low acuity emergency department (ED) visits, suggesting that homeless children face many barriers to accessing their primary care physicians. Homeless shelter clinics (HSC's) are commonly used to reduce low acuity ED visits by homeless families, though their efficacy is not well established. St. Christopher's Hospital for Children has partnered with Drexel University College of Medicine to provide free, biweekly medical services for homeless children residing in a Philadelphia emergency shelter.

OBJECTIVE: To determine the healthcare needs of children served by this HSC and to document its effectiveness in reducing low acuity ED visits by homeless children.

DESIGN/METHODS: Self-administered written surveys were distributed to all mothers of children seen at the HSC between September of 2010 and May of 2011. The survey assessed barriers to accessing primary care, previous ED utilization, and willingness to use ED services for the presenting complaint. Sixty-three surveys representing 72 children were returned. HSC medical records were reviewed to identify the medical needs and treatment plans for children seen at the shelter.

RESULTS: Almost half of children had been seen in the ED at least once in the past six months with a total 60 visits and 23 admissions. Additionally, 73% of mothers reported that they would utilize ED services if their child was sick and 33% had previously visited the ED for similar symptoms. After visiting the clinic, women a third of women reported that if their child were not seen they would have gone to the ED for the same complaint.

The most commonly evaluated diagnosis for children presenting to the HSC were upper respiratory infection (24%), asthma (11%), gastroenteritis (9%) and eczema (7%). The most commonly dispensed medications were acetaminophen (15%), albuterol (15%), and ibuprofen (15%). Most of the children were insured and had primary care physicians, but they reported multiple barriers to accessing primary care including: no money (41%), no transportation (30%), and distance to the office (17%).

CONCLUSIONS: While most children evaluated at an HSC had low acuity medical issues, their mothers reported a high likelihood of using ED services if the HSC were not available. HSC's have the potential to reduce low acuity ED visits by homeless children. Homeless shelters should assist families in overcoming the barriers to accessing primary care.

82
9:45am

Chief Resident

Improving HIV Adolescent Screening in a Busy, Urban, Continuity Clinic

Janice Hobbs, Mario Cruz, Daniel Taylor, Roberta Laguerre-Frederique, Barbara Bungy, Robert Bonner, Jill Foster.

Center for Child and Adolescent Health, St. Christopher's Hospital for Children, Philadelphia, PA; Dorothy Mann Center for Pediatric and Adolescent HIV, St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Resident continuity clinics (RCC) balance patient care and teaching clinical management. In 2006, the Centers for Disease Control (CDC), recommended annual, opt-out, HIV screening for adolescents in all health-care settings. Prior to August 2009, adolescents in our RCC were referred to the Adolescent or Immunology clinics for serum HIV antibody testing. The primary concerns were maintaining confidentiality and continuity of care.

OBJECTIVE: We report on the effectiveness of a quality improvement project to improve compliance with the current CDC recommendations.

DESIGN/METHODS: In August 2009, quality improvement measures were implemented to increase HIV adolescent screening rates in our RCC. These systems-based and educational interventions addressed issues from a needs assessment. The educational interventions included pre-visit handouts for adolescents and parents on HIV/STI testing, trainings for residents and attendings, and peer-to-peer trainings for medical assistants (MA). The systems-based interventions included an opt-out HIV screening policy, use of rapid HIV testing, a protocol for managing positive HIV tests, simplification of HIV consent, and revision of the adolescent visit. Also, the MA role was expanded to include obtaining HIV consent and performing HIV testing prior to the physician encounter. Rapid HIV testing rates were monitored monthly and in relation to quality improvement measures.

RESULTS: A needs assessment regarding barriers to HIV testing in the RCC was conducted one year after induction. Ninety percent of residents believed time was a significant barrier. In the first month, 26.6% of adolescents received rapid HIV testing. Trainings for MAs, residents, attendings, and development of a protocol improved testing rates to 31.3% by January 2010. Interactive sessions for residents improved testing rates to 42% by January 2011. The greatest increase in testing occurred after the role of the MA was expanded. Testing rates increased from 43.3% to 82.6%.

CONCLUSIONS: Routine opt-out HIV screening is feasible in a RCC. The most effective measure was expansion of the role of the MA to include obtaining HIV consent and performing HIV testing. Results are available towards the beginning of the physician encounter, which allows the resident to be more efficient and integrate results at the start of clinical management.

83
10:00am

House Officer

Perception and Use of Marijuana among Children and Adolescents: A Community-Based Study

Esmil Perez, Patricia Burris-Warmoth, Susana Rapaport, Louis Primavera, Joseph Cannavo, Jasmin Patel, Fernanda Kupferman.

Pediatrics, Flushing Hospital Medical Center, Flushing, NY; School of Health Sciences, Touro College, Bay Shore, NY.

BACKGROUND: Marijuana (MJ) is the most commonly used illicit drug worldwide, particularly among adolescents. The prevalence of MJ use among youth 12 to 17 years in the US is estimated to be 9%.

OBJECTIVE: To identify perceptions about and the prevalence of MJ use among children and adolescents in our community.

DESIGN/METHODS: This was a descriptive, cross-sectional study. After obtaining written consent from the parents and assent from the child, an anonymous questionnaire was offered to subjects aged 10-18 years in the outpatient and inpatient services of Flushing Hospital Medical Center from September-October, 2011. Items included demographic data and questions about subject perception and use of MJ. Subjects were divided into users (U) and non-users (NU). Data were statistically analyzed using percentages and Chi-square with SPSS software; a p-value of <0.05 was considered significant.

RESULTS: Of 80 subjects enrolled, 56% were female; 51% were Hispanic, 15% African American (AA), 10% Asian, 12% mixed, 3% White and 9% other ethnic groups. Subjects' ages were 22% 10-12, 35% 13-15 and 43% 16-18 years. Nineteen subjects (24%) reported MJ use and use increased with age: 10-12 years 0%, 13-15 32% and 16-18 68% (p=0.008) and was higher in AA (37%) followed by Hispanics (32%) and mixed (26%), p=0.005.

Perceptions and Use of Marijuana in Children and Adolescents

	Non-users (n=61)	Users (n=19)	p value
Perceived MJ as safe	1.6%	37%	< 0.001
Rode in car driven by someone under the influence of MJ	5%	58%	< 0.001
Perceived as alleviating depression	31%	68%	< 0.001
Believed that MJ negatively affected school performance	66%	53%	0.01
Better school performance	81%	26%	< 0.001
More likely to plan for college	82%	32%	< 0.001
Parents disapprove MJ use	88%	68%	< 0.001

The most frequent adverse effects reported by U were drug craving after discontinuing MJ (84%) and difficulty sleeping (63%). Ten percent reported selling their belongings to buy MJ and 26% got into trouble with the police due to MJ use. Forty-seven percent of U's friends did not care about MJ use and 32% approved of its use, whereas most of NU's friends disapproved of its (NU= 59% vs U =21%; p<0.001).

CONCLUSIONS: Our study showed a high prevalence of MJ use among adolescents in our community. Users reported signs of dependency such as craving and selling belongings to buy MJ, poor school performance and adverse legal consequences.

84
10:15am

House Officer

Comparing the Knowledge, Perceptions and Perceived Consequences of Cyberbullying between Youth and Their Parents in an Urban Community

De' Andra Davis, Fernanda Kupferman, Susana Rapaport, Louis Primavera, Patricia Burris-Warmoth.

Department of Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Graduate School of Psychology and Health Sciences, Touro College, NY, NY.

BACKGROUND: Networked computers and mobile devices allow for exposure to cyberbullying (CB). CB is prevalent among youth and is linked to severe consequences such as suicide. The American Academy of Pediatrics (AAP) has recommended pediatricians to screen for exposure to social networking site (SNS) use and CB.

OBJECTIVE: To determine the prevalence of CB, differences in recognition of CB exposure between parents and youth, and whether pediatricians are screening for SNS use and CB.

DESIGN/METHODS: This was a descriptive cross-sectional study based on a confidential 41-item questionnaire given simultaneously to youth aged 10-18 years and one parent in inpatient and outpatient settings at Flushing Hospital Medical Center from July-October 2011. Items asked demographic data and questions about SNS use, CB exposure, knowledge and consequences, and whether their pediatrician had screened for SNS use and CB. The data were analyzed descriptively using frequencies and Pearson Chi-squares, with a p-value < 0.05 considered significant.

RESULTS: Of the 51 youth and parent pairs that participated, 61% of youth were exposed to CB; 16% as victims, 6% as perpetrators, 6% as both, and 55% as bystanders. Sixty-two percent of youth said they would tell their mother if victimized, but only 16% would tell their doctor. However, of the 8 victimized youth, none were reported, and their parents were unaware. Of the youth not victimized, 10% of parents thought they were. SNS use increased with age ($p < 0.001$), as did exposure to CB ($p = 0.03$). Of the victims, 50% wanted to hurt themselves, 25% wanted to hurt the cyberbully, and 12% wanted to hurt anybody. Only 52% of youth when compared with 73% of parents were very concerned about CB. Most youth and parents chose some but not all of the potential actions in response to CB. Exposure to CB did not vary with age, gender or ethnicity, and being a cybervictim was not increased with frequency of SNS use or total number of SNS visited ($p>0.05$). Seventy-three percent of youth reported never being screened by their pediatrician about SNS use and CB exposure.

CONCLUSIONS: In our urban community, the majority of youth was exposed to CB and frequented SNS. Frequent use of SNS increased exposure to CB. Parents were not reliable reporters of CB in their child, and pediatricians did not screen for SNS use and CB exposure appropriately in their patients.

Infectious Diseases & Immunology Platform Session

Saturday, March 31, 2012
8:15am-10:30am

85
8:15am

Zoster in Children in the Era of Varicella Vaccine

Marietta Vazquez, Anne A. Gershon, Alexandra P. Grizas, Phil LaRussa, Nancy Holabird, Sharon P. Steinberg, Eugene D. Shapiro.

Pediatrics, Yale University School of Medicine, New Haven, CT; Pediatrics, Columbia University, College of Physicians and Surgeons School of Medicine, New York, NY.

BACKGROUND: There is little information about the characteristics of Herpes zoster (HZ) in children since routine immunization with varicella vaccine was introduced.

OBJECTIVE: To characterize features of HZ in children due to wild-type (WT) and vaccine-type (OKA) varicella-zoster virus (VZV).

DESIGN/METHODS: Active surveillance in 20 pediatric practices in Connecticut was conducted for children 13 mos-16 yrs of age suspected of having HZ. Potential cases were visited by a research nurse on day 3-5 of the illness who took photos of the rash and obtained clinical and demographic data. Severity of disease (mild, moderate or severe) was assessed by an author (EDS), based on photos and abstracted clinical data, who was blinded to history of both varicella and receipt of varicella vaccine. Samples from skin lesions were tested using a VZV-specific PCR and further characterized as WT or OKA strain using restriction fragment length polymorphism analysis.

RESULTS: Of the 31 potential cases of HZ identified from 2004-2011, 21 (68%) were positive for VZV, 6 (19%) were negative and 4 (13%) had an inadequate sample. Of the 21 VZV+ cases, 8 (38%) had WT+ and 13 (62%) had OKA+ HZ. Ages of the children ranged from 2–15 yrs (median 8 yrs); 67% of the children were male. WT+ children were significantly older than OKA+ children (mean ages, 11 vs. 6 yrs; p=0.003). None of the OKA+ children and 5 (62%) of the WT+ children had a previous history of varicella (p=0.003). All of the OKA+ children and 3 (37%) of the WT+ children had received varicella vaccine (p=0.003). Overall, 12 (92%) OKA+ and 7 (88%) WT+ subjects had mild or moderately severe disease; only 1 OKA+ and 1WT+ subject had severe disease. There were no significant differences between children with WT+ and OKA+ HZ in gender, race (100% of WT+, 77% of OKA+ were white), number of dermatomes or side of the body affected (83% of WT+, 62% of OKA+ were on the left side), or whether antiviral therapy was prescribed (50% of WT+, 39% of OKA+). No significant differences were found between OKA+

and WT+ vaccinated children by number of doses, mean age at vaccination, and mean time elapsed between vaccination and development of HZ.
CONCLUSIONS: In children, the clinical presentation of HZ due to OKA strain of VZV is similar to that due to WT VZV. Vaccinated children can develop WT HZ without a clinical history of breakthrough varicella.

86
8:30am

House Officer

Prevalence of the Urine Pneumococcal Antigen Test in Children with Sickle Cell Disease

Duygu Unkaracalar, Tsoline Kojaoghlanian.
Pediatrics, St Barnabas Hospital, Bronx, NY; Pediatric Infectious Disease, Children's Hospital at Montefiore, Bronx, NY.

BACKGROUND: Invasive pneumococcal disease (IPD) remains a major cause of morbidity and mortality among children with sickle cell disease (SCD). Urine pneumococcal antigen testing aids in early diagnosis of IPD in adults. The test has had mixed results with varying specificity in the young pediatric population (< 5 years) mostly due to their high rate of nasopharyngeal colonization with Streptococcus pneumoniae. There is evidence that children with SCD have lower rates of colonization secondary to the use of antibiotic prophylaxis and increased vaccination schedule. The prevalence of positive urine pneumococcal tests in the pediatric SCD population is unknown.
OBJECTIVE: To determine the prevalence of positive urine pneumococcal antigen tests in children with SCD, stratified by age and presence or absence of acute illness.
DESIGN/METHODS: Cross-sectional, prospective study that enrolled children with SCD, from 12 months to 21 years of age, who presented to an urban medical center or an affiliated community hospital for well visits, or with an acute febrile illness or pain crisis between April and October 2011. The BINAX urine pneumococcal antigen test was performed after obtaining consent.
RESULTS: Seventy six children were enrolled with a mean age of 11.7 ± 5.7 years. Twelve children (16%) were < 5 years of age and were receiving antibacterial prophylaxis; 33 children (43%) were between 5 and 12 years and 31 (41%) were > 12 years of age. All study subjects were immunized with pneumococcal vaccine at recommended intervals. Sixty of the 76 children presented for well visits and the urine pneumococcal antigen was positive in 2/60 (3.33%) - one child was 8 years old and the other 15 years old, both were not on antibiotic prophylaxis; neither one developed IPD within 30 days after recruitment. Nine children presented with a febrile illness and 7 children presented with pain crises; none of these subjects tested positive for the urine antigen.
CONCLUSIONS: The prevalence of positive urine pneumococcal antigen in well children > 5 years of age with SCD is very low (3%). There were no positive urine tests in the < 5-year age group. None of the children who were acutely ill had positive pneumococcal antigen tests, although none of them presented with IPD.

87
8:45am

Fellow in Training

Prevalence of Pneumococcal Bacteremia in Low Risk Patients with Sickle Cell Disease and Fever

Shashidhar R. Marneni, Jennifer H. Chao, Konstantinos G. Agoritsas, Shahriar Zehtabchi.
Emergency Medicine, SUNY Downstate Medical Center, Brooklyn, NY.

BACKGROUND: Pneumococcal bacteremia is an important cause of morbidity and mortality in patients with sickle cell disease (SCD). The National Heart, Lung, and Blood Institute guidelines state that nontoxic sickle cell patients with fever <40C and oxygen saturation (O2sat), chest x ray (CXR), white blood cells (WBC), platelets, and hemoglobin within normal limits, are candidates for outpatient treatment with antibiotics as they are at low risk for bacteremia.
OBJECTIVE: To determine the prevalence of pneumococcal bacteremia in low risk febrile emergency department (ED) patients with SCD.
DESIGN/METHODS: This is a retrospective cohort study of sickle cell patients ≤ 18 years of age who presented to an urban Pediatric ED from November 2005 to March 2011 with a triage temperature of ≥100.4F and had CBC and blood culture performed. We excluded patients with temperature >104F, abnormal CXR, O2sat <90%, WBC <5K or >30K, platelets <100K, hemoglobin <5gm/dl, or admitted to PICU. Continuous variables are presented as median and interquartile (IQR) ranges and categorical data as percentages with 95% confidence interval (CI). Man-Whitney-U and Fisher's Exact tests were used to compare continuous and categorical data, respectively.
RESULTS: We enrolled 317 patient visits during the study period. Median age was 6 years (IQR 2-11), temperature 101.8F (IQR 101-102.8), WBC 15.83 (IQR 11.8-19.88), ANC 66.25 (IQR 53.22-75.18), band count 0.00 (IQR 0.0-3.0). 64% were admitted to floor (95%CI, 59-69%). Of the 317 blood cultures, 10 were positive (3.1%, 95%CI, 1.7-5.8%). Streptococcus pneumoniae was not isolated from any of the cultures.
CONCLUSIONS: In our study the prevalence of pneumococcal bacteremia in low risk febrile patients with SCD is low. These results suggest that routine antibiotics against S. pneumoniae might not be warranted in these patients.

88
9:00am

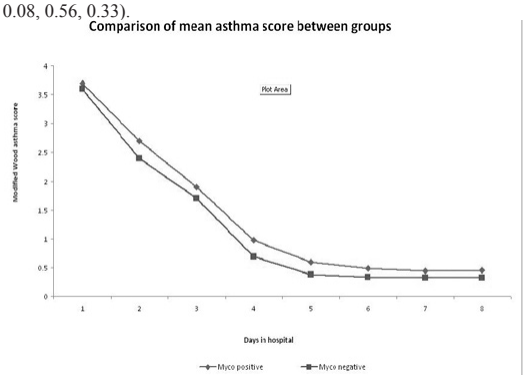
House Officer

Does Mycoplasma Infection Worsen Symptoms in Acute Asthma Exacerbation? A Retrospective Case Control Study

Ramkumar Natarajan, Sandeep Puranik, Fernanda Kupferman, Susana Rapaport, Kelly Cervellione, Dakshayani Guttal.
Department of Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Department of Pediatrics, Jamaica Hospital Medical Center, Flushing, NY.

BACKGROUND: Mycoplasma infection is known to trigger first episode of asthma, exacerbations, persistent lung inflammation and lung remodeling in chronic asthmatics. Its not known if mycoplasma infection worsens the severity of acute asthma exacerbations (AAE).

OBJECTIVE: To explore the relationship between mycoplasma infection and severity of AAE.
DESIGN/METHODS: We retrospectively reviewed charts of children aged 2-18 years admitted to Jamaica Hospital Medical Center for AAE from Jan 2010 to June 2011. Patients with other infections or with inadequate data for asthma severity scoring were excluded. Mycoplasma infection was defined as a positive Mycoplasma IgM complement fixation test result at admission. Children with positive tests were compared to those who tested negative. Independent variables were age, body mass index(BMI), gender, ethnicity and radiographic findings. Dependent variables were asthma severity score (modified Wood asthma scale, score range 0-10 with higher scores indicating severe disease), days of hypoxia (DoH, oxygen saturation below 95% in room air), fever and length of stay(LOS). Descriptive data were reported using frequency, means and standard deviation. Statistical analysis was by general linear model (repeated measures ANOVA)and Pearson's chi-squares.
RESULTS: We collected data on 176 children; 17 subjects with incomplete data were excluded. Included in the final analysis were 159 children (100 mycoplasma positive, 59 negative). There was no statistical differences between the groups for age, BMI, ethnicity and radiographic findings (p values 0.91, 0.32, 0.06, 0.27). Mycoplasma positive group had more females with a ratio of 73:27 (p = 0.04). There was no significant differences in daily mean asthma severity scores between groups. There was no statistical difference between the groups with respect to fever, DoH and LOS (p = 0.08, 0.56, 0.33).



CONCLUSIONS: Mycoplasma infection did not alter severity of AAE in our study.

89
9:15am

Medical Student

Rates of Neonatal Intensive Care Unit (NICU)-Based Administration of Trivalent, Inactivated Influenza Vaccine (TIV) in Parents Who Smoke Compared to Non-Smokers

Caitlin E. Welch, Shetal Shah.
Stony Brook Children's Hospital, Stony Brook, NY.

BACKGROUND: TIV is indicated for caretakers of newborn infants. NICU-based administration of TIV to parents results in high immunization rates. Smoking is also an indication for TIV. Population data suggests smokers exhibit lower TIV vaccination rates than non-smokers (34.1% vs. 48%). The rates of TIV vaccination in parents who smoke and have hospitalized NICU infants has not been determined.
OBJECTIVE: To determine if rates of bedside TIV immunization differed among smokers and non-smokers in this unique population.
DESIGN/METHODS: For a 4-month period from Nov. to Mar. for the 2005-06 (Year 1), 06-07 (Year 2) 08-09 (Year 3) & 09-10 (Year 4) influenza seasons, NICU parents were informed of the risks & benefits of TIV. Parents were screened, medically consented, & immunized at their infant's bedside. Data on smoking status, immunization rates & patient demographic factors was obtained. Odds ratio & 95% Confidence Intervals (CI) were calculated and Mental-Hazel Chi-Square Test for Trend was used to compare annual differences.
RESULTS: 991 parents were screened. TIV rate was 87.8% (range 77.1% - 95.9%). 107 parents (11 Mothers, 96 Fathers; 10.7%) were smokers upon NICU admission. TIV rates for smokers were increased compared to non-smokers (96.2% vs. 86.8% OR 3.88, 95% CI 1.4-10.7). Vaccination rates for smokers ranged from 88.2% in Year 1 to 100% in Years 2 & 3). No differences in rates between smokers and non-smokers were seen in Year 1 (OR 0.47, 95% CI 0.09-2.4) and Year 2 (OR 0.99, 95% CI 0.14-3.3).
Maternal TIV rates were decreased compared to paternal rates (79.0% vs. 96.5% OR 0.13, 95% CI 0.07-0.22). All mothers who smoked received TIV compared with 95.8% (92/96) fathers.No difference in vaccination rates of fathers was seen in relation to smoking status (95.8% vs. 96.7% OR 0.76 95% CI 0.2-2.4).
TIV immunization for all patients in Year 3 was significantly lower than other study years ($p<0.05$). This was driven by a decreased rate of immunization in non-smokers ($p<0.05$). No differences in TIV rates between smokers and non-smokers were seen based on year of study.
CONCLUSIONS: Administration of TIV in the NICU is a sustainable means of increasing TIV

rates in parents.Though limited by the low incidence of materal smokers, these parents received TIV at higher rates than non-smokers. Parental vaccination in the NICU may mitigate the reduced TIV rates smokers exhibit in the general population.

90

9:30am

Retrocyclin: A Candidate Microbicide with Effects on the Vaginal Microbiota

Thomas A. Hooven, Tara M. Randis, Saul R. Hymes, Ryan Rampersaud, Adam J. Ratner.

Department of Pediatrics, Columbia University, New York, NY.

BACKGROUND: Retrocyclin (RCL) is a circular peptide defensin shown to have antimicrobial and antitoxin activities. RCL is produced by some nonhuman primates, but the human gene contains a premature stop codon. Work is underway to develop RCL as a broadly active candidate microbicide. Bacterial vaginosis (BV) is a common polymicrobial infection in which the *Lactobacillus*-dominant vaginal microbiota is replaced by overgrowth of other organisms, primarily *Gardnerella vaginalis*. BV, which increases the risk of preterm labor, postpartum infections, and STI acquisition, contributes significantly to global neonatal morbidity and mortality. We hypothesized that RCL might have efficacy against BV-associated microorganisms and their protein toxins, while sparing nonpathogenic lactobacilli.

OBJECTIVE: 1. Test RCL activity against *G. vaginalis* and vaginolysin (VLY), its protein toxin, *in vitro*.

2. Determine the effect of RCL on *Lactobacillus crispatus*, a vaginal microbe commonly associated with non-BV states.

DESIGN/METHODS: 1. The effect of RCL against live bacteria was determined. *L. crispatus* and *G. vaginalis*, grown in either planktonic or biofilm states, were treated with RCL or vehicle control at various concentrations. Bacterial viability was measured by optical density and quantitative culture.

2. Purified, recombinant VLY was combined with RCL or vehicle control solution and activity against target cells (erythrocytes and genital tract epithelial cells) assessed. Statistical analysis was by analysis of variance with Tukey post-test as appropriate.

RESULTS: 1. RCL was bacteriostatic against growing *G. vaginalis* in both planktonic and biofilm conditions but had no effect on stationary phase organisms.

2. RCL significantly reduced VLY-mediated lysis of erythrocytes (IC_{50} ~15 μg/ml; $P < 0.01$ for all concentrations tested) and cultured epithelial cells.

3. RCL was both bacteriostatic and bactericidal against *L. crispatus*.

CONCLUSIONS: RCL inhibits *G. vaginalis* growth and VLY cytolytic activity, indicating potential efficacy in the setting of BV. However, the effect of RCL on members of the normal vaginal microbiota, including *L. crispatus*, poses challenges for its development.

91

9:45am

UNGAL as a Potential Biomarker for Late Onset Sepsis among Infants in the NICU

Jennifer M. Pynn, Elvira Parravicini, Lisa Saiman, David Bateman, Jonathan Barasch, John Lorenz.

Pediatrics, Stony Brook University Medical Center, Stony Brook, NY; Pediatrics, Columbia University-NY Presbyterian, New York, NY.

BACKGROUND: There has been much interest in the use of biomarkers to evaluate infants in the NICU for suspected sepsis. Urinary neutrophil gelatinase-associated lipocalin (UNGAL) is upregulated during acute kidney injury and sepsis in adults and children. Results from a pilot study suggest a potential role for UNGAL as a noninvasive early biomarker for late onset sepsis.

OBJECTIVE: To determine UNGAL concentrations associated with culture proven late onset sepsis compared to other outcomes of the sepsis evaluations; to determine the sensitivity, negative predictive value (NPV), and number needed to treat (NNT) for UNGAL for culture positive sepsis.

DESIGN/METHODS: We performed a prospective observational study of infants of all gestational ages and birth weights who underwent a sepsis evaluation at >72 hours of age in our NICU. At the time of evaluation, urine was obtained for UNGAL determination via Western immunoblot. Using ANOVA and post-hoc Dunnett's test, mean log UNGAL concentrations were compared in several groups based on results of the evaluations: all cultures negative (reference group), culture positive sepsis, single culture positive for *S. epidermidis*, positive urine cultures, necrotizing enterocolitis without positive blood culture, and an 'other' category which included wound infections and positive tracheal cultures.

RESULTS: From February 1, 2010 to April 1, 2011, 179 infants underwent 368 late onset sepsis evaluations. Overall, 136 of these infants had ≥1 UNGAL level obtained. In post-hoc testing only one comparison demonstrated a significant difference in mean log UNGAL values: culture positive sepsis (n=32) vs. all cultures negative (n=49; 215.4 vs. 52.9ng/ml, respectively; p<0.01). We performed an ROC and explored the sensitivity, NPV, and NNT for several UNGAL cut-off values for this comparison. The AUC was 0.81 (95% CI: 0.72-0.9). Sensitivities were 94%, 86%, and 67%; NPVs were 92%, 92%, and 88%; and NNT were 5, 3, and 2 for cutoff values of 20, 50, and 165 ng/ml, respectively. CRP values obtained at the time of late onset sepsis evaluation had lower sensitivity and NPV and higher NNT than these parameters for UNGAL ≥50 ng/ml.

CONCLUSIONS: At a cutoff value ≥50 ng/ml, UNGAL discriminates between positive and negative blood culture status for infants evaluated for late onset sepsis with a sensitivity of 86%, NPV of 92%, and a NNT of 3. A larger, multicenter study is needed to further verify our results.

92

10:00am

Determinants of Group B Streptococcal Colonization of the Murine Vaginal Epithelium

Tara M. Randis, Ritwij Kulkarni, Adam J. Ratner.

Pediatrics, Columbia University, New York, NY.

BACKGROUND: Group B Streptococcus (GBS) is a significant neonatal pathogen and the leading infectious cause of morbidity and mortality among infants in the United States. Colonization of the maternal genitourinary tract is the primary risk factor for neonatal disease. GBS produces β-hemolysin/cytolysin (β H/C), a pore-forming toxin known to be a critical virulence factor in animal models of invasive neonatal disease. The role of this toxin in the establishment of maternal genitourinary colonization is unknown.

OBJECTIVE: To determine the contribution of the β H/C toxin to the establishment of GBS colonization of the murine vaginal epithelium.

DESIGN/METHODS: Following synchronization of the estrous cycle with exogenous 17-beta-estradiol, female C57BL6/J mice were vaginally inoculated with either wild type (WT) or β H/C deficient (cylE knock-out (KO)) strains of GBS at 8-12 weeks of age. Serial vaginal swab specimens were collected for quantitative culture, and the duration and extent (colony-forming units (CFU)/ml recovered) of GBS colonization between study groups were determined. In a separate cohort, mice were simultaneously infected with both WT and KO GBS strains. Vaginal swabs were collected 5 days following infection and the competitive index [(WT CFU recovered/ WT CFU inoculated) / (KO CFU recovered/ KO CFU inoculated)] calculated.

RESULTS: There was no difference in the duration of GBS colonization between groups infected with WT or KO strains (100% and 40% of animals colonized in both study groups at days 5 and 19 respectively). Additionally, there was no statistically significant difference observed in the median CFU/ml recovered 5 days post-infection between the WT and KO groups (P = 0.15; Mann Whitney U test). A median competitive index of 2.5 X 10^3 was observed in animals co-infected with both WT and KO strains, indicating a significant competitive colonization advantage for GBS strains expressing β H/C.

CONCLUSIONS: GBS strains lacking β H/C colonize the murine vaginal epithelieum as effectively as WT strains. However, expression of the β H/C toxin confers a significant colonization advantage to the wild-type strain in the co-infection model. We speculate that modulation of and relative resistance to innate immune responses by the β H/C-expressing bacteria may account for this observation.

93

10:15am

Bacterial Meningitis in the Neonatal Intensive Care Unit (NICU): A Prospective Observational Study

Lakshmi Srinivasan, Samir S. Shah, Soraya Abbasi, Lavanya Madhusudan, Michael A. Padula, Mary C. Harris.

Pediatrics, The Children's Hospital of Philadelphia and the Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA; Pediatrics, Cincinnati Children's Hospital Medical Center and the University of Cincinnati College of Medicine, Cincinnati, OH; Pediatrics, Pennsylvania Hospital, Philadelphia, PA.

BACKGROUND: Despite advances in neonatal intensive care, bacterial meningitis remains a significant cause of morbidity and mortality. Recent studies suggest that meningitis may occur despite normal cerebrospinal fluid (CSF) parameters and negative blood cultures.

OBJECTIVE: To compare CSF parameters between infants with bacterial meningitis and uninfected infants.

DESIGN/METHODS: This study included infants <6 months receiving lumbar punctures (LPs) in 3 NICUs. Infants with potential causes of CSF pleocytosis (seizures, IVH, bacteremia) were excluded from the uninfected (control) group. CSF parameters were compared between groups, and sensitivity, specificity and predictive values calculated.

RESULTS: Of 802 infants, 382 met inclusion criteria; 11 had culture proven meningitis (1.4%) (Table 1). These infants were more likely to be premature and have late-onset sepsis. Five had meningitis with concomitant bacteremia; 6 had negative blood cultures and a history of neurosurgical intervention. Bacteria isolated from CSF included Group B streptococci (3), Staphylococcus aureus (4), coagulase negative staphylococci (2), Enterococcus faecalis (1) and Enterobacter cloacae (1). The mortality rate was 18.2%. A cut-off limit for CSF WBC of 21 cells/mm^3 provided excellent sensitivity and specificity (Table 2).

Table 1: Infants with meningitis versus controls

Variable, *median (IQR)*	**Meningitis** (n=11)	**Controls** (n=371)	p value*
Gestational age (weeks)	32 (24-38)	37 (33-39)	0.012
Postnatal age (days)	40 (21-55)	3 (1-17)	<0.001
Birthweight (grams)	1665 (660-2665)	2828 (1883-3370)	0.017
CSF protein (mg/dL)	322 (141-841)	86 (63-119)	<0.001
CSF WBC (cells/mm^3)	215 (30-483)	3 (1-6)	<0.001
CSF glucose (mg/dL)	32 (20-46)	50 (43-60)	<0.001

*Wilcoxon rank sum testing

Table 2: Sensitivity, specificity and predictive values of selected cut-off levels (%)

CSF parameter	**Cut-off limit**	**Sensitivity**	**Specificity**	**Positive predictive value**	**Negative predictive value**
CSF protein (mg/dL)	120	82	76	9	99
	150	73	89	17	99
CSF WBC (cells/mm^3)	21	91	96	39	99
	30	73	97	44	99
CSF glucose (mg/dL)	20	46	99	71	98
	40	64	87	11	99

CONCLUSIONS: In the absence of neurosurgical interventions, bacterial meningitis was accompanied by positive blood cultures in this cohort of NICU infants. Cut-off limits for CSF WBCs allowed accurate prediction of meningitis, although our findings are limited by a low disease incidence. Mortality from bacterial meningitis remains high.

Neonatology - Monitoring Platform Session

Saturday, March 31, 2012
8:15am-10:30am

94
8:15am

Fellow in Training

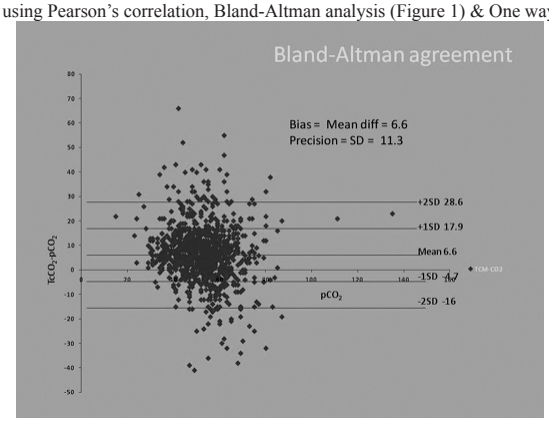
Reliability of Transcutaneous Carbondioxide Monitoring in VLBW Infants

Jagadish Elumalai, Shanthy Sridhar, Adriann Combs, Catherine Messina.
Pediatrics, StonyBrook Children's hospital, Stony Brook, NY.

BACKGROUND: Continuous non-invasive transcutaneous CO2 (TcCO2) monitoring has become an important bedside tool for management of mechanically ventilated babies in NICU. Fluctuation levels of CO2 is often a concern due to risks of PVL & IVH. The data on correlation and agreement between pCO2 and TcCO2 levels is sparse.

OBJECTIVE: To find correlation and agreement between transcutaneous CO2 and blood pCO2 in VLBW babies.

DESIGN/METHODS: Retrospective study done in a level III NICU on VLBW infants. Paired values of TcCO2 and pCO2 were collected from 39 VLBW infants born between June 2008 & June 2010. All samples were grouped for three CO2 values (pCO2<35,35-55 & >55mmHg),GA(24-26wks and 27-30wks),BW(<750gms,751-1000gms & 1001-1500gms).Statistical analysis was performed using Pearson's correlation, Bland-Altman analysis (Figure 1) & One way ANOVA.

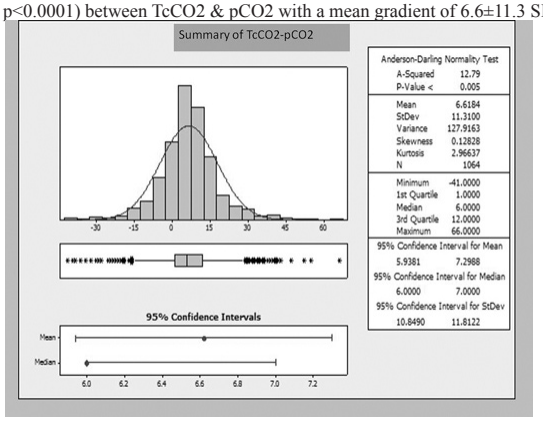


Performance of TcCO2 monitoring was analyzed using sensitivity,specificity,PPV & NPV.

Performance of TcCO2 monitoring

	pCO2<35	pCO2 35-55	pCO2 >55
Sensitivity	19.5%	50%	84%
Specificity	98%	79.8%	55.4%
PPV	30%	77%	55%
NPV	97%	55%	84%

RESULTS: There were a total of 1064 paired samples analyzed. There was a moderate correlation (r=0.64 with p<0.0001) between TcCO2 & pCO2 with a mean gradient of 6.6±11.3 SD.



The mean gradient between TcCO2 & pCO2 was significantly less in infants with B.W 1001-1500gms compared to B.W <1000gms.

CONCLUSIONS: In our study we found only moderate correlation and agreement between pCO2 and TcCO2 levels in ventilated VLBW infants. Routine use of Transcutaneous monitor should be applied with caution in this patient population.

95
8:30am

Fellow in Training

Methemoglobinemia and Inhaled Nitric Oxide, Are We Monitoring Too Much?

Kathryn A. Ziegler, Ursula Nawab, Brian Glynn, Zubair H. Aghai.
Neonatology, Thomas Jefferson University Hospital, Philadelphia, Pa; Neonatology, Nemours AI duPont Hospital for Children, Wilmington, DE; Neonatology, Christiana Care Hospital System, Newark, DE.

BACKGROUND: Infants with pulmonary hypertension and respiratory failure are often treated with inhaled nitric oxide (iNO) to promote pulmonary vasodilatation and improved oxygenation. A serious complication of iNO is methemoglobinemia due to the interaction with nitric dioxide and oxyhemoglobin. Methemoglobinemia has been associated with higher doses of iNO especially at 80ppm. Current practice at our institution requires blood sampling for methemoglobin (methHb) levels every 8 hours while on iNO.

OBJECTIVE: To evaluate levels of methHb in infants on iNO to determine how often levels must be monitored to prevent methemoglobinemia.

DESIGN/METHODS: Retrospective study of all newborns on iNO at Thomas Jefferson University Hospital from January 1, 2006-September 30, 2011. Infants on iNO and with at least one methHb level were included in the review. Charts were reviewed utilizing the institution's EMR for the number of methHb levels, the methHb values, iNo administration and the ventilator settings at time of blood sampling. In addition pertinent demographic data were also reviewed.

RESULTS: 624 methHb levels were performed on 79 infants (19, <34 w; 11, 34-36 w and 49 term infants). The median (range) duration of iNO therapy was 5 days (1-34 days). The median starting dose of iNO was 20 ppm (20-20 ppm) in full term infants and 20 ppm (10-20 ppm) in preterm infants. A median of 7 (1-41) methHB levels were performed on each infant. The mean methHb level (±SD) was 0.68±0.34%. Only one of 624 (0.16%) blood samples demonstrated a methHb level greater than 2% and there were no levels more than 5%. The one elevated level may represent a lab error as the methHb values preceding and following this level were normal and the dose of iNO was not changed. In two premature infants, even after 30 days of iNO therapy (cumulative doses 480,960 ppm and 662,400 ppm), the methHb levels were <1%. Starting dose of iNO, duration of iNO therapy, cumulative dose of iNO and the higher FiO_2 requirement were not associated with the higher methHb levels.

CONCLUSIONS: When iNO is used at standard doses (≤20ppm) there is no increased risk of methemoglbobinemia in preterm, late preterm or full term infants. Dose and duration of iNO and increased FiO_2 have no impact on methHb levels. The routine and frequent monitoring of methHb levels may not be necessary in infants receiving currently suggested doses of iNO.

96
8:45am

Fellow in Training

Effect of Fresh Frozen Plasma (FFP) on Coagulation Status by Thromboelastography (TEG) in Encephalopathic Newborns Treated with Hypothermia

Katie R. Forman, Edward Wong, Naomi Luban, Meanavy Gallagher, An N. Massaro.
Neonatology, Children's National Medical Center, Washington, DC; Laboratory Medicine, Children's National Medical Center, Washington, DC.

BACKGROUND: Therapeutic hypothermia may worsen baseline coagulopathy in asphyxiated newborns by inhibiting enzymatic activity essential to factor activation and clot formation. It is unclear whether transfusion of additional clotting factors can overcome the affect of hypothermia on coagulation. Thromboelastography (TEG) is global assessment of coagulation status that can be calibrated for temperature. Changes in TEG following FFP transfusion in newborns undergoing hypothermia have not been previously described.

OBJECTIVE: To evaluate changes in TEG and routine coagulation studies (i.e. PT, aPTT, INR, fibrinogen) following FFP transfusion in encephalopathic newborns undergoing therapeutic hypothermia.

DESIGN/METHODS: Neonates with encephalopathy referred for hypothermia were enrolled in this prospective observational study evaluating utility of TEG as a measure of coagulation disturbance. Laboratory data pre and post FFP transfusion were compared using paired-samples T-test.

RESULTS: Preliminary data from 5 encephalopathic newborns undergoing hypothermia are included in this report. FFP was given in response to clinical bleeding (pulmonary hemorrhage n=3, GI bleeding n=2) or profoundly prolonged coagulation studies (i.e. INR>1.75) (n=1). Although routine coagulation tests improved after transfusion, normalization did not occur. Differences between pre and post transfusion results were not statistically significant. In contrast, significant improvements in several TEG prameters were observed.

	Pre FFP Transfusion	Post FFP Transfusion	P-Value
Reaction Time = R (Minutes)	10.44±2.5481	8.560±1.787	0.280
Clot Kinetics = K (Minutes)	4.46±1.74	2.72±0.773	0.049*
Angle = α (Degrees)	41.66±9.123	55.46±7.58	0.008*
Maximum Amplitude = MA (mm)	49.02±7.247	58.46±4.6231	0.019*
Lysis at 30 Minutes = Ly30 (%)	0.68 ±1.5205	1.48±1.8102	0.306
Coagulation Index = CI	-7.12±3.743	-3.04±2.3223	0.067
PT (Seconds)	28.32±9.8258	22.880±5.0702	0.142
aPTT (Seconds)	45.040±4.4433	43.380±7.9440	0.457
INR	2.716±1.23099	2.042±0.59209	0.155
Fibrinogen	153.75±52.386	233.5±63.88	0.102

FFP = Fresh Frozen Plasma

CONCLUSIONS: Prolongation of PT/PTT in hypothermia-treated encephalopathic newborns persists after FFP transfusion, while transfusion therapy significantly improves TEG parameters. This pilot data suggests that TEG may be a more sensitive measure of coagulation status. Confirmation of these preliminary findings and correlation with clinical bleeding is needed.

97

9:00am

Fellow in Training

Effect of Temperature on Thromboelastography (TEG) and Implications for Clinical Use in Neonates Undergoing Therapeutic Hypothermia

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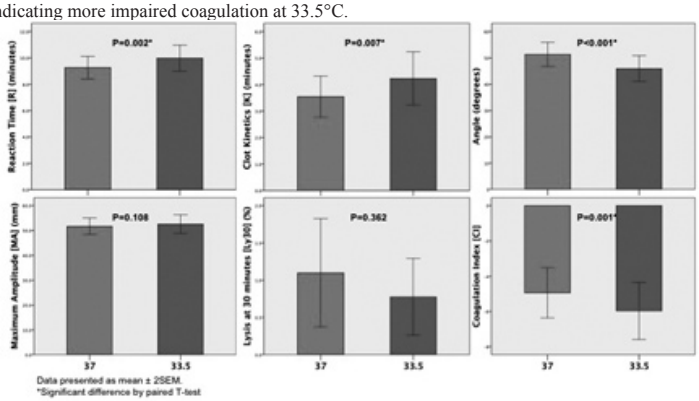
BACKGROUND: Thromboelastobraphy (TEG) is a global measure of coagulation status. Its output is a trace described by 6 quantitative measurements - clot reaction time (R), kinetics (K), angle (α), maximum amplitude (MA), lysis at 30 minutes (Ly30), and the coagulation index (CI). TEG offers advantages over routine studies (e.g. PT, aPTT, INR, fibrinogen, platelet count) because it evaluates coagulation disturbances with a single test that can be calibrated for temperature. This feature is particularly of interest in encephalopathic neonates treated with hypothermia, a population at high risk for coagulopathy.

OBJECTIVE: To evaluate the effect of temperature on TEG performed on whole blood specimens from encephalopathic neonates undergoing therapeutic hypothermia.

DESIGN/METHODS: Encephalopathic neonates treated with whole body hypothermia were enrolled in this prospective study. Daily blood specimens were collected for standard coagulation tests during hypothermia and after rewarming. Concurrent TEG assays were performed at 33.5 and 37°C for comparison. Paired-samples T test was used to evaluate within-subject differences in results.

RESULTS: A total of 28 paired TEGs from 10 subjects were performed. Subjects were treated with hypothermia for encephalopathy due to asphyxia (n=9) or hyperammonemia (n=1). Mean birthweight was 3.2±0.7 Kg, gestational age 38.4±1.4 wks and 40% were male. TEG results differed significantly between assays performed at normothermia (37°C) vs hypothermia (33.5°C), indicating more impaired coagulation at 33.5°C.



CONCLUSIONS: TEG results are affected by temperature, consistent with the known association of hypothermia with coagulopathy. Ability to calibrate TEG to 33.5°C simulates in vivo conditions during therapeutic hypothermia. This may provide a more accurate assessment of cogulation status compared to PT/PTT that is standardly performed at 37°C. Correlation with clinical bleeding risk in a larger sample of patients is needed.

98

9:15am

NIRS Abdominal Somatic Tissue Oxygen Saturation Validation Model for Neonates ≤ 4kg

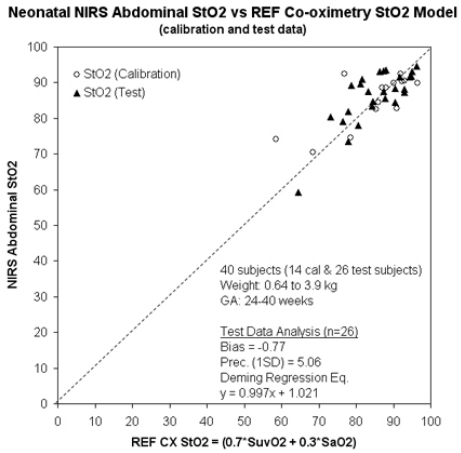
Mariam M. Said, Nickie Niforatos, Khodayar Rais-Bahrami.
Neonatology, Children's National Medical Center, Washington, DC; The George Washington University School of Medicine, Washington, DC.

BACKGROUND: Near infrared spectroscopy (NIRS) is used in the measurement of cerebral and somatic tissue oxygenation (StO_2). Traditional NIRS algorithms have been primarily designed in the measurement of cerebral StO2, however, no formal validation studies exist for measurement of somatic StO_2.

OBJECTIVE: In this study, we present a method to validate a novel stool compensating somatic NIRS algorithm to measure abdominal tissue oxygen saturation (StO_2) in neonates ≤ 4 kg, using weighted umbilical venous and arterial oxygen saturation as a reference model.

DESIGN/METHODS: With parental agreement we enrolled neonates with an umbilical venous catheter (UVC) positioned in the inferior vena cava (IVC) to validate a NIRS tissue oximeter (FORE-SIGHT®, CAS Medical Systems, Branford, CT USA) to measure abdominal StO_2. A sensor was placed over left & right flank, liver, and intestine in three positions (infraumbilical, RLQ, LLQ) for a period of 2 minutes each. The StO_2 measurements from the six abdominal positions were averaged together to determine a composite abdominal StO_2, which better reflects global IVC blood. The composite abdominal StO_2 value from each subject was compared with co-oximetry measured oxygen saturation obtained from UVC ($SuvO_2$) and pulse oximetry (SaO_2) to determine a Reference co-oximetry StO_2 value from the equation ($0.7*SuvO_2 + 0.3*SaO_2$).

RESULTS: Data was obtained from 40 subjects weighing 0.64-3.9 kg, 1-13 days old, and GA of 24-40 weeks. Figure 1 illustrates a scatterplot of the composite NIRS abdominal StO2 vs Reference StO_2 with both monitor calibration data (n=14) and test data (n=26). The test data showed an overall bias ± precision (1sd) of -0.77 ± 5.06%. For the test data, the concordance correlation coefficient (CCC) was 0.789 demonstrating strong correlation.



CONCLUSIONS: This validation model demonstrates that the FORE-SIGHT new somatic algorithm, which compensates for the optical properties of stools, can be applied to abdominal tissue in order to yield accurate measures of abdominal StO_2.

99

9:30am

Comparison of NIRS Traditional Vs Stool Compensating Somatic Algorithms When Measuring Abdominal Tissue Oxygen Saturation on Neonates ≤ 4kg

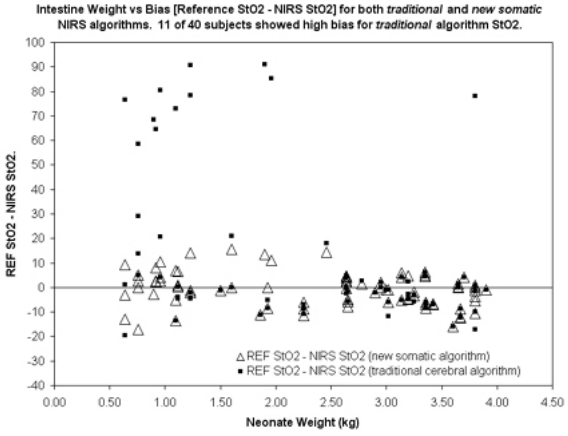
Mariam M. Said, Nickie Niforatos, Khodayar Rais-Bahrami.
Children's National Medical Center, Washington, DC; The George Washington University School of Medicine, Washington, DC.

BACKGROUND: Near-infrared spectroscopy (NIRS) has been used to measure cerebral and somatic tissue oxygen saturation (StO_2), however, traditional NIRS algorithms have been primarily designed in the measurement of cerebral StO_2.

OBJECTIVE: In this study, we compared a novel stool compensating somatic NIRS algorithm vs a traditional NIRS algorithm to measure abdominal StO_2 in neonates ≤ 4 kg, using weighted umbilical venous and arterial oxygen saturation as a reference.

DESIGN/METHODS: With parental agreement we enrolled neonates with an umbilical venous catheter (UVC) in this prospective study using a NIRS oximeter (FORE-SIGHT®, CAS Medical Systems, Branford, CT USA). NIRS StO_2 values from both algorithms were compared with co-oximetry measured oxygen saturation obtained from UVC ($SuvO_2$) and pulse oximetry (SaO_2) to determine a Reference StO_2 value from the equation ($0.7*SuvO_2 + 0.3*SaO_2$). A sensor was placed over left & right flank, liver, and intestine in three positions (infraumbilical, RLQ, LLQ) for a period of 2 minutes each.

RESULTS: Data was obtained from 40 subjects weighing 0.64-3.9 kg, 1-13 days old, and GA of 24-40 weeks. Figure 1 illustrates the difference between the Reference StO_2 and NIRS StO_2 measured over the intestine as a function of subject weight. The *new somatic* algorithm StO_2 correlated more closely with the Reference StO_2, as compared with the *traditional* algorithm StO_2, which showed a high bias for 11/40 subjects, indicating stool interference. Additionally, smaller subjects (lower BW & GA) tended to have lower *traditional* algorithm StO_2 values when compared to Reference StO_2. Among organ systems, the intestine had the highest degree of stool interference, followed by the liver, and least interference in the flank measurements.



CONCLUSIONS: Data from this study suggest that the FORE-SIGHT new somatic algorithm, which compensates for the optical properties of stool, can be applied to abdominal tissue in order to yield accurate measures of abdominal StO_2.

100
9:45am

Fellow in Training

Near-Infrared Spectroscopy (NIRS) Evaluation of the Efficacy and Safety of *Booster* Packed Red Blood Cell (pRBC) Transfusions in Very Low Birth Weight (VLBW) Neonates during the First Postnatal Week

Jonathan P. Mintzer, Boriana Parvez, Michael Chelala, Gad Alpan, Edmund F. LaGamma.
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BACKGROUND: pRBC transfusions are commonly performed in neonatal intensive care and improve cerebral, renal, & splanchnic regional tissue oxygenation (rSO_2) when given for *symptomatic* anemia as evaluated using NIRS. In our institution, we utilize a *booster* pRBC transfusion strategy, in which a 15mL/kg transfusion is provided following 10mL/kg of measured blood removed for laboratory testing in VLBW neonates during the first postnatal week. We sought to evaluate the efficacy of *booster* pRBC transfusions utilizing NIRS.

OBJECTIVE: To determine: 1) the effect of *booster* pRBC transfusions on cerebral, renal, & splanchnic rSO_2 and 2) whether this procedure posed any immediate safety risks.

DESIGN/METHODS: Data were collected in a prospective, observational, non-interventional, NIRS survey of "stable" neonates with BW 500-1250g. Cerebral, renal, & splanchnic NIRS monitoring was begun within 72h of birth and continued for 7 days. Demographic, transfusion, laboratory, cardiopulmonary, and NIRS data were collected. Fractional tissue oxygen extraction [FTOE = $(SpO_2\text{-}rSO_2)/SpO_2$] was calculated for each site. Before/after *booster* pRBC transfusion comparisons were performed using paired Student's t-test or one-way repeated-measures ANOVA.

RESULTS: Ten subjects (GA 26 ± 1wk; BW 879 ± 154g; x ± SD) received a total of 14 *booster* pRBC transfusions at a postnatal age of 3 ± 2d. 79% (11/14) of transfusion cases were mechanically ventilated, 29% (4/14) were given in the context of enteral feeds, & 14% (2/14) were provided during vasopressor usage. Mean hematocrit increased from 35 ± 1 to 39 ± 1% ($p < 0.05$) following *booster* transfusion, whereas blood pH, base deficit, lactate, creatinine, & all cardiopulmonary parameters (HR, BP, & SpO_2) were unchanged. Consistent with an augmented red cell mass, cerebral, renal, & splanchnic rSO_2 measures significantly increased 10, 18, & 16%, with concomitant decreases in FTOE of 27, 30, & 9%, respectively (all $p < 0.05$). No adverse effects were seen following any *booster* pRBC transfusion.

CONCLUSIONS: 1) *Booster* pRBC transfusions augment red cell mass, thus restoring O_2-carrying capacity & tissue oxygenation in VLBW neonates without affecting CV status during the first postnatal week. 2) The potential benefits of *booster* pRBC transfusions appear to outweigh their risks.

101
10:00am

Fellow in Training

Monitoring Mesenteric Tissue Oxygenation with Near-Infrared Spectroscopy (NIRS) during Packed Red Blood Cell Transfusion in Preterm Infants

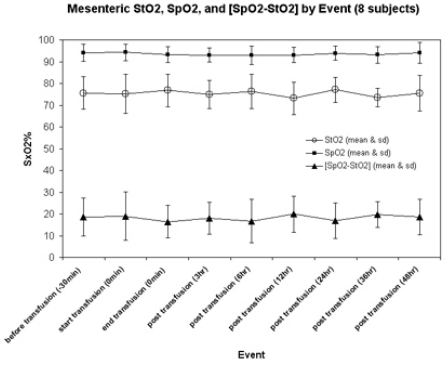
Lee T. White, Mariam M. Said, Khodayar Rais-Bahrami.
Neonatology, Children's National Medical Center, Washington, DC.

BACKGROUND: Premature infants must adapt to extra-uterine life during a period when many organ systems are not fully matured such as the gastrointestinal (GI) system. This immaturity predisposes the infant to the development of necrotizing enterocolitis(NEC). Several recent retrospective studies have associated packed red blood cell (PRBC) transfusion with development of NEC likely though a perfusion/reperfusion injury.

OBJECTIVE: To monitor for altered mesenteric tissue oxygenation using NIRS during PRBC transfusion.

DESIGN/METHODS: We used a 4-wavelength NIRS device (FORE-SIGHT, CASMED, Branford, CT USA) to monitor infants' mesenteric tissue oxygen saturation (StO2). A NIRS sensor was placed on the right, lower, abdominal quadrant one hour prior to PRBC transfusion for baseline then continued for 48 hours post transfusion. Pulse oximetry SpO2 data was collected simultaneously with StO2 data, with the SpO2 - StO2 difference calculated to normalize for hypoxic episodes. All data was averaged in 30 minute windows for events before, during, and post transfusion. Time and area under different StO2 thresholds (TUT & AUT) were also determined.

RESULTS: 8 neonates with gestational age of 25-32 weeks and weighing 1.3-1.94 kg were studied. The PRBC transfusion period was 3-5 hours. One subject had NEC located primarily in the left lower abdomen, opposite side of the sensor placement. Our results showed no prolonged changes for StO2, SpO2, and SpO2-StO2 difference for any subject. However, TUT & AUT analysis showed that StO2 briefly dropped below 65% often, where the highest TUT & AUT values occurred for NPO, lowest HCT, and NEC subjects.



CONCLUSIONS: It is known that the causes of NEC are multifactorial with ischemia or hyperoxemia being potential causes. Our initial results do not show prolonged mesenteric ischemia or hyperoxemia events post blood transfusion. However, there were many transient mesenteric StO2 drops indicating brief oxygen deficits, possibly due to transient hypoxia events.

102
10:15am

Continuous Tomographic Monitoring of Necrotizing Enterocolitis (NEC) in Preterm Infants Using Multi-Channel Tissue Oxymeter

M. Roger Kim, David McNeil, Randal Barbour, Thati Ganganna, Sinora Shrestha, Harry Graber.
Pediatrics, Brookdale University Hospital and Medical Center, Brooklyn, NY; Patholgy, Downstate Medical Center, Brooklyn, NY.

BACKGROUND: NEC is a heterogeneous disease resulting from multiple contributing factors. Therefore early detection is essential for successful management.

OBJECTIVE: The objective of our study is to establish a fast and reliable metric for early detection of NEC, using Diffuse Optical Tomography (DOT).

DESIGN/METHODS: A DOT Imager (NIRScout) was used to collect tomographic data that can be processed to reveal the position-dependent hemoglobin oxygenation state of the abdomen. Six preterm infants were studied. GA: 30-32 wk, BW: 1270-1825 g and DOL: 11-20th day. Two have NEC and four have no NEC. This includes a pair of fraternal twins, one with NEC and the other without NEC. The difference in absorption at the different wavelengths used in the study is an indication of Hb status: 850nm absorption is oxyHb-weighted 760nm is deoxyHb-weighted. The temporal mean of the 850nm/760nm data gathered from each subject.

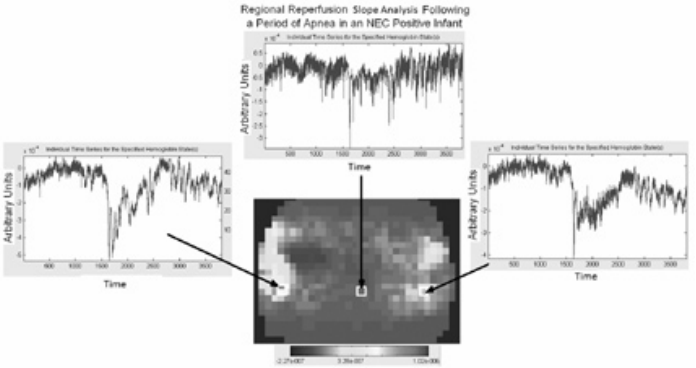
RESULTS: The babies with NEC showed characteristic differences in the number of channels with an increased ratio of 850nm/760nm. Thus this ratio may be a useful indicator of ischemic/necrotic bowel. Analysis shows a statistically significant difference between NEC-positive infants and NEC-negative infants with Mann-Whitney U test. ($p<.0001$)

850nm/760nm Ratio Across the Abdomen of Infant

	# of Channels	Mean	SD	P value
NEC +	97	2.28	1.29	< 0.0001
NEC -	231	1.21	0.26	

Mann-Whitney U test

By applying Fourier analysis to this raw 850nm/760nm data, characteristic physiologic frequencies (cardiac, respiratory, and autonomic) are found throughout the time sample. DOT can be used to quickly assess the gross level of bowel tissue oxygenation in neonates with NEC.



CONCLUSIONS: These results suggest that DOT have diagnostic utility for NEC and can identify the location of ischemic/dysfunctional bowel or NEC. Our future goal is to screen a larger number of infants in order to determine the diagnostic power of DOT for NEC, as a function of Modified Bell Staging.

Neonatology - Pulmonary Platform Session

Saturday, March 31, 2012
8:15am-10:30am

103
8:15am

A Pharmacoeconomic Analysis of In-Hospital Costs Due to Reintubation in Preterm Infants: Impact of Surfactant Selection

Carlos G. Guardia, Fernando R. Moya, Sunil Sinha, Phillip Simmons, Robert Segal, Jay S. Greenspan.
Discovery Laboratories, Warrington, PA; Neonatology, South East Area Health Education Center, Wilmington, NC; James Cook University Hospital, Middlesbrough, United Kingdom; Pediatrics, Thomas Jefferson University; Nemours/A.I. duPont Hospital for Children, Wilmington, DE.

BACKGROUND: Reintubation in preterm infants after surfactant replacement therapy is associated with excess morbidity and may be influenced by surfactant selection [Guardia 2011].

OBJECTIVE: We hypothesized that differences in reintubation rates observed with different surfactant preparations may impact healthcare resource utilization.

DESIGN/METHODS: We conducted a pharmacoeconomic analysis of the impact of surfactant selection and reintubation of preterm infants on inpatient healthcare resource utilization.

Reintubation rates and duration of mechanical ventilation (MV) after reintubation were determined using data from 1546 preterm infants from two trials comparing lucinactant vs. beractant and lucinactant vs. poractant alfa (SELECT [Moya 2005]; STAR [Sinha 2005]). Daily costs were obtained using 2010 US data from 1564 preterm infants with RDS in the NICU on MV (Premier Hospital Database). Cost by study and treatment was estimated as incidence of reintubation x days on MV after reintubation x cost per day for direct ventilation costs, standardized per 100 surfactant-treated infants.

RESULTS: Average MV duration following reintubation was similar between treatment groups in both trials. However, reintubation rates were significantly lower ($p<0.05$) for infants treated with lucinactant compared with beractant and poractant alfa. The observed difference in reintubation rates resulted in a projected cost-saving of $160,013 and $252,203 per 100 infants treated with lucinactant vs. beractant and poractant, respectively.

Cost Component Comparison

Study	Cost Per Day	Days of MV Following Reintubation	Reintubation Rate	Total Cost[1]
SELECT				
Lucinactant	$2,637	7.4	34.6%	$6,752
Beractant	$2,637	7.4	42.8%*	$8,352
Cost Difference per 100 Infants				
STAR				
Lucinactant	$2,637	9.2	32.7%	$7,933
Poractant	$2,637	8.4	47.2%*	$10,455
Cost Difference per 100 Infants				

[1]Total cost is cost per day × days of MV × reintubation rate. *p<0.05 vs. lucinactant

CONCLUSIONS: In this analysis, the lower estimated in-hospital costs for lucinactant-treated preterm infants vs. comparator surfactants resulted from observed lower reintubation rates. Additional cost assessment of potential reduction in reintubation-associated morbidity is warranted.

104

8:30am

Effect of High Flow Nasal Cannula Flow Rate and Cannula Size on Generated Airway Pressures: An In-Vitro Study

Emidio M. Sivieri, Jeffrey S. Gerdes, Soraya Abbasi.

Pediatrics,Division of Neonatology, Children's Hospital, Philadelphia, PA; OB/GYN, Pennsylvania Hospital, Philadelphia, PA; Pediatrics, Univ. of Pennsylvania School of Medicine, Philadelphia, PA.

BACKGROUND: In an effort to reduce the prevalence of chronic lung disease in premature infants, there has been a trend toward increased use of non-invasive forms of respiratory support such as nasal CPAP, nasal IMV and high flow nasal cannula (HFNC).

OBJECTIVE: To quantify the effect of HFNC flow rate on delivered airway pressure while varying the ratio of nasal prong (NP) to nares diameter using a simulated airway and active lung model for both open and closed mouth conditions.

DESIGN/METHODS: Neonatal and infant Fisher&Paykel nasal cannulae (3.0 and 3.7mmOD prongs) were tested in combination with 7 sizes of simulated nares openings for 13 NP-to-nares ratios ranging from 0.43 to 1.06 (see Figure). Simulated nares consisted of two 10mm lengths of vinyl tubing connected to an active test lung set at: TV 10ml, 60b/m, Ti 0.35s, compliance 1.6ml/cmH2O, airway resistance 70cmH2O/L/sec. The neonatal and infant NP's were inserted 6 and 8 mm into the simulated nares. A Fisher&Paykel HFNC system with integrated pressure limiting valve was set to flows of 1 to 6 L/m while measuring mean NP and airway pressures, and cannula and airway flows. This was repeated for open and closed mouth conditions.

RESULTS: The Figure illustrates airway pressure vs HFNC flow, each line representing a different NP/nares ratio. Airway pressure increased with both flow rate and NP/nares ratio. Partial occlusion ratios >0.86 demonstrated a notable rapid increase in pressure with increasing flow. Complete nasal occlusion (ratio ≥ 1.0) developed the highest pressures. The simulated closed mouth condition produced higher airway pressures than open month by a mean factor of 12±7SD over all NP/nares ratios for HFNC flows above 1 L/m.

CONCLUSIONS: Generated airway pressure by HFNC is dependent on the delivered flow rate and the amount of air leak around the nasal cannula and through the mouth**.** Safe and effective use of HFNC requires careful selection of an appropriately low nasal prong-to-nares ratio even with an integrated pressure limiting safety valve.

105

8:45am

Fellow in Training

Work of Breathing in Infants with Respiratory Insufficiency on High Flow Nasal Cannula vs. Nasal Continuous Positive Airway Pressure

Beatriz E. de Jongh, Robert Locke, Amy Mackley, John Stefano, John Emberger, Elena Rodriguez, Thomas Shaffer.

Neonatology, Christiana Care Health System, Newark, DE; Alfred I duPont Children's Hospital, Wilmington, DE; Pediatrics/Neonatology, Thomas Jefferson University, Philadelphia, PA.

BACKGROUND: The comparative work of breathing (WOB) indices between HFNC and NCPAP in premature infants with respiratory insufficiency has not been fully established.

OBJECTIVE: To compare WOB indices between two NCPAP settings and two flow levels of HFNC in a crossover study.

DESIGN/METHODS: Stable infants with a CGA 30-40 weeks, baseline of HFNC 3-5 lpm (Vapotherm)or NCPAP 5-6 cmH_20 (Drager Evita: demand flow; flow variable, pressure constant) and FiO_2<40% were eligible. Exclusion: major congenital anomalies or neuromuscular disorders. WOB (phase angle, phase relation total breath (PhRTB), labored breathing index (LBI) and % breaths with a phase angle > 90) was analyzed using respiratory inductive plethysmography (RIP) while controlling for patient variability for each of the 4 modalities; HFNC 3 lpm, HFNC 5 lpm, NCPAP 5 cmH_20, NCPAP 6 cmH_20. FiO_2 was kept at patient's baseline. Demographic data; n=8, GA(wks) 30.5(±4.9); CGA(wks) 33.4(±2.7); study wt(g) 1793(±539); baseline FiO_2(%) 25(±1).

RESULTS:

Work of Breathing Indices

Mode	Phase Angle±SD	LBI±SD	PhRTB±SD
HFNC 3 lpm	117 (±51)	1.67 (±0.63)	61 (±21)
HFNC 5 lpm	104 (±53)	1.42 (±0.44)	55 (±22)
NCPAP 5 cmH20	102 (±58)	1.47 (±0.42)	56 (±21)
NCPAP 6 cmH20	81 (±56)	1.39 (±0.45)	48 (±21)

There were statistical differences in the WOB indices between the 4 modalities ($p<0.01$) with the exception of LBI and PhRTB when comparing HFNC 5 lpm and NCPAP 5 cmH_20. A biphasic breathing pattern was found in 76% of the modes; 86% of the patients breathing in a monophasic pattern had asynchronous breathing. Patients receiving NCPAP 6 cmH_20 had the lowest % of breaths with a phase angle >90. No significant difference was found between HFNC of 5 lpm and NCPAP of 5 cmH_20 for % breaths > 90 (phase angle). Normalizing HFNC flow rate for weight (flow/wt) explained 8% of the variability in phase angle (r^2 0.08; $p< 0.01$). The contribution of patient variability was not statistically significant.

CONCLUSIONS: There was a slight improvement in work of breathing indices when on NCPAP 6 cmH_20. WOB indices were similar between HFNC 5 lpm and NCPAP 5 cmH_20. The phenomenon of the biphasic breathing pattern may represent an infant's strategic response to WOB demands. This is the first study evaluating work of breathing indices in infants 30 to 40 wks CGA with mild respiratory insufficiency while receiving HFNC and/or NCPAP.

106

9:00am

Fellow in Training

Effect of Early Initiation of Inhaled Nitric Oxide (iNO) on Oxygenation and Oxidative Stress in PPHN

Devaraj Sambalingam, Daniel D. Swartz, Bobby Mathew, Sylvia Gugino, Carmon Koenigsknecht, Jayasree Nair, Stephen Wedgwood, Robin H. Steinhorn, Satyan Lakshminrusimha.

University at Buffalo, Buffalo, NY; Northwestern University, Chicago, IL.

BACKGROUND: In clinical trials, earlier initiation of iNO did not reduce the risk of ECMO/death in PPHN. However the effect of initiation of iNO at the onset of respiratory failure, and its impact on oxidative stress is not known

OBJECTIVE: To determine whether early administration of iNO, prior to prolonged ventilation improves oxygenation, response to iNO and markers of oxidative stress in lambs with PPHN

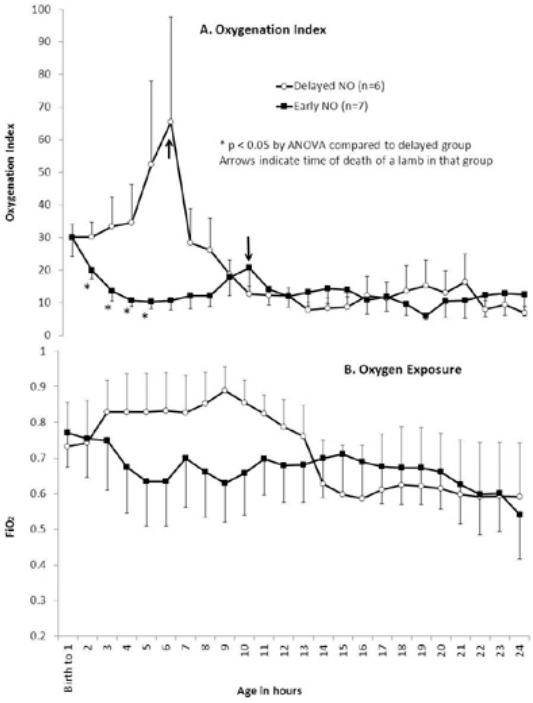
DESIGN/METHODS: Lambs with PPHN (induced by antenatal ductal ligation) were randomized to

(1) early iNO - initiation of iNO (20ppm) if oxygenation index (OI)>15 or by 3h of age, whichever is earlier or

(2) delayed iNO - no iNO for the first 6h and then iNO initiation when OI >25 or by 12h of age, whichever is earlier.

Lambs were ventilated for 24h with FiO_2 titrated to maintain preductal PaO_2 between 60-80mmHg. Contractilty of PA rings was assessed by exposure to norepinephrine (NE, 1μM). Lung sections were stained for superoxide anions and peroxynitrite.

RESULTS: One lamb died in each group. Early iNO lambs received iNO at 1.4±0.2h with an OI of 26.4±6.6. Delayed iNO group received iNO at 10.2±1.1h with an OI of 25.7±9.6. OI was significantly lower in the early iNO group in the first few hours of life (fig A). iNO significantly decreased OI in both groups (10.8±2 and 10.6±6 respectively by 60min). Cumulative oxygen exposure over the 24h period did not differ between both groups (fig. B). Among survivors, PA contraction to NE (1μM) was significantly lower in early iNO (100±21g/g) compared to delayed iNO lambs (206±39g/g). Exposure to early iNO did not increase superoxide or peroxynitrite formation in PAs.



CONCLUSIONS: We conclude that both early and late initiation of iNO improve oxygenation in PPHN. Early initiation of iNO also decreases PA contractile responses to NE. Oxygenation response to iNO, cumulative oxygen exposure and peroxynitrite formation in PA's are not altered by early iNO.

107

9:15am

Fellow in Training

Antenatal Betamethasone Decreases Hypoxic Pulmonary Vasoconstriction in Late Preterm Lambs Delivered by Elective C-Section

Jayasree Nair, Bobby Mathew, Pritha Nayak, Sylvia F. Gugino, Stephen Wedgwood, Robin H. Steinhorn, Satyan Lakshminrusimha.

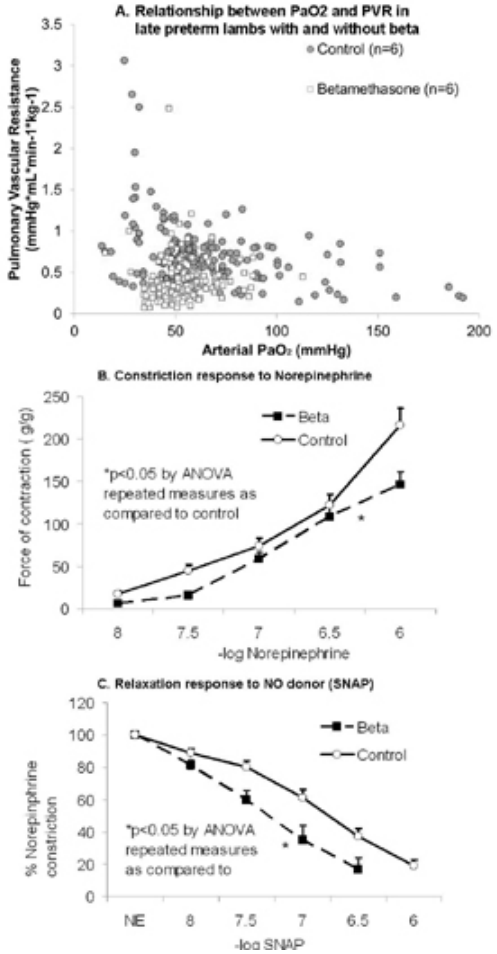
Neonatology, University of Buffalo, Buffalo, NY; Neonatology, Women and infants Hospital, Providence, RI; Northwestern University, Chicago, IL.

BACKGROUND: Late preterm infants with hypoxic respiratory failure on ECMO have higher morbidity and mortality rates than term infants (Ramachandrappa et al, JPeds 2011). Antenatal betamethasone in infants born by C-section at later gestation reduces respiratory morbidity (Stutchfield P et al, BMJ 2005). Current ACOG guidelines recommend antenatal betamethasone between 24-34 wks of gestational age (GA). The physiological changes in pulmonary vasculature at late preterm GA following antenatal steroids are not known.

OBJECTIVE: To determine the effects of antenatal betamethasone (beta) on pulmonary vascular resistance (PVR) and pulmonary arterial (PA) reactivity in late preterm lambs (134d).

DESIGN/METHODS: Time dated pregnant ewes were injected with beta (n=12) at 132 & 133d GA (term-145d). Lambs were delivered by C-section at 134d. Six lambs were instrumented, ventilated and monitored for 6h and PVR was measured. Six lambs were sacrificed at birth, PA dissected and constriction responses to norepinephrine (NE) and relaxation responses to NO donor SNAP obtained. Control lambs without beta were sacrificed at birth or ventilated for 6h. Markers of oxidative stress (superoxide anions and peroxynitrite) were evaluated in PA.

RESULTS: In late preterm controls, hypoxia induced severe pulmonary vasoconstriction below a PaO_2 of 43±0.1mmHg which was significantly attenuated by beta. NE constriction was significantly reduced and SNAP relaxation enhanced with beta. There was no difference in superoxide anions or peroxynitrite in the PA.



CONCLUSIONS: Antenatal betamethasone attenuates hypoxic pulmonary vasoconstriction and vascular reactivity in late preterm lambs by modifying the NO pathway without altering common markers of oxidative stress. We speculate that the benefits of antenatal betamethasone are in part due to reduced hypoxic pulmonary vasoconstriction and reduced hypoxic injury of the lung and systemic organs.

108

9:30am

Perinatal Pulmonary Hemodynamics in Acute and Chronic Models of Persistent Pulmonary Hypertension of Newborn (PPHN)

Satyan Lakshminrusimha, Bobby Mathew, Sylvia F. Gugino, Carmon Koenigsknecht, Robin H. Steinhorn, Daniel D. Swartz.

University at Buffalo, Buffalo, NY; Northwestern University, Chicago, IL.

BACKGROUND: Fetal pulmonary vascular resistance (PVR) is high and is further elevated by asphyxia and/or meconium aspiration syndrome (MAS, acute PPHN) or by chronic vascular remodeling (e.g.,diaphragmatic hernia, chronic PPHN).

OBJECTIVE: To evaluate pulmonary hemodynamic and oxygenation changes during the perinatal period in models of acute and chronic PPHN.

DESIGN/METHODS: Four groups of fetal lambs were fully instrumented to measure PVR and blood gases:

(i) Controls

(ii) Cord occlusion for 10min (asphyxia)

(iii) Cord occlusion and asphyxia with MAS - 5ml/kg of 20% meconium was connected to the ETT. The umbilical cord was occluded for 10min resulting in deep gasping and meconium aspiration. Cord occlusion was released briefly midway to avoid severe bradycardia

(iv) Chronic pulmonary vascular remodeling induced by *in-utero* ductal ligation 8d prior to delivery

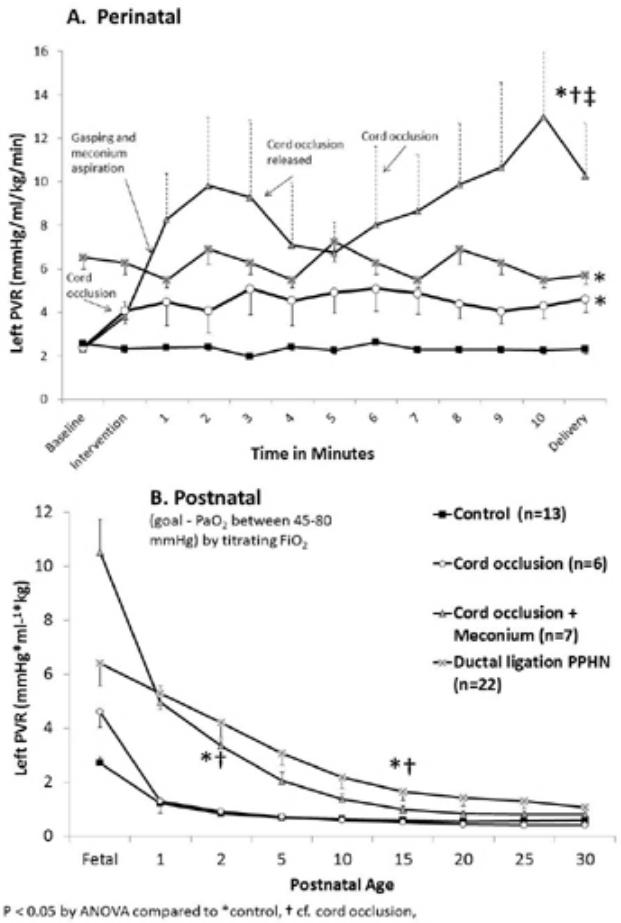
RESULTS: Cord occlusion resulted in hypercarbic acidosis (table) and increased PVR (fig A). Cord occlusion with MAS resulted in significantly higher elevation of pCO_2 and PVR. In control and cord occlusion lambs, resuscitation with 21%O_2 was sufficient to normalize PaO_2 and rapidly drop PVR. In contrast, MAS lambs required 70%O_2 and ductal ligation lambs required 100%O_2 to achieve PaO_2 levels of 45-80mmHg and had a slower drop in PVR with resuscitation (fig B).

CONCLUSIONS: Acute asphyxia increases PVR which decreases rapidly in response to 21%O_2 resuscitation. Acute asphyxia associated with MAS delays the expected decrease in PVR and requires higher FiO_2 similar to chronic PPHN induced by antenatal ductal ligation.

Comparison - blood gases at delivery and at 30min

Model	Control	Asphyxia	Asphyxia+MAS	Ductal ligation
Cord pH before delivery	7.28±0.02	6.96±0.04*	6.92±0.05	7.27±0.03‡†
Cord pCO2	57±3	102±9*	134±9*†	62±4†‡
Cord paO2	18±1	6.3±1*	8.2±1*	20±1†‡
PaO2 at 30 min of resuscitation	56±8	62±12	71±11	40±4*†‡
FiO2 at 30min	0.21	0.21	0.7±0.1*†	1.0*†

* p < 0.05 cf.control; †p<0.05 cf.cord occlusion; ‡cf. MAS



109
9:45am

Does Parenchymal Lung Disease Alter the Relationship between PO_2 and Pulmonary Vascular Resistance (PVR)?

Satyan Lakshminrusimha, Bobby Mathew, Chang Xing Ma, Jayasree Nair, Sylvia F. Gugino, Carmon Koenigsknecht, Robin H. Steinhorn, Daniel D. Swartz.
University at Buffalo, Buffalo, NY; Northwestern University, Chicago, IL.

BACKGROUND: In animal models without lung disease, PVR increases when PaO_2 decreases below 50 mmHg (Rudolph et al 1966 and Lakshminrusimha et al 2009). In the absence of parenchymal lung disease, A-a gradient is low and alveolar PAO_2 and PaO_2 are similar. In the presence of parenchymal lung disease such as RDS or meconium aspiration syndrome (MAS), the relationship between PAO_2, PaO_2 pulmonary arterial (PA) PO_2 and PVR is not known.

OBJECTIVE: To evaluate if PO_2 in the systemic artery, PA or alveolus is the primary determinant of PVR.

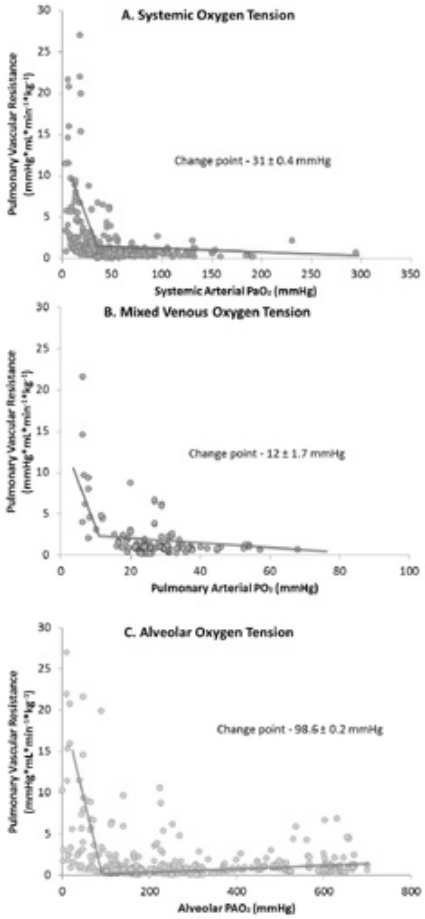
DESIGN/METHODS: Control term lambs (n=22, delivered at 139-141d GA - term 145d) and lambs with prenatal asphyxiation and meconium aspiration (n=7) or preterm (126-8d GA with surfactant, n=4) were evaluated. Lambs (1-6h of age) were instrumented to measure PVR and ventilated with varying FiO_2. Gases were obtained simultaneously from PA (mixed venous) and ascending aorta. Scatter plots with PVR on Y-axis and either PaO_2, PAO_2 or PO_2 in the PA on the X-axis were generated. Change point (the point where the trend lines change their slope) was calculated by the MCMC procedure using SAS software.

RESULTS: The change point is 50±0.2 mmHg in aorta and 35±14 mmHg in PA in control lambs. The change point was reduced significantly in the presence of lung disease(figure). Presence of parenchymal lung disease did not significantly alter alveolar PAO_2 change point. Lambs with parenchymal lung disease had higher A-a gradient and lower pH (table).

CONCLUSIONS: Alveolar oxygen tension is probably the primary determinant of PVR in neonatal lambs. In the presence of adequate alveolar PAO_2 levels, decisions on target SpO_2 and PaO_2 range must be based on optimizing tissue oxygen delivery.

PO_2 change point-mean±SD

Model	Systemic Artery	Pulmonary Artery	A-a gradient	pH
Control term	50±0.2	35±14	58±10	7.37±0.1
Meconium aspiration	32±1.1	11±0.6	351±221	7.13±0.2
Premature RDS	44±1.2	14±2.6	231±178	7.23±0.2



110
10:00am

Fellow in Training

Nfib Hemizygous Mice Are Protected from Hyperoxia-Induced Mortality

Joseph Chaker El Khoury, Rita M. Ryan, Richard M. Gronostajski, Huamei Wang, Vasanth H. Kumar.
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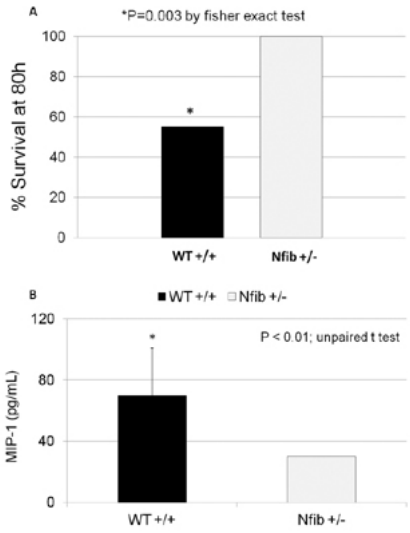
BACKGROUND: Nuclear Factor Ib (*Nfib)* is important in lung development. *Nfib* null mice (-/-) die at birth with immature lungs. Hemizygous mice (*Nfib* +/-) have reduced lung maturation, with 60% survival past 24 hours of age.

OBJECTIVE: To study the hypothesis that adult hemizygous *Nfib* +/- mice would have lower survival in hyperoxia.

DESIGN/METHODS: Adult *Nfib*+/- mice and their wild type (WT) litter mates were exposed to 100% oxygen. *Nfib*+/- *(n*= 6) and & WT (n= 7) littermates were exposed to 66h of hyperoxia. Controls of *Nfib*+/- *(n*= 5) and WT (n= 5) littermates were kept in room air. Bronchoalveolar lavage was done at sacrifice for cell counts & cytokine measurements (IL-1, IL-6, MCP-1, MIP-1 & KC: Keratinocyte Chemoattractant) by Millipore Luminex assay.

RESULTS: WT mice had higher mortality (10/22) compared to *Nfib* +/- mice (0/14) after 80h of hyperoxia ($p<0.003$; fisher exact test) (Fig A). WT mice had lower survival [2/4 - 50% vs. 4/5 - 80%) after 72h of hyperoxia. There were no differences in bronchoalveolar lavage cell counts & differential counts between the 66h exposure groups. IL-1, IL-6, MCP-1 and KC were similar in *Nfib*+/- and WT groups exposed to hyperoxia. MIP-1 was significantly higher in WT mice exposed to hyperoxia compared to *Nfib*+/- mice (Fig B).



CONCLUSIONS: *Nfib+/-* mice are more resistant to hyperoxia than WT mice. We speculate that Nfib hemizygozity might be protective against oxidative stress. Inflammation may not be the major mechanism leading to mortality in wildtype mice. Oxidant lung injury and activation of pro-apoptotic signals may explain higher mortality in wild type mice but additional studies will be needed to determine this.

111
10:15am

Medical Student

Expression Levels of Lung Heme Oxygenase Determine Its Cytoprotective Role *In Vivo*

Jennifer A. Murphy, Fumihiko Namba, Ping La, Amal P. Fernando, Guang Yang, Phyllis A. Dennery.
Children's Hospital, Philadelphia, PA; University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Heme oxygenase (HO) is the rate-limiting enzyme in heme degradation, which produces biliverdin, CO, and iron. The inducible isoform, HO-1, is upregulated in response to oxidative stress. While biliverdin and CO have antioxidant effects, iron is cytotoxic due to its ability to create reactive oxygen species. We have previously shown that high overexpression of HO-1 is detrimental to cells in culture. We hypothesized that the same holds true *in vivo* in the lung exposed to hyperoxia.

OBJECTIVE: To evaluate whether high or low expression levels of HO-1 provide cytoprotection in the newborn lung exposed to hyperoxia.

DESIGN/METHODS: Two transgenic lines overexpressing high (22 fold; H) or low (2 fold; L) levels of HA-tagged full-length (FL) HO-1 under the regulation of the human SP-C promoter, resulting in lung-specific expression, were generated. Newborn mice were exposed to 21% or 95% O_2 for 3 days. Some were allowed to recover in room air for 4 or 11 days. Lung morphology was assessed by H & E staining and by measuring radial alveolar counts (RAC) and alveolar wall thickness. Immunohistochemistry for cell specific markers (SP-C, vimentin, α-smooth muscle actin (SMA), CD45) and proliferating cell nuclear antigen (PCNA) was performed. Poly (ADP-

ribose) polymerase (PARP) and p53 levels were evaluated as indices of apoptosis and DNA repair using Western blot.
RESULTS: Only FL(L) showed improved RAC after hyperoxia compared with wild-type. Alveolar wall thickness with hypercellularity developed in FL(H) during the recovery period whereas this did not occur in FL(L). During recovery, the FL(H) had thickened alveolar walls and the accumulating cells were found to be immunoreactive for SP-C and PCNA, indicating that these were proliferating type II cells. Total lung PCNA levels remain elevated after 3 days of hyperoxia in FL(H), whereas it was decreased in wild-type and FL(L). During recovery from hyperoxia, FL(H) had decreased cleaved PARP levels whereas this was increased in the FL(L) as was p53, indicating increased apoptosis in the FL(L) lung.
CONCLUSIONS: FL(L) protects against cellular damage by increasing apoptosis that is necessary for lung development. However, FL(H) decreases apoptosis, leading to alveolar wall thickness and hypercellularity, which may worsen lung function. These data suggest that there is a threshold of beneficial effects of HO-1 in the lung.

Neurobiology I
Platform Session

Saturday, March 31, 2012
8:15am-10:30am

112
8:15am

Mechanism of Hypoxia-Induced Expression of Caspase-1 in the Cerebral Cortex of Guinea Pig Fetus at Term

Qazi M. Ashraf, Dimitris Angelis, Angely Modestin, Om P. Mishra, Maria Delivoria-Papadopoulos.
Department of Pediatrics, St. Christopher's Hospital for Children and Drexel University College of Medicine, Philadelphia, PA.

BACKGROUND: Caspase-1 activation induces pyroptosis, which is defined as caspase-1-dependent programmed cell death and and results in rapid lysis of the affected cell, unlike capase-9 intiated programmed cell death where there is no lysis. Caspase 1, however, is an inflammatory enzyme and mediates inflammatory response during infection by maturation of cytokines IL-1B and IGIF. We have shown that hypoxia results in increased activation of caspase-1 in cerebral cortex of newborn piglets. Hypoxia also results in generation of nitric oxide (NO) free radicals which may lead to activation of caspase-1 and production of inflammatory cytokines.
OBJECTIVE: The present study tests the hypothesis that the increased expression of caspase-1 in the cytosol of the guinea pig fetus brain at term during hypoxia is mediated by nitric oxide.
DESIGN/METHODS: Guinea pig fetuses were studied at term (60 days) gestation and grouped in normoxic (Nx, n=7), hypoxic (Hx, n=7) and hypoxic pretreated with a NOS inhibitor, N-Nitro-L-Arginine Methyl Ester (Hx+L-NAME, 30mg/kg i.p., n=6). Hypoxia was induced by exposing pregnant guinea pigs to FiO_2 of 0.07 for 1 hr. Hypoxia was documented by biochemically determining the levels of ATP and phosphocreatine (PCr). **C**aspase-1 expression was determined by Western blot using an active caspase-1 antibody. Protein bands were visualized, analyzed by densitometry and density expressed as absorbance (OD xmm^2).
RESULTS: ATP levels (µmol/g brain) were 4.6±0.3 (Nx), 1.6±0.4 (Hx, p<0.001) and 1.6±0.2 (Hx+L-NAME). PCr values (µmol/g brain) were 3.4±0.3 (Nx), 1.2±0.4 (Hx) and 1.1±0.2 (Hx+L-NAME). Active caspase-1 expression was: 584.7±158.06 in Nx, 1152.26±186.90 in Hx and 525.11±178.96 in Hx+LNAME. The data show that caspase-1 expression is increased in the hypoxic group and administration of NOS inhibitor prevented the increased expression of caspase 9.
CONCLUSIONS: We conclude that during hypoxia increased expression of caspase-1 in the cytosolic fraction of the cerebral cortex of guinea pig fetus at term is mediated by nNOS derived NO. We propose that nitric oxide free radicals generated during hypoxia lead to NO-mediated modification of caspase-1 (by nitration, nitrosylation or phosphorylation) resulting in its activation. Activated caspase-1 during hypoxia leads to generation of inflammatory cytokines and cause inflammatory response and pyroptotic cell death in the fetal brain. (NIH-HD-20337).

113
8:30am

Fellow in Training

Mechanism of Increased Caspase-1 Activation during Hypoxia in the Cytosol of the Cerebral Cortex of Newborn Piglets

Dimitrios Angelis, Qazi Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos.
Dept. of Pediatrics, Drexel University and St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: It is known that caspase-1 is linking the apoptotic mechanisms with inflammation and is responsible for inducing IL-1, TNFa and the inflammatory cascade. Caspase-1 activation induces pyroptosis, defined as caspase-1 dependent programmed cell death. The response of caspase-1 to cerebral injury by hypoxia is not well understood. Src kinase is linked to cell proliferation and differentiation. Previously we have shown that hypoxia results in increased activation of Src kinase in the cortex of newborn piglets.
OBJECTIVE: The present study tests the hypothesis that hypoxia results in increased activity of caspase-1 in the cytosol of the cerebral cortex of newborn piglets and that this hypoxia-induced activation of caspase-1 is mediated by a specific protein tyrosine kinase, Src kinase.
DESIGN/METHODS: Thirteen newborn piglets were divided into 3 groups: Normoxia (Nx, n=5), Hypoxia (Hx, n=5) and hypoxia-treated with the Src kinase inhibitor, PP2 (Hx+PP2, n=3, 1mg/kg iv, 30 min) prior to hypoxic exposure The group of hypoxic piglets were exposed to FiO_2 0.7% for 1 hour. Brain hypoxia was documented by determining ATP and phosphocreatine (PCr) levels. Cytosol was isolated from the cortex and caspase-1 activity was determined by spectrofluorometry, using a specific substrate (Ac-Trp-Glu-His-Asp-AMC) for caspase-1.
RESULTS: ATP (µmoles/g brain) was 4.4±0.4 in Nx, 1.57±0.3 in Hx and 1.7±0.4 in Hx+Srci. PCr (µmoles/g brain) was 3.5±0.2 in Nx, 1.3±0.3 in Hx and 1.2±0.3 in Hx+Srci. Caspase-1 activity (nmols/mg protein/hr) was 0.73±0.09 in Nx, 1.19±0.13 in Hx (p<0.05 vs Nx) and 0.89±0.13 in Hx+PP2 (p=NS vs Nx). The data show that caspase-1 activity is increased in the hypoxic group and the administration of Src kinase inhibitor prevented the hypoxia-induced increase in caspase-1 activity.
CONCLUSIONS: This study shows that hypoxia results in increased activity of caspase-1 in the cytosolic fraction of the cerebral cortex of the newborn piglets and the hypoxia-induced activation of caspase-1 is mediated by Src kinase. The increased caspase-1 activity in the hypoxic brain would lead to caspase-1-mediated programmed cell death. The increased activation of caspase-1 (in the present study) along with increased activation of caspase-9 and caspase-3 (as shown in our previous studies) in the hypoxic brain suggest that hypoxia results in cell death by both the inflammatory as well as non-inflammatory mechanisms. (NIH-HD-20337).

114
8:45am

Effect of Systemic Inflammation on Hippocampal Volume in Newborn Mice: An MRI-Based Study

Shadi Malaeb, Ilka Pinz, Maribel Rios, Jonathan Davis, Olaf Dammann.
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BACKGROUND: Perinatal infection and inflammation are important in the pathogenesis of preterm delivery and brain damage. The inflammatory process can continue postnatally and further contribute to brain injury. Premature infants have grey and white matter damage and reduced hippocampal volumes which correlate with deficits in working memory later in life. The hippocampus plays a role in recovery after brain injury. Intraperitoneal (IP) lipopolysaccharide (LPS) administration to newborn mice has been used as a model for systemic inflammation. The effects of sustained systemic inflammation on the developing brain with a focus on the hippocampus has not been clearly defined.
OBJECTIVE: Is daily IP administration of LPS between postnatal day 3 and 13 associated with brain injury and reduced hippocampal volume in juvenile mice?
DESIGN/METHODS: C57BL6/J mouse pups received daily IP injections of 0.3µg/gram LPS (E. coli 055:B5, Sigma; 5 litters) or saline (4 litters) between day 3-13. Brains were harvested on day 14 and fixed in 4% paraformaldehyde. Four random whole brain samples from each group were suspended in 2% agarose and non-enhanced coronal T2-MRI images with an in plane resolution of 27µm were obtained. Crysel Violet stained 30µm coronal tissue sections obtained at the level of the third ventricle from two samples in each group were also compared. The hippocampal region in each image was manually demarcated and its area measured using Image J software (rsb.info.nih.gov/ij). Brain weights, hippocampal volumes and areas were compared between the two groups by t-test.
RESULTS: 18/22 pups in the control and 17/34 pups in the LPS group survived to day 14 (P<0.05). The average brain weight was reduced by 16%, and hippocampal volume by 20% in the LPS compared to the control group on day 14 (P<0.01). Microscopic analysis of the hippocampal region on matching tissue sections confirmed the reduction in hippocampal volume seen on MRI.

	Control	LPS	P-value
Brain weight* (g)	0.37±0.01	0.31±0.01	P<0.01
Hippocampal volume on MRI* (mm^3)	9.42±0.17	7.53±0.46	P<0.01
Hippocampal area in tissue sections* (mm^2)	8.33±0.19	5.08±0.68	P<0.05

*Mean±SEM

CONCLUSIONS: Systemic inflammation sustained during the early postnatal period was associated with reduced brain weight and hippocampal volume in newborn mice. We speculate that injury to the hippocampus from perinatal inflammation will have important implications in newborn infants that contributes to neurodevelopmental impairment.

115
9:00am

Fellow in Training

Mast Cell Isolation from Neonatal Rat Brain

Gillian Brennan, Jacqueline Brazin, Shayma Patel, Leah Elizondo, Randi B. Silver, Susan J. Vannucci.
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BACKGROUND: Hypoxic-ischemic encephalopathy (HIE) occurs in 1-2/1000 live term births & most of the survivors have lifelong neuro-developmental sequelae such as cerebral palsy, epilepsy, and cognitive disabilities. The immature immune system & incomplete myelination make the immature brain prone to a pro-inflammatory response after an ischemic event.
There is increasing evidence that the mast cell (MC), a multifunctional immune cell derived from the hematopoetic stem cell, plays an integral role in the pathophysiology of diseases affecting the immature brain including HIE. We have previously shown that HI in the neonatal rat results in increased MC migration & degranulation, with rapid release of preformed TNFα; MC inhibition with cromolyn is neuroprotective. MCs can interact with other neural cells, including neurons, astrocytes, and microglia. Such cell-cell interactions are best studied in vitro; previous studies have relied on MC isolated from gut or bone marrow or MC lines which may behave differently from brain MC. Isolation of MC from rodent brain has not been reported.
OBJECTIVE: To develop a reproducible procedure to isolate pure MC from neonatal rodent brain following hypoxic and HI conditions, suitable for direct phenotypic analysis and future in vitro co-culture conditions.
DESIGN/METHODS: P11 (term equivalent) Wistar rats were subjected to hypoxia for 2 hours at 8% O2/bal N2. Rats were sacrificed 18 hrs following exposure to hypoxia. Brains were extracted, weighed and placed in incubation buffer. Using a razor blade, brains were minced and cells were dispersed. Cells were washed and centrifuged multiple times. MC specific antibody FcεRI was applied followed by a secondary antibody attached to a MACS microbead. Samples were passed through an OctoMACS Magnetic Sorting Columns removed from magnet and flushed into a tube with washing buffer to produce a suspension rich in MCs, which was centrifuged to produce a mast cell pellet. Following resuspension of the pellet, MCs were stained with toluidine blue and counted.

RESULTS: We isolated 13800 MCs per mg of brain tissue. Western blot for microglial marker (Iba1) demonstrated no significant microglial contamination.
CONCLUSIONS: To our knowledge this is the first example of MC isolation from the immature rat brain. This novel method will allow us to further elucidate the role that MCs play following HI and the possible therapeutic target they may offer. Supported in part by the Leducq Foundation (SJV).

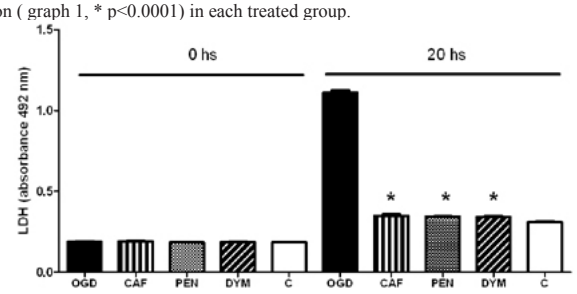
116

9:15am

Protective Effect of Methylxanthines in an *In Vitro* Model of Neuronal Injury

John Ladino, Javier Pacheco-Quinto, Ben Lee, Hui Peng, Elizabeth Eckman, Christopher Eckman.
Neonatology, Morristown Medical Center, Atlantic Health System, Morristown, NJ.

BACKGROUND: Neonatal brain injury secondary to hypoxia-ischemia (HIE) is a frequent cause of neurodevelopmental disability. Recent studies have suggested that the methylxanthines may have anti-inflammatory and neuroprotective properties in the premature and therefore, may have a potential therapeutic benefit for HIE.
OBJECTIVE: To investigate the effects of methylxanthines in an *in vitro* model of neuronal injury.
DESIGN/METHODS: Neuron-glial cells were isolated from Sprague-Dawley rats brain cortex at P2 and then grown in poly-D-lysine coated plates. On day 7, cells were treated with 10 µM of either caffeine (CAF), pentoxyfilline (PEN) or 1,7-Dimethylxanthine(DYM). At day 8, each treatment group was subjected to 1.5 hour of oxygen-glucose deprivation (OGD). Cell damage was assessed by measuring LDH release using an enzymatic colorimetric assay after a 20 hour recovery period. A group not subjected to OGD was used as control (C).
RESULTS: Oxygen-glucose deprivation for 1.5 h produced a significant increase on LDH release after 20 hours in the non-treated cells. Exposure to caffeine, pentoxyfilline and 1,7-Dimethylxanthine significantly decreased the release of LDH after 20 h of oxygen glucose deprivation (graph 1, * p<0.0001) in each treated group.



CONCLUSIONS: All the methylxantines tested protected neuron-glial cells against OGD-induced injury. Further studies on animal models of neonatal brain injury are warranted. The methylxanthines may have neuro-protective effects after HIE in the newborn.

117

9:30am

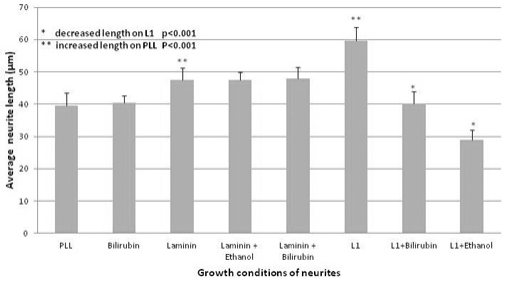
Fellow in Training

Bilirubin Inhibits Lipid Raft Dependent Neurite Outgrowth

Gail S. Cameron, Penny Bamford, Ningfeng Tang, Cynthia F. Bearer.
Pediatrics, University of Maryland School of Medicine, Baltimore, MD.

BACKGROUND: Bilirubin causes neuronal toxicity which may result in kernicterus, a form of chronic and permanent neurological dysfunction seen in children. The molecular mechanism of bilirubin induced neuronal toxicity is not fully resolved. We hypothesize that bilirubin, a lipophilic molecule, inhibits the functions of lipid rafts, microdomains of the plasma membrane critical for signal transduction. L1 cell adhesion molecule (L1) and laminin are two substrates which stimulate neurite outgrowth of cerebellar granule neurons (CGN). Neurite outgrowth of neurons plated on L1 is dependent on lipid rafts unlike that of neurons plated on laminin. Therefore, bilirubin at clinically significant concentrations will decrease L1 but not laminin mediated neurite outgrowth of CGN.
OBJECTIVE: To determine if bilirubin reduces neurite length of CGN grown on L1 or laminin.
DESIGN/METHODS: CGN from 6 day old rat pups were prepared and plated on 3 different substrates: poly L-lysine (PLL), laminin, or L1. Ethanol, a negative control and 5 µM bilirubin(0.3mg/dL) were added 2 hours after plating. Cells were fixed 24 h after and neurite length determined by a blinded investigator. Significance was determined by Student's t test. Statistical significance was defined as p<0.05.
RESULTS: Neurite length was significantly increased with laminin or L1 compared to PLL (see Table). Adding bilirubin or ethanol to neurites plated on L1 reduced neurite length (Table). Neurons plated on laminin did not change neurite length with the addition of ethanol or bilirubin. There was no significant difference in lengths of neurites grown on PLL vs. neurites exposed to bilirubin on PLL.

Figure 1. Neurite length with different growth conditions



CONCLUSIONS: We conclude that bilirubin at low concentrations (0.3mg/dL) significantly inhibits lipid raft dependent, L1 mediated neurite outgrowth but does not affect laminin mediated growth, a process independent of lipid raft function. This suggests that bilirubin promotes neurotoxicity through a lipid raft dependent mechanism.

118

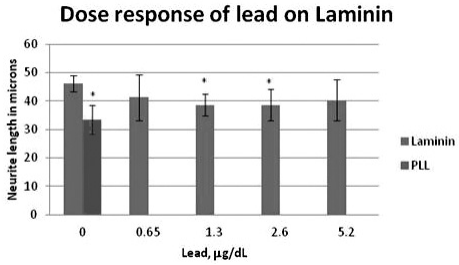
9:45am

Fellow in Training

Lead Concentrations in VLBWs Following Blood Transfusion Reduces Laminin-Mediated Neurite Outgrowth

Misty C. McCaig, Penny Bamford, Ningfeng Tang, Min He, Cynthia F. Bearer.
Pediatrics, University of Maryland, Baltimore, MD.

BACKGROUND: Lead is a known neurodevelopmental toxicant. Current data suggests there is no safe level of blood lead concentration. Donor blood contains a significant amount of lead. We have previously shown that blood lead concentration increases following blood transfusion in very low birth weight infants. Lead added to culture media has been shown to reduce neurite lengths of ventral mesencephalic neurons from E15 rat embryos plated on a non-physiologic substrate poly-L-lysine (PLL). Laminin is a substrate which is found in -vivo that is known to stimulate neurite outgrowth. Our previous studies show that lead causes a significant reduction in neurite length of cerebellar granular neurons (CGN) when plated on laminin at levels as low as 5ug/dL. We hypothesize that levels much lower than the current lead recommendations cause a significant reduction in neurite length of CGN.
OBJECTIVE: To determine at what concentration of lead the neurite length of CGN is significantly reduced.
DESIGN/METHODS: CGN from 6 day old rat pups are prepared and plated on PLL as a control, and laminin. After plating, lead at concentrations of 5.2, 2.6, 1.3, and 0.65 ug/dL is added to the media. Cells are fixed 24 h after plating and neurite length is determined by a blinded investigator.
RESULTS: Laminin significantly increases neurite length compared to PLL. Lead at concentrations of 2.6 and 1.3 ug/dL are shown to significantly reduce neurite length stimulated by laminin.



CONCLUSIONS: We conclude that lead significantly reduces the stimulation of neurite outgrowth mediated by laminin at levels as low as 1.3 ug/dL. Lead exposure via blood transfusion may be of concern when considering blood transfusions.

119

10:00am

Fellow in Training

Overexpression of EC-SOD Has a Protective Role Against Brain Injury Induced by Chronic Hypoxia in Adult Mice

Nahla Zaghloul, Hardik Patel, Champa Codipilly, Philippe Marambaud, Stephen Dewey, Wynne Schiffer, Mohamed Ahmed.
Pediatrics/Neonatology, Cohen Children's Medical Center of New York, New Hyde park, NY; Pediatrics/Neonatology, Feinstein Institute for Medical Research, Manhasset, NY; Neuroscience, Feinstein Institute for Medical Research, Manhasset, NY.

BACKGROUND: Hypoxia causes regional changes in the brain including neurogenesis, hippocampal atrophy, altered transcription factor regulation and protein expression. These changes are associated with impaired mental performance and productivity.
OBJECTIVE: To determine whether over-expression of EC-SOD is protective against brain injury induced by chronic hypoxia in adult mice.
DESIGN/METHODS: Transgenic adult mice (TG, with an extra-copy of human EC-SOD knocked in) and wild type adult mice (WT) were exposed to hypoxia (10% of FiO_2) for 10 days versus control group in RA. After exposure, [^{18}F]-fluorodeoxyglucose (^{18}FDG) uptake was measured using a Siemens Inveon Micro PET. As an index of oxidative stress, reduced glutathione/oxidized glutathione ratio was measured. Quantitative Western blot of GFAP, IBA1, MIF, pAMPK and pACC, were done and presented as a ratio of marker band density to Actin density. To assess apoptosis induced by hypoxia, ELISA was used to measure caspase3 in all groups.
RESULTS: Micro PET scanning showed a significantly higher ^{18}FDG uptake in the WT hypoxic brain compared to hypoxicTG and control RA groups in all brain regions of adult mice (P<0.05), including hypoxia-sensitive brain structures (dorsal and ventral hippocampus, hypothalamus and cerebellum). These findings suggest a significant less inflammation/damage of brain cells in the hypoxic TG group compared to hypxoic WT group. Reduced glutathione/oxidized glutathione ratio was significantly lower in WT hypoxic group (3.4±0.5) compared to TG hypoxic group (7.06±0.9). Western blot for inflammatory makers showed a significant increase of GFAP, IBA1, MIF pAMK and pACC in WT hypoxic group compared o TG hypoxic and RA control groups.

Quantitative western blot of inflammatory and metabolic markers of brain injury after exposure to hypoxia compared to normoxia groups among adult mice

Markers	RA WT	RA TG	H WT	H TG
GFAP	0.792±0.04	0.796±0.03	1.426±0.08	0.812±0.08*
IBA1	0.160±0.01	0.162±0.02	0.194±0.01	0.178±0.01*
MIF	0.662±0.07	0.699±0.07	0.935±0.09	0.714±0.02*
pAMPK	0.430±0.12	0.420±0.15	1.378±0.34	0.765±0.19*
pACC	0.276±0.01	0.267±0.01	0.551±0.04	0.369±0.01*

* P < 0.05 (H WT vs H TG)

For apoptosis, there was a significant higher activated caspase3 among WT hypoxic adult mice (1.731±0.335) compared to TG hypoxic group (1.162±0.088).
CONCLUSIONS: Overexpression of EC-SOD offers significant protection against brain damage induced by chronic hypoxia.

120
10:15am

Fellow in Training

Characterization of Hypoxia-Ischemia Induced Seizures in P7 Neonatal Rat Pups

Aimee M. Parow, Murray Engel, Jeffrey M. Perlman, Susan J. Vannucci.
Division of Newborn Medicine, Weill Cornell Medical College, New York, NY;
Division of Pediatric Neurology, Weill Cornell Medical College, New York, NY.

BACKGROUND: Late preterm infants, 34-36 weeks, make up 71% of preterm births and 8.8% of all births. The perinatal course may be complicated by hypoxia-ischemia (HI), with resultant encephalopathy including seizures (Sz). Sz are more likely to be subclinical due to immaturity of the brain making diagnosis more difficult. Subclinical Sz, if untreated, may contribute to ongoing brain injury.
OBJECTIVE: To characterize the occurrence & timing of clinical and subclinical Sz during & following HI in the postnatal day (P) 7 rat and resultant brain damage.
DESIGN/METHODS: P7 Wistar rats (brain development approximating a 32-36 wk gestation human) were used. EEG headmounts (HM) were placed on P7. P8 pups underwent unilateral right carotid artery ligation, were connected to video electroencephalogram (VEEG) & subjected to HI (8% O2/balance N) for 75 min at 36.5°C (n=11) or hypoxia (H) alone (n=4). Littermates underwent HI, no HM (n=11). Pups were monitored for 60 min post-HI during normoxic recovery. EEG Sz was defined as repetitive, rhythmic patterns with increased amplitude, lasting at least 10 sec. Sz were classified as clinical or subclinical by correlating with behavioral activity. Brains were removed at 48 hours post HI and stained with triphenyltetrazolium chloride (TTC) to assess damage.
RESULTS: Subclinical Sz occurred in all 11 HI pups. 7/11 pups exhibited clinical Sz. Time to first Sz during HI was 43-75 min, median 65 min (subclinical) and 42-67 min, median 61 min (clinical). Total number of Sz per animal during HI ranged from 1-4 and 1-5 for subclinical and clinical Sz, respectively, with 68% of all Sz observed being subclinical. Sz continued into the recovery period in 9/11 pups; 84% subclinical. Brain damage was severe, greater than 50% of ipsilateral hemisphere damaged, in 10/11 rats with HI and HM and in 9/11 HI without HM. H only pups had no Sz and no damage.
CONCLUSIONS: Time to first Sz was longer during HI in these younger rats than we previously reported for P12, term equivalent, pups, and the total number of Sz were fewer. There was no exacerbation of injury due to the headmount itself. Also in contrast to older pups, the majority of Sz in the younger animals were subclinical. These subclinical Sz continued into the recovery period for most animals. This latter observation is important because it may provide opportunity to explore interventions i.e. anticonvulsants that could minimize or prevent ongoing injury following HI.

Plenary II: Young Investigator, Faculty Plenary Session

Saturday, March 31, 2012
2:00pm-3:00pm

125
2:00pm

Fellow in Training

Ultrastructural Consequences of VLY Exposure in Human Epithelial Cells

Joanne Zaklama, Tara M. Randis, Tim LaRocca, Adam Ratner.
Department of Pediatrics, Columbia University Medical Center, New York, NY.

BACKGROUND: Bacterial vaginosis (BV) is the most prevalent cause of vaginitis in childbearing women and is responsible for ~90,000 excess preterm births per year. Gardnerella vaginalis, the major etiologic agent in BV, produces vaginolysin (VLY), a member of the cholesterol dependent cytolysin family of bacterial toxins.
OBJECTIVE: We sought to determine if sublytic concentrations of VLY are capable of more complex signaling mechanisms, mediated through the CD59 receptor, that contribute to the pathogenesis of G. vaginalis in the female genital tract.
DESIGN/METHODS: We exposed human cervical epithelial cells (HeLa) to sublytic concentrations of VLY (16 ng/ml). Cells were similarly exposed to recombinant toxins that bind CD59 but arrest pore formation at various stages of pore assembly. Additionally HeLa cells were pretreated with anti-CD59 antibody for 1 hr prior to toxin exposure. Cells were observed for ultrastructural changes of the cell membrane using live cell imaging for 10 min following treatment with each toxin.
RESULTS: Following exposure to VLY, large bleb-like structures were noted protruding from the cell membrane and appeared to be contiguous with the cytoplasm.

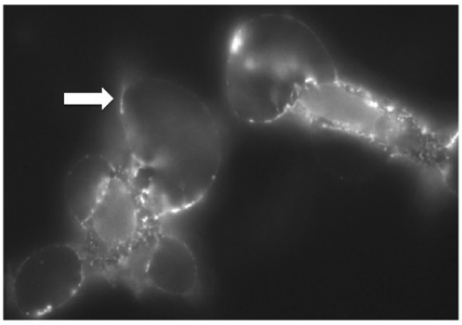


Figure 1: VLY causes membrane blebbing in epithelial cells. Exposure of human cervical epithelial cells to sublytic concentrations of VLY illicits rapid formation, as indicated by arrow.

Twenty-four hours after toxin exposure, the blebs were no longer visualized and the cells remained viable as demonstrated by trypan blue exclusion. Similar membrane blebbing was observed following treatment with recombinant toxins that bind CD59 but arrest pore formation at various stages of pore assembly. Cell membrane blebbing is not seen after exposure of HeLa cells to toxins after pretreatment with anti-CD59 antibody.
CONCLUSIONS: We speculate epithelial cell membrane blebbing in response to VLY is mediated by its binding to CD59 and may be an adaptive response, functioning as a means for toxin removal from the membrane.

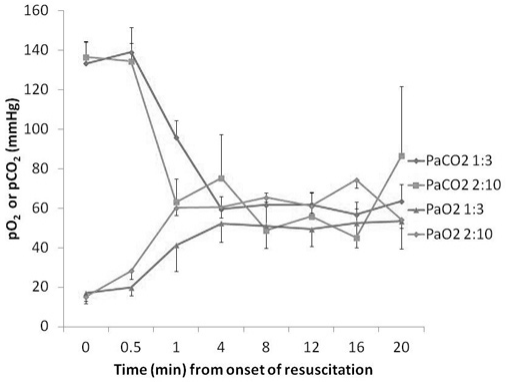
126
2:15pm

Gas Exchange at Different Compression to Ventilation Ratios during Neonatal Resuscitation

Bobby Mathew, Daniel D. Swartz, Sylvia F. Gugino, Devaraj Sambalingam, Carmon Koenigsknecht, Satyan Lakshminrusimha.
Pediatrics, The Women and Children's Hospital of Buffalo, NY.

BACKGROUND: The current NRP guidelines recommend Ventilation to Compression ratio (V:C) of 1:3 for cardiopulmonary resucitation of newborn infants. There is however limited evidence for this recomendation. A lower V:C ratio may result in imparied gas exchange.
OBJECTIVE: To study the effect of two different V:C ratios (1:3 & 2:10) on gas exchange and on the rate of and time to return of spontaneous circulation (ROSC)in a newborn piglet model of asphyxia induced cardiac arrest.
DESIGN/METHODS: 27 Newborn piglets (1-3 days old) were anesthetised with isoflourane, ketamine and acepromazine. Carotid arterial and internal jugular lines were placed. Animals were asphyxiated until asystole by occlusion of the endotracheal tube. Resuscitation was begun immediately with 30 seconds of positive pressure ventilation (PPV), followed by chest compressions at one of two ratios (1:3 or 2:10). 100% O_2 was used as the resuscitation gas. Arterial blood gases were obtained at cardiac arrest, after 30 seconds of PPV, 1 min, 4 min and every 4 min till ROSC or 20 min. The time to ROSC was recorded.
RESULTS: 9/18 and 4/9 animals achieved ROSC in the 1:3 and 2:10 V:C groups respectively. There were no significant differences in the pH, $PaCO_2$ or PaO_2 at the point of cardiac arrest or during resuscitation prior to ROSC.

Baseline Characteristics			
Vent to compression ratio	1:3	2:10	
Weight (Kg) SD	1.74 ±0.38	1.6±0.36	NS
Time to Arrest (s)	798±364	724±324	NS
$PaCO_2$ @ Arrest	133 ±32	137±17	NS
PaO_2 @ Arrest	17.2±10.8	15.4±9.2	NS
Time to ROSC (s)	263±129	159±75	NS



CONCLUSIONS: Effective gas exchange can be maintained with a lower ventilation to compression ratio similar to the conventional 1:3 ratio. Results from this study must be interpreted with caution as the newborn piglet model may not be representive of the asphyxiated newborn in the delivery room.
This study was funded by Young Investigator Award Grant from the NRP of the AAP (BM).

127

2:30pm

Prenatal Bisphenol A Exposure Is Associated with Decreased Child Lung Function

Adam J. Spanier, Robert S. Kahn, Allen Kunselman, Richard Hornung, Yingying Xu, Bruce P. Lanphear.

Pediatrics, Penn State University College of Medicine, Hershey, PA; Public Health Sciences, Penn State University College of Medicine, Hershey, PA; General & Community Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, OH; Emergency Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, OH; Child & Family Research Institute, BC Children's Hospital, Faculty of Health Sciences, Simon Fraser University, Vancouver, BC, Canada.

BACKGROUND: Bisphenol A (BPA) is an endocrine disrupting chemical that is found in many consumer products. It is detectable in over 90% of the US population. Our previous work has demonstrated an association of prenatal BPA with child wheeze, but studies of objective lung function are lacking.

OBJECTIVE: To examine the relationship between prenatal BPA exposure and lung function in early childhood.

DESIGN/METHODS: We examined a birth cohort study of 398 mother-infant dyads, enrolled in early pregnancy. We collected maternal urine at 16 weeks and 26 weeks gestation to measure urinary BPA concentration. We used the log10 of the mean of the two urinary BPA concentrations as the primary exposure measure. We assessed child forced expiratory volume in one second (FEV1) at age four and calculated percent predicted FEV1 following methods proposed by Eigen et al. We used linear regression for analysis and conducted five-fold cross validation to assess the predictive performance of the statistical model.

RESULTS: The geometric mean urinary BPA concentration was 2.3 µg/g of creatinine (95% CI 2.1, 2.6). FEV1 was available from 156 children at age four. The mean and standard deviation percent predicted FEV1 was 64.8 ± 22. In multivariable analysis, adjusting for season, child's insurance, and cotinine levels, we found that a 10-fold increase in mean prenatal urinary BPA concentration was associated with an average percent predicted FEV1 decrease of 9.9% (β = -9.9, S.E. 4.9, p= 0.04). In secondary analyses we examined the effect of the timing of prenatal BPA exposure by evaluating the two prenatal BPA measures separately. Maternal urinary BPA concentration at 16 weeks gestation had a borderline association with percent predicted FEV1 (β = -8.3, S.E. 4.6, p=0.07), whereas the 26 week maternal urinary BPA was not associated with FEV1 (β = -5.5, S.E. 4.7, p=0.24).

CONCLUSIONS: We found that prenatal BPA exposure, particularly early pregnancy exposure, was associated with a decrease in lung function in children. These results are consistent with the observed increased odds of childhood wheeze associated with BPA exposure which we previously described in this same cohort.

128

2:45pm

Randomized Trial of Varying Levels of Oxygen (21%, 40% and 100%) at Resuscitation in Premature Infants < 32 wks GA

Vasanth H. Kumar, Karen Wynn, Rita M. Ryan, Lori Nielsen, Anne Marie Reynolds, Vivien Carrion.

Dept of Pediatrics, Children's Hospital of Buffalo, Buffalo, NY; Dept of Pediatrics, MUSC Children's Hospital, Charleston, SC.

BACKGROUND: NRP recommends adjusting FiO_2 at birth based on preductal saturations (SpO_2) in the first 10 min of life. It is possible that resuscitation of preterm infants with 100% O_2 initiates significant oxidant stress early in lung development predisposing them to BPD.

OBJECTIVE: Limiting O_2 at resuscitation in infants < 32 wks would decrease oxidant stress as assessed by reduced to oxidized glutathione ratio (GSH / GSSG).

DESIGN/METHODS: Infants < 32 wks GA were randomized to 21%, 40% or 100% O_2 & resuscitated per 2004 NRP guidelines. Soon after birth preductal SpO_2 were recorded (Masimo SET, Masimo, CA). O_2 groups & SpO_2 were unmasked at 10 min, FiO_2 adjusted to maintain SpO_2 85-95%. The intervention was complete when infant in ICU. Blood was collected at 24h, 8d and 28d for measurement of oxidative stress markers such as GSH/GSSH, nitrotyrosine (NT) and 8-hydroxydeoxyguanosine (8-OHdG). At 30% enrollment the study was stopped after publication of the 2010 NRP guidelines.

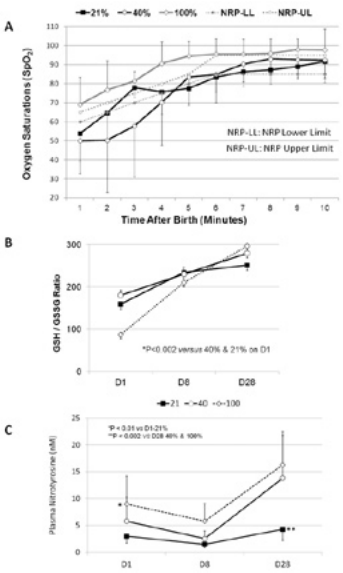
RESULTS: Admission data are as follows:

Characteristics & Clinical Outcomes In Study Infants

Oxygen Group	21% (n=6)	40% (n=8)	100% (n=5)
GA (wks)	29.3 ± 2.3	28.1 ± 2.6	27.6 ± 2.4
BW (gms)	1182 ± 340	1206 ± 439	1139 ± 374
Males (%)	2 (33%)	5 (62%)	3 (60%)
Cord pH	7.28 ± 0.04	7.32 ± 0.05	7.33 ± 0.06
Apgar - 5 min	9	9	8
IVH (I-IV)	0	0	2 (40%)
BPD+NEC+Death	3 (50%)	5 (63%)	5 (100%)

Values expressed as mean ± SD

100% group had SpO_2 above NRP-UL in the first 10 mins (Fig A). GSH/GSSG was significantly lower (Fig B) & NT significantly higher (Fig C) at 24h in 100% group compared to other groups. GSH/GSSG, NT & 8-OHdG were significantly higher on D28 compared to D1, indicating significant oxidant stress & DNA damage over time.



CONCLUSIONS: Resuscitation of premature infants with 21% O_2 will maintain SpO_2 within 2010 NRP guidelines. GSH/GSSG & NT are impacted by O_2 at birth & over time, which may lead to DNA damage. 21%-40% O_2 seems appropriate at resuscitation in premature newborns (funded by Wildermuth Grant).

Plenary II: Young Investigator, Trainee Plenary Session

Saturday, March 31, 2012
3:00pm-4:00pm

129

3:00pm

Fellow in Training

Heliox in Combination with High Flow Nasal Cannula Decreases Diaphragmatic Injury in Newborn Porcine Lung Injury Model

Romal Sekhon, Haritha Vellanki, Anne Hesek, Jordan Wang, Yan Zhu, Maria Elena Rodriguez, Jichuan Wu, Thomas H. Shaffer, Marla R. Wolfson.

Nemours Lung Research, A. I. duPont Hospital for Children, Wilmington, DE; Physiol, Med & Peds; Center for Inflammation, Translational and Clinical Lung Research, Temple Univ Sch of Med, Philadelphia, PA; Neonatology, Thomas Jefferson Univ Hosp, Philadelphia, PA.

BACKGROUND: High flow nasal cannula (HFNC) improves ventilation and oxygenation by washing out nasopharyngeal dead space while delivering supplemental oxygen during spontaneous breathing. Heliox, a low density gas mixture, decreases resistance to airflow, reduces the work of breathing and facilitates distribution of inspired gas. Lung injury increases the inspiratory workload on the immature diaphragm and can lead to inflammatory and oxidative stress, thereby impairing diaphragmatic function resulting in muscle fatigue.

OBJECTIVE: To test the hypothesis that Heliox by HFNC will decrease the work of breathing thereby unloading the neonatal diaphragm and reducing biomarkers of diaphragmatic injury.

DESIGN/METHODS: Spontaneously breathing neonatal pigs were anesthetized, lung injured with oleic acid, supported with 4 L/min HFNC, and randomized to Nitrox (n = 7) or Heliox (n = 7). F_IO_2 was titrated for pulse oximetry (SpO_2) 95 ± 2% for 4 hr. Gas exchange and pulmonary mechanics were measured serially. Sections of diaphragm were obtained for measurement of :1) interleukin–8 (IL–8) and myeloperoxidase (MPO) from tissue homogenate and 2) the composite muscle injury score by histomorphology of hematoxylin/eosin stained sections, to assess presence of inflammatory cells, quality of cytoplasm stain, position of nuclei, muscle fiber integrity and cross-sectional diameter.

RESULTS: With Heliox, animals demonstrated lower inspiratory load with lower pressure rate product ($p < 0.05$) and decreased work of breathing reflected by lower labored breathing index ($p = 0.01$) compared to Nitrox. $PaCO_2$ was similar in both groups. With Heliox, animals demonstrated lower levels of diaphragmatic IL-8 ($p < 0.05$), trend towards reduced MPO ($p = 0.15$) and lower muscle injury score ($p < 0.01$) as compared to animals breathing Nitrox.

CONCLUSIONS: In the presence of lung injury, Heliox in combination with HFNC reduces the inspiratory load on the diaphragm and work of breathing thereby improving the efficiency of inspiratory effort and diaphragmatic function. Heliox-induced unloading of the diaphragm resulted in decreased muscle inflammation and damage as compared to Nitrox breathing. These results suggest that Heliox in combination with HFNC offers a therapeutic approach to attenuate diaphragmatic fatigue in the presence of lung injury.(P20 RR020173; N0014-10-0761).

130
3:15pm

Fellow in Training

Single Nucleotide Polymorphisms and Variability in Severity of Neonatal Abstinence Syndrome

E. M. Wachman, M. S. Brown, J. A. Paul, B. A. Logan, N. A. Heller, K. B. Harvey-Wilkes, H. O. Kasaroglu, T. Marino, J. M. Davis, J. V. Aranda, M. J. Hayes.
Neonatology, Tufts Medical Center, Boston, MA; Neonatology, Eastern Maine Medical Center, Bangor, ME; OB / Gyn, U Texas Medical Branch, Galveston, TX; Psychology, U Maine, Orono, ME; OB / Gyn, Tufts Medical Center, Boston, MA; Neonatology, SUNY Downstate NY, Brooklyn, NY.

BACKGROUND: There is significant variability in the incidence and severity of neonatal abstinence syndrome (NAS) due to in-utero opioid exposure. Adult studies show that single nucleotide polymorphisms (SNPs) in the mu opioid receptor (OPRM1), multi-drug resistance (MDR1), and catechol-O-methyltransferase (COMT) genes affect opioid addiction risk, metabolism and dosing requirements. These SNPs may also affect infants with NAS.

OBJECTIVE: To determine if SNPs in the ORPM1 (A118G), MDR1 (C3435T, G2677T, C1236T), and/or COMT (Val158Met) genes are associated with differences in the incidence and severity of NAS in infants exposed antenatally to methadone or buprenorphine. Outcome measures included length of hospital stay (LOS), maximum Finnegan score, and need for pharmacologic intervention.

DESIGN/METHODS: Full-term opioid-exposed newborns (n=28) were studied. A DNA sample was obtained from cord blood or saliva and then genotyped for 5 SNPs. Infants were monitored for NAS (modified Finnegan scoring) and treated with replacement opiates according to institutional protocol. T-tests for continuous variables, and chi square for discrete variables were used to evaluate differences in severity outcome measures.

RESULTS: All SNPs demonstrated Hardy-Weinberg equilibrium (p-value > 0.1). For the ORPM1 A118G SNP, 65% of infants with the AA genotype required treatment for NAS vs 18% of AG/GG infants (X^2= 4.34, p<0.05); LOS of 24.5 (95% CI 16.2, 32.8) vs 8.8 days (0.5, 17.2) (p<0.01); and daily dose of methadone of 1.1 vs 0.2mg (p<0.05). Infants with the COMT Val/Met or Met/Met genotype had decreased NAS severity as measured by LOS [34.3 (16.6, 52.1) vs 16.9 days (9.6, 24.1), p<0.05]; need for ≥2 NAS medications (68% vs 25%, X^2= 3.54, p=0.05); maximum Finnegan score [14 (9.7, 18.3) vs 11 (9.5, 12.5), p=0.05]; and daily dose of neonatal morphine (1.6 vs 0.5mg, p=0.05). There was no significant difference in NAS severity with the MDR1 SNPs. Dose of maternal opioid, psychiatric medication use, gestational age, and breastfeeding were not significant determinants of NAS severity.

CONCLUSIONS: Data suggest that SNPs in the OPRM1 and COMT genes affect NAS severity, with presence of the minor allele demonstrating a milder phenotype. This has important implications for the earlier identification and treatment of infants at highest risk for NAS.

131
3:30pm

Fellow in Training

PRBC Transfusion Increases Mesenteric Vasoconstriction in Preterm Lambs

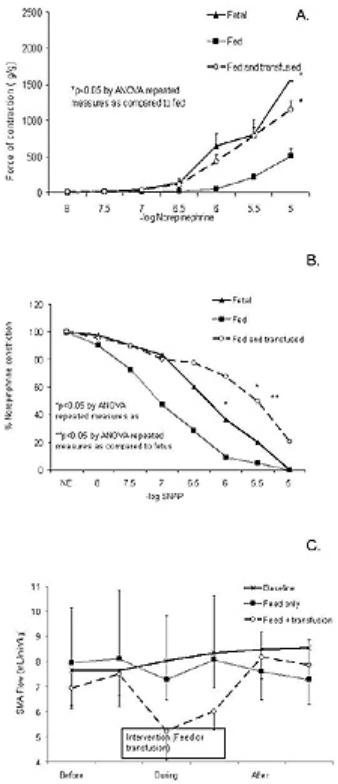
Jayasree Nair, Sylvia F. Gugino, Bobby Mathew, Melissa Carmen, Daniel D. Swartz, Satyan Lakshminrusimha.
Neonatology, University at Buffalo, Buffalo, NY.

BACKGROUND: An association between PRBC transfusion and development of NEC in preterm neonates on feeds (Christensen et al,Transfusion 2010) is postulated to be due to failure of postprandial increase in mesenteric blood flow following transfusion (Krimmel et al 2009). We have previously reported a reduction the mesenteric artery(MA) constriction to norepinephrine (NE) following enteral feeds in 134d gestation lambs (Nair et al PAS 2011). Developmentally, 134d lambs correspond to late preterms in humans, which is the most prevalent postconceptional age at onset of NEC.

OBJECTIVE: To measure superior mesenteric artery (SMA) flow changes associated with feeds, with and without transfusion and the effect of PRBC transfusion on MA vasoreactivity.

DESIGN/METHODS: Eight lambs at 134d gestation were ventilated for 24h and fed expressed breast milk (5 ml/kg q3h) starting at 6h of age. Five of these lambs received 3 PRBC transfusions (10ml/kg) at 9, 15 and 21h of life. An ultrasonic flow probe was placed around the SMA in 3 transfused lambs. Flow was measured in the initial hours before feed or transfusion, with feed and with transfusion during which a feed was given. Transfusions were run over 2h and feeds over 30 min. MA were dissected after 24h and constriction responses to NE and relaxation responses to nitric oxide donor SNAP were obtained. Control data was obtained from 6 lambs sacrificed at birth.

RESULTS: Fetal MA had a dose dependent constriction response to NE and relaxation to SNAP. Enteral feeds reduced NE constriction and improved SNAP relaxation. PRBC transfusion with feeds increased NE constriction and impaired SNAP relaxation. SMA flow did not change with feeds but decreased during PRBC transfusion associated with feeds.



CONCLUSIONS: The beneficial effects of enteral feeds on mesenteric vasoreactivity are negated by PRBC transfusion. We speculate that PRBC transfusions impair mesenteric vascular NO pathway resulting in intestinal ischemia and increase the risk of NEC.

132
3:45pm

Medical Student

Hyperoxia Regulates Degradation of Circadian Protein Rev-Erbα: Implications for Cytoprotection

Maurice Hinson, Chhanda Biswas, Ping La, Guang Yang, Phyllis A. Dennery.
Neonatology, Children's Hospital, Philadelphia, PA; Pediatrics, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Dysregulation of myofibroblast differentiation in the alveolar microenvironment contributes to the pathogenesis of bronchopulmonary dysplasia. The precise signaling mechanisms dictating myofibroblast differentiation are not well understood. The nuclear receptor protein Rev-ERBα is an important regulator of adipocyte differentiation. Its degradation is regulated through phosphorylation of specific serine residues (55/59) via GSK3β. The role of Rev-ERBα in myofibroblast differentiation has not been elucidated.

OBJECTIVE: To evaluate whether Rev-ERBα inhibits myofibroblast differentiation in mouse neonatal lung-mesenchymal (MLg)-progenitor cells and protects against hyperoxic injury.

DESIGN/METHODS: Rev-ERBα WT and phosphorylation defective mutant (SD: 55/59 Ser to Asp) MLg cells were exposed to 95%O2/5%CO2 (hyperoxia) or air/5%CO2 (normoxia) for 0-24 h. In other experiments, cells were pre-incubated with SB216763, an inhibitor of GSK3β to prevent Rev-ERBα degradation. Cell proliferation was assessed by BrdU and p21 mRNA. Cell differentiation to a myofibroblast phenotype was assessed by αSMA immunofluorescence. Apoptosis was evaluated by caspase-3 activity, and pro-inflammatory cytokine levels (IL-1β and IL-6) were evaluated in the media using ELISA. Cellular steady-state mRNA and protein levels of Rev-ERBα and p-GSK3β, were assessed by qRT-PCR and Western blot respectively.

RESULTS: MLg-WT cells exposed to hyperoxia had increased Akt activity, increased pGSK3β protein and decreased Rev-ERBα protein. This was associated with decreased BrdU incorporation and increased p21 mRNA levels. Immunoreactive αSMA and caspase-3 activity were also increased, as was IL-1β and IL-6 secretion. In contrast, Rev-ERBα levels remained stable in the SD mutants and in the cells pre-incubated with SB216763 and exposed to hyperoxia. This was associated with increased BrdU, decreased p21 as well as decreased αSMA, caspase-3 activity and IL-1β and IL-6 secretion.

CONCLUSIONS: We conclude that hyperoxia mediates the degradation of Rev-ERBα. Preventing this degradation reduces myofibroblast differentiation and protects the cells against hyperoxic injury. We speculate that activation of AKT kinase and subsequent phosphorylation of pGSK3β may mediate the degradation of lung Rev-ERB in hyperoxia, thereby reducing levels of this cytoprotective protein, promoting myofibroblast differentiation and enhancing susceptibility to hyperoxia.

Saturday, March 31, 2012
4:15pm-5:45pm

133

4:15pm

Incidence and Acute Complications of Asymptomatic Central Venous Catheter-Related Deep Venous Thrombosis in Critically Ill Children

E. Vincent S. Faustino, Philip C. Spinella, Simon Li, Matthew Pinto, Cicero T. Silva.
Department of Pediatrics, Yale University School of Medicine, New Haven, CT; Department of Pediatrics, Washington University at St. Louis School of Medicine, St. Louis, MO; Pediatric Intensive Care Unit, Maria Fareri Children's Hospital, Westchester, NY; Department of Diagnostic Radiology, Yale University School of Medicine, New Haven, CT.

BACKGROUND: The majority of cases of deep venous thrombosis (DVT) in children are associated with central venous catheters (CVC). When symptomatic with signs of inflammation, venous obstruction or CVC dysfunction, CVC-related DVT in critically ill children is associated with prolonged duration of mechanical ventilation (possibly from pulmonary embolism [PE]) and prolonged stay in the intensive care unit (ICU). The clinical significance of the more common asymptomatic CVC-related DVT in critically ill children is unclear.

OBJECTIVE: We determined the incidence and acute complications of asymptomatic CVC-related DVT in critically ill children.

DESIGN/METHODS: We performed a multicenter, prospective cohort study enrolling children admitted to the ICU with a newly-inserted CVC. Portable ultrasonography was performed at the CVC insertion site to detect the presence of DVT. We excluded children with symptomatic DVT. Acute complications monitored included duration of mechanical ventilation, ICU length of stay, hospital length of stay and rates of mortality and PE. χ^2 test, Mann-Whitney test and logistic regression were used for analysis.

RESULTS: A total of 101 children from 3 ICUs were included in the study. Asymptomatic CVC-related DVT was diagnosed in 16 (15.8%) children. Compared to children <1 year old, the adjusted odds ratio of DVT in children >13 years old was 14.7 (95% confidence interval: 2.1-104.0; *P*=.007). Other demographic variables, interventions (including anticoagulant use) and CVC characteristics were similar between children with and without DVT. There were no significant differences in the duration of mechanical ventilation, ICU stay and hospital stay (Table). A total of 3 patients died, 1 with DVT and 2 with no DVT (*P*=.471). No child was diagnosed with PE.

Table. Acute complications of asymptomatic CVC-related DVT.*

	With DVT	No DVT	*P* value
Duration of mechanical ventilation	5±8	5±10	.338
ICU length of stay	9±10	10±13	.705
Hospital length of stay	14±10	19±31	.654

*All values are mean±SD in days.

CONCLUSIONS: Asymptomatic CVC-related DVT is common in critically ill children. However, this was not associated with acute complications compared to children with no DVT. These findings do not support routine prophylaxis against asymptomatic DVT in the CVC insertion site. Future studies should focus on defining the chronic complications associated with asymptomatic CVC-related DVT.

134

4:30pm

Hydrocortisone (HC) Prophylaxis To Prevent Postoperative Cardiovascular Instability Following Patent Ductus Arteriosus (PDA) Ligation

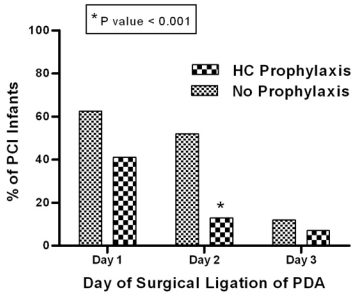
Upender K. Munshi, Sachin D. Tadphale, Joaquim M.B. Pinheiro.
Pediatrics, Albany Medical Center, Albany, NY.

BACKGROUND: Postoperative cardiovascular instability (PCI) has been frequently reported after PDA ligation in extremely preterm infants. Relative adrenal insufficiency is common in this group and may contribute to PCI. At our center during last few years, perioperative stress doses of HC have been used empirically at the discretion of treating neonatology team to prevent PCI following PDA ligation.

OBJECTIVE: To study the efficacy of HC prophylaxis in preventing PCI after PDA ligation in infants <29weeks gestation.

DESIGN/METHODS: IRB approved retrospective chart review of <29weeks gestation infants who had PDA ligation at Albany Medical Center, from Jan 2006 to June 2011. Data recorded included birthweight, gestational age, HC prophylaxis given before PDA ligation (study group) or no prophylaxis (control group), presence of PCI on day of surgery and the next two days. PCI was defined as administration of volume bolus >10ml/kg or starting dopamine infusion at >5mcg/kg/min or escalating existing dopamine infusion >2.5mcg/kg/min or starting rescue HC for low blood pressure as per treating neonatolgy team. Morbidities recorded included intestinal perforation, necrotizing enterocolitis, hyperglycemia or culture positive sepsis within one week after surgery.

RESULTS: Seventy nine eligible infant charts were reviewed; 39 received HC prophylaxis and 40 did not. Demographic characterstics of study and control groups were similar. Study group showed a trend towards fewer infants with PCI on day of surgery and a significantly lower number of infants with PCI 24 hours later. Both groups showed improvement in PCI by >48hours .There was no significant difference in the short-term morbidities in the two groups.



CONCLUSIONS: HC prophylaxis given before PDA ligation decreases PCI in <29weeks gestation infants. Stable hemodynamic state after HC prophylaxis may improve long term outcomes in this high risk group.

135

4:45pm

Masters of Public Health

Surgical Site Infections and Perioperative Antibiotic Prophylaxis in Neonates Undergoing Cardiac Surgery

Meghan Murray, Rozelle Corda, Lisa Saiman, Emile Bacha, Rebecca Turcotte, Lisa Covington, Brian Thumm, Ganga Krishnamurthy.
Pediatrics, Columbia University Medical Center, New York, NY.

BACKGROUND: Surgical site infections (SSI) occur in 5-8% of all children who undergo cardiac surgery. Data on pathogens involved in SSI after cardiac surgery in neonates is limited. The rationale for type and duration of perioperative antibiotic prophylaxis (PAP) after neonatal cardiac surgery largely stems from data on adult cardiac surgical patients and is highly variable within and across institutions. A protocol for PAP after neonatal cardiac surgery was developed by a multidisciplinary task force at our center and was implemented on January 1, 2011 after education of the medical teams. The major focus of the protocol was to decrease the duration of PAP and to administer antibiotics in a timely manner.

OBJECTIVE: 1. Incidence of SSI after neonatal cardiac surgery in a single medical center.
2. Comparison of the rate of SSI and provision of "appropriate" PAP before and after the implementation of protocol.
3. Identification of pathogens involved in SSI after neonatal cardiac surgery and their susceptibility to the recommended PAP.

DESIGN/METHODS: This is an observational cohort study of 180 neonates who underwent cardiac surgery at a single center from January 1, 2010 to September 30, 2011. The Center for Disease Control case definition for SSI was followed. Case ascertainment of SSI was determined by a single individual in the surgical team. Protocol adherence was determined by review of medical records. PAP was deemed appropriate if protocol was followed. Rate of provision of appropriate PAP and rate of SSI was compared before and after the institution of the protocol and Chi square test was used to evaluate differences.

RESULTS: There were 5.5 SSI per 100 procedures during the study period. There was no significant difference in rate of SSI before and after the protocol was introduced. The most common pathogen was methicillin susceptible *S. aureus*, which occurred in 60% of SSI and were susceptible to the recommended PAP. Appropriate PAP significantly improved in the four areas of the protocol: correct drug, dose and timing and appropriate discontinuation of antibiotics (p value < 0.006 for all four parameters).

CONCLUSIONS: SSI is common after neonatal cardiac surgery. Limiting the duration of PAP did not increase the rate of SSI. Establishment of protocol and education of medical team significantly improved the provision of appropriate PAP.

136

5:00pm

House Officer

Donor-Specific Antibodies at and after Pediatric Heart Transplantation Are Associated with Increased Risk of Rejection, but Not Early Mortality

Emily P. Williams, Kimberly Y. Lin, Brian D. Hanna, Curt T. Lind, Dimitri S. Monos, Robert E. Shaddy.
Pediatric Residency Program, The Children's Hospital of Philadelphia, Philadelphia, PA; Division of Cardiology, The Children's Hospital of Philadelphia, Philadelphia, PA; Immunogenetics Laboratory, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Due to an ongoing donor shortage in pediatric heart transplant (Tx), many centers transplant children with donor-specific antibody (DSA) present at the time of Tx. The risks associated with this approach, and the risks of DSA after transplant, are ill-defined.

OBJECTIVE: The purpose of this study was to examine whether the presence of DSA at or after Tx was associated with death or listing for retransplantation. Secondary outcomes included episodes of rejection, infection requiring hospitalization or IV antibiotics, post-transplant lymphoproliferative disease (PTLD), and cardiac allograft vasculopathy (CAV).

DESIGN/METHODS: We performed a retrospective cohort study in a single center population of heart Tx recipients (age ≤18 years at Tx) who were tested for anti-human leukocyte antigen (HLA) DSA at Tx and routinely after Tx.

RESULTS: Mean age at Tx (n=58) was 8.0±6.9 yr; median follow up was 3.4 yr (IQR 1.4-5.1). Eleven pts had DSA at the time of Tx; 4 from that group had resolution of DSA by 3 months post-Tx. Eighteen pts had DSA after Tx, of whom 7 had persistent DSA from the time of Tx and 11 had de novo DSA after Tx. Neither the presence of DSA at Tx nor the presence of DSA after Tx had a significant association with death or listing for retransplantation (p=0.28 and 0.66). The

presence vs absence of DSA at Tx (n=11 vs 47) was associated with a higher number of subjects who experienced rejection episodes requiring IV therapy (91% vs 43%; p=0.006). The presence vs absence of DSA after Tx (n=18 vs 40) was associated with a higher number of rejection episodes requiring IV therapy per subject (1.4 vs 0.7; p=0.004). Presence of DSA at or after Tx was not associated with increased number of infections requiring hospitalization or IV antibiotics (p=1.00 and 0.78), PTLD (p=0.09 and 1.00), or CAV (p=1.00 and 1.00).
CONCLUSIONS: In our cohort, the presence of DSA at or after Tx was not associated with death or listing for retransplantation, nor was it associated with an increase in infections, PTLD, or CAV at a median follow-up of 3.4 years. It was, however, associated with an increased risk of rejection. Extended follow up is needed to determine whether this increased risk of rejection is associated with long-term morbidity and mortality.

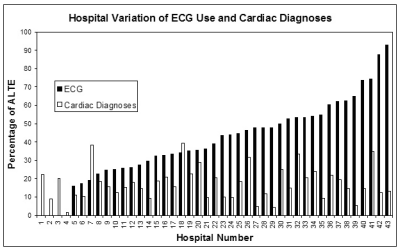
137
5:15pm

House Officer

Prevalence of Electrocardiogram Screening and Cardiac Diagnoses in Apparent Life-Threatening Events in Children

Matthew D. Elias, V. Ramesh Iyer, Meryl S. Cohen.
Division of General Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA; Division of Cardiology, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: The etiology and evaluation of apparent life-threatening events (ALTE) can be challenging for physicians. In contrast to sudden infant death syndrome, the use of electrocardiograms (ECG) as a screening tool for cardiac causes and the prevalence of cardiac diagnoses in patients who present with ALTE have not been previously reported.
OBJECTIVE: We sought to determine the prevalence of ECG use and cardiac diagnoses in patients presenting to children's hospitals with ALTE.
DESIGN/METHODS: Data from 43 children's hospitals from the Pediatric Health Information System database were collected from 2009 to 2010. Patients were included if they were less than 1 year of age at the time of ALTE admission. Demographic data, including age, gender, and length of hospital stay, were recorded, along with prevalence of ECG testing and hospital diagnoses.
RESULTS: 2,179 patients presented to the 43 hospitals with ALTE during that time period; of those admitted with ALTE, 41% were male. The mean age at admission was 66 ± 69 days (76% less than 3 months, 16% between 3 and 6 months, 8% between 6 and 12 months). The mean length of stay was 3.4 ± 7.8 days. There were 7 deaths, including 5 patients with cardiac diagnoses. 85 were readmitted with a second ALTE, including 3 patients with cardiac diagnoses. Of the ALTE admissions, 355 (16%) had a cardiac diagnosis, with atrial septal defect and cardiac dysrhythmias being the most common. Patients with a cardiac diagnosis had a longer length of stay compared to all ALTE patients (8.4 vs. 3.4 days, p<0.01). Of all patients, 43% had ECG performed during the ALTE admission. Across all 43 hospitals, the range of cardiac diagnoses was 1-39%, and the range of ECG performed was 0-93% (see figure).
CONCLUSIONS: Cardiac diagnoses are prevalent in children presenting with ALTE. There is wide practice variation among children's hospitals in the use of ECG as a screening tool for infants presenting with ALTE.



138
5:30pm

The Temporal Kinetics of Circulating Angiopoietin Levels in Children with Sepsis

John S. Giuliano, Jr., Kevin Tran, Veronika Northrup, Vineet Bhandari.
Pediatrics, Yale University School of Medicine, New Haven, CT; Yale School of Public Health, New Haven, CT; Pediatrics, Yale Center for Analytical Sciences, New Haven, CT.

BACKGROUND: Capillary leak continues to challenge critical care physicians worldwide when treating children with sepsis. Vascular growth factors, specifically angiopoietin (ang)1 and ang2, play opposing roles in capillary stabilization or leak in septic patients, respectively. These proteins have equal receptor affinity making the ang2/1 ratio a clinically relevant marker of vascular integrity.
OBJECTIVE: To determine whether pediatric patients with severe sepsis/septic shock have persistently high ang2/1 ratios when compared to non-septic pediatric intensive care unit (PICU) controls over a 7-day period.
DESIGN/METHODS: We performed a prospective observational pilot study of pediatric patients with varying sepsis severity. Patients were classified within the first 24h of admission into: non-systemic inflammatory response syndrome (non-SIRS) controls, SIRS/sepsis, or severe sepsis/septic shock. Plasma levels of ang1 and 2 were measured via ELISA. The ang2/1 ratio was graphically plotted and a blinded researcher determined whether patients fell into constant or variable patterns. Variable patterns consisted of elevated ratios whereas constant ratios were persistently below 10 throughout the course. Individual group trajectories with splines were plotted for comparison.
RESULTS: To date, 36 patients have been enrolled (n=9 non-SIRS controls, n=14 SIRS/sepsis, and n=13 severe sepsis/septic shock). Age, weight, PICU length of stay (LOS) and hospital LOS were not significantly different between the groups. Pediatric organ dysfunction and index of mortality scores were significantly elevated in the severe sepsis/shock group when compared to the other two groups (all p<0.05). Initial ang1 levels and ang2/1 ratios were significantly different in the severe sepsis/shock group when compared to the other two groups (both p<0.05). Additionally, the latter were significantly elevated in the severe sepsis/shock group at multiple time points in the course (all p≤0.05). In a blinded analysis, 21% of SIRS/sepsis and 62% of severe sepsis/shock had variable ang2/1 ratio patterns compared to none in the control group (p=0.006). The variable pattern patients in the severe sepsis/shock group showed an elevated ang2/1 ratio peaking >100 at day2 of illness before decreasing.
CONCLUSIONS: A subset of pediatric patients with severe sepsis/septic shock demonstrates an elevated ang2/1 ratio that peaks at day 2 of admission.

Gastroenterology / Hematology - Oncology / Nephrology / Nutrition Platform Session

Saturday, March 31, 2012
4:15pm-5:45pm

139
4:15pm

Fellow in Training

Acute Chest Syndrome with Respiratory Syncytial Virus and Seasonal Influenza in Children with Sickle Cell Disease

Sara C. Sadreameli, John J. Strouse, James F. Casella.
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BACKGROUND: Respiratory syncytial virus (RSV) has been associated with acute chest syndrome (ACS) in sickle cell disease (SCD), but its clinical course and acute complications have not been well characterized.
OBJECTIVE: In order to characterize the clinical features of RSV infection in SCD patients, we compared RSV vs. seasonal influenza infections in patients with SCD at a single tertiary care hospital.
DESIGN/METHODS: We defined a case as lab-confirmed RSV infection in a patient <18 years with SCD at Johns Hopkins Hospital from 1 September 1993 to June 2008. We used Fisher's exact test to compare proportions, Student's t-test or Wilcoxon rank-sum test to compare continuous variables, and logistic regression to evaluate associations.
RESULTS: 47 patients with SCD and RSV and 76 with SCD and influenza were identified during the study period. Clinical symptoms, such as reported fever, cough, and rhinorrhea were similar for RSV and influenza as were complications, including acute chest syndrome and treatments given (Table). In a multivariable logistic regression model, older age (OR 1.3 per year, 95% CI 1.04 -1.5, P=.02) and increased white blood cell count at presentation (OR 1.2 per 1000/ul increase, 95% CI 1.03 – 1.4, P=0.02) were independently associated with increased risk of ACS in children with RSV.

Characteristics of Children with RSV and Sickle Cell Disease, Johns Hopkins Hospital 1993-2008

Variable	RSV n=47	Influenza n=76	P-Value
Age (years)	1.5 (0.7 - 3.4)	4.3 (1.7-10.9)	0.0001
Male	62%	53%	0.34
HbSS	79%	84%	0.57
Acute Chest Syndrome	22% (9/41)	12% (8/69)	0.15
Hospital admission	100%	88%	0.02
Intensive Care	4%	3%	0.64
RBC Transfusion	7%	11%	0.66
Bronchodilators	50%	33%	0.06
Length of stay (days)	2 (1-3)	2 (1-3)	0.11
Hospital Charges ($)	4676 (3350-6348)	45690 (3008-6419)	0.53

IQR, interquartile range; HbSS, sickle cell anemia; RBC, red blood cells

CONCLUSIONS: RSV infection was predominantly identified in hospitalized infants and toddlers, while influenza infection was identified across age groups. Both older age and high WBC at presentation may be risk factors for more severe disease in RSV infection. This is unlikely to reflect referral bias, as a similar pattern was not seen for influenza infection. We conclude that RSV infection is often associated with ACS and similar in severity to influenza infection in children with SCD.

140
4:30pm

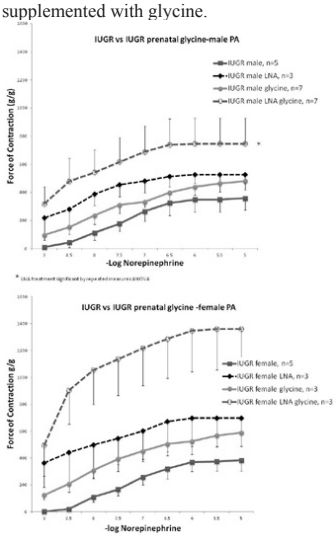
Fellow in Training

Prenatal Glycine Supplementation Improves Weight Gain and Endogenous Nitric Oxide (NO) Production in the Pulmonary Arteries (PA) of Intrauterine Growth Restricted (IUGR) Rats

Melissa F. Carmen, Sylvia Gugino, Carmon Koenigsknecht, Satyan Lakshminrusimha, Daniel D. Swartz.
Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: The effect of IUGR on the lung in not well known. Maternal low protein diet (LPD) is an established model used to induce IUGR. The reduction of amino acids in the LPD limits the fetal supply of glycine, an amino acid that plays an integral role in fetal development. Supplementation of the maternal diet with glycine, in rats that are otherwise fed a LPD, has been shown to decrease systemic blood pressure of the offspring (Jackson et al,2002). However, the effect of maternal glycine supplementation on pulmonary vasculature in IUGR is not known.
OBJECTIVE: To study the effect of prenatal glycine supplementation on weight gain and pulmonary vascular reactivity in IUGR offspring.
DESIGN/METHODS: Pregnant dams were fed LPD to induce IUGR in their pups and a subset of these dams received 1% glycine solution (instead of water) during pregnancy to birth. Dams continued to be fed a LPD while nursing the pups. The pups were sacrificed at 3wks, PA rings were tested for constriction response to NE. Some PA were treated with nitro-L-arginine (LNA, an inhibitor of nitric oxide synthase-NOS). Enhanced constriction following pretreatment with LNA

suggests high endogenous NOS activity in the PA.
RESULTS: Supplementation of the maternal LPD with glycine during pregnancy resulted in significantly increased birth weight(4.7±1.2g vs. 4.1±0.6g) and growth velocity during suckling(22.3±4.2g vs. 11.3±1.4g at 3wk) when compared to IUGR offspring whose mothers were not supplemented. Pretreatment with LNA increased PA reactivity in both male and female IUGR pups whose mothers were supplemented with glycine.



CONCLUSIONS: Maternal protein restriction during pregnancy impairs weight gain and reduces endogenous NOS acitivity in the PA. Prenatal glycine supplementation corrects these abnormalities and may have therapeutic potential in preventing IUGR secondary to maternal malnutrition.

141
4:45pm

Fellow in Training

Certain Developmental Stages May or May Not Be More Vulnerable to a High Fat Diet Exposure

Maria del Mar Plata, Lyda Williams, Yoshinori Seki, Maureen Charron, Patricia M. Vuguin.
Pediatrics, Children's Hospital at Montefiore, Bronx, NY; Biochemistry, Albert Einstein College of Medicine, Bronx, NY; Biochemistry, Albert Einstein College of Medicine, Bronx, NY; Biochemistry, Albert Einstein College of Medicine, Bronx, NY; Pediatrics, Children's Hospital at Montefiore, Bronx, NY.

BACKGROUND: Exposure to an altered intrauterine environment predisposes adults to an increased incidence of metabolic disease. Fetuses may be uniquely vulnerable to environmental stress at specific times during development.
OBJECTIVE: To define the critical period during development when metabolic programming to high fat (HF) diet occurs in utero.
DESIGN/METHODS: Female CD1 wild type (WT) mice (10-12 wks, n=5-9/diet), were fed a HF (36% fat) diet or breeding chow (C, 10% fat) for 2 wks prior to mating. During pregnancy, animals were either kept on the same diet (C-C or HF-HF) or switched at mid-pregnancy (embryonic day, e9.5) to the opposite diet (C-HF or HF-C). Fetuses were sacrificed at e18.5, and body weight (BW) and length were measured. Fetal livers of different litters (n=2-6/diet) were collected for gene expression studies. Statistical analyses were performed using ANOVA and two tailed t-test.
RESULTS: Mothers in the C-C group gained significantly more weight compared to the HF-HF group (11.4±1.5 C-C vs. 4.0 ±1.8 g HF-HF, p=0.02). HF exposure at mid-pregnancy (C-HF) was associated with a significant decrease in maternal adiponectin levels (27405 ±2828 in HF-C vs. 12545 ±1856 ug/ml in C-HF; $p<0.05$), and a significant increase in serum triglyceride levels when compared to HF-HF and HF-C groups (144.4±61.6 C-HF vs. 18.1±4.4 HF-HF, 39.9±5.4 mg/dl HF-C, $p<0.03$). Independent of the time of exposure to a HF diet, fetal BW and length were significantly decreased when compared to C-C diet (1.40±0.02 C-C vs. 1.24±0.01 HF-HF, 1.22±0.02 HF-C and 1.30±0.02g C-HF, p=0.0004; 2.55±0.03 C-C vs. 2.43±0.02 HF-HF, 2.45±0.03 HF-C and 2.42±0.02cm C-HF, $p<0.04$). Preliminary results show that only HF-HF fetal livers had alterations in the expression of genes involved in glucose metabolism (FOXA2, PEPCK, GSK2b), lipid metabolism (SREBF2), and stress response (DUSP1 and MAFF).
CONCLUSIONS: HF exposure at any time during pregnancy had a significant impact on fetal growth. In contrast, prolonged HF exposure is necessary to alter the expression of hepatic genes associated with metabolic syndrome. Thus, in our model, the pattern of susceptibility to the development of metabolic syndrome requires continuous exposure to a HF diet, challenging the idea that there is a very specific time during development when metabolic programming occurs.

142
5:00pm

House Officer

Use of the Anti-CD20 Antibody Rituximab in the Treatment of Epstein-Barr Virus-Induced Hemophagocytic Lymphohistiocytosis

Deepak Babu Chellapandian, Susan Wiener, Kristin Zelley, Kim E. Nichols.
Department of Pediatrics and Adoloscent Medicine, Albert Einstein Medical Center, Philadelphia, PA; Department of Pediatric Oncology, Children's Hospital, Philadelphia, PA.

BACKGROUND: Hemophagocytic lymphohistiocytosis (HLH) is a rare complication of Epstein Barr virus (EBV) infection that is characterized by the proliferation of EBV-infected B cells and the exuberant activation of T lymphocytes and macrophages.
OBJECTIVE: To study the safety and efficacy of anti-CD20 monoclonal antibody Rituximab in EBV -induced HLH.
DESIGN/METHODS: To gather information regarding experience with the use of Rituximab in the treatment of EBV-HLH, questionnaires were distributed to members of the Histiocyte Society who stated they had administered this medication to one or more patients. Retrospective clinical and laboratory data were gathered and analyzed for this report.
RESULTS: Here we describe 42 patients (30 boys and 12 girls) ranging in age from 1 to 44 years (median 6.7 years) with EBV-HLH who received treatment with Rituximab. A causal link to EBV was established in all patients based on positivity by monospot, EBV serology, EBV PCR or a combination of these methods. Among the 37 patients for whom genetic data were available, 16 (43%) harbored germline mutations in HLH-associated genes. On average, patients received a total of 3 infusions of Rituximab (range 1 to 10) at a dose of 375 mg/M2 with the first dose administered within 1 month from the date of HLH diagnosis in most patients, and it was always given in conjunction with other medications, including chemotherapy, steroids, cyclosporine, immunoglobulin and/or anti-viral medications. Rituximab administration was associated with reversible immediate side effects in 8 patients (fever, n=7; chills, n=2; allergic reaction, n=5; and hypotension, n=2). Nine patients experienced later side effects, including transaminitis (n=1), neutropenia (n=4), B-cell suppression (n=1) and hypogammaglobulinemia (n=3). In 27 of 33 (82%) patients for whom serial data are available, administration of Rituximab led to a significant reduction in EBV load, and in 24 of 34 (71%) patients, a reduction in ferritin levels was observed. For 22 of 40 (55%) patients, Rituximab ameliorated the clinical and laboratory features of HLH with a median time to improvement of 11.5 days (range 2-100 days).
CONCLUSIONS: Rituximab is a well-tolerated medication with minimal side effects, even when administered to patients with HLH. Based on our data Rituximab reduces viral load, diminishes inflammation and improves clinical status in patients with EBV-HLH.

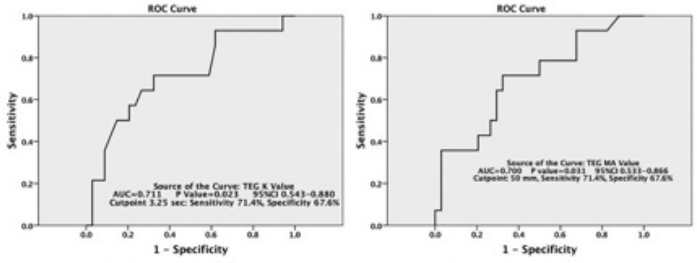
143
5:15pm

Fellow in Training

Prediction of Thrombocytopenia by Thromboelastography (TEG) in Newborn Infants at Risk for Coagulopathy

Katie R. Forman, Edward Wong, Naomi Luban, Meanavy Gallagher, An N. Massaro.
Neonatology, Children's National Medical Center, Washington, DC; Laboratory Medicine, Children's National Medical Center, Washington, DC.

BACKGROUND: Thromboelastography (TEG) is a trace that describes the functional aspects of clot formation and stabilization. Platelet function is reflected in several TEG parameters. Clot kinetics (K) and Angle (α) describe the rate of clot growth. Maximum amplitude (MA) reflects clot strength. These properties are, to different extents, dependent on platelet function and number. While adult normative values are available, there is limited information about TEG and its association with thrombocytopenia in newborns.
OBJECTIVE: To compare TEG results between newborns with and without thrombocytopenia.
DESIGN/METHODS: Neonates at risk for coagulopathy were enrolled in this prospective observational study. The study population consisted of encephalopathic newborns undergoing therapeutic hypothermia and neonates with respiratory failure being treated with ECMO. Serial daily TEG tracings and platelet counts were obtained. Thrombocytopenia was defined as platelet count ≤ 100,000. Differences in TEG parameters (K, angle, and MA) between thrombocytopenic (T) and non-thrombocytopenic (NT) newborns were evaluated with non-paired T tests. TEG parameters that differed significantly between groups were further evaluated with receiver operating curve (ROC) analyses to establish cut-off values for prediction of thrombocytopenia.
RESULTS: A total of 48 concurrent TEG tracings and platelet counts were obtained from 10 hypothermia and 6 ECMO subjects. Thrombocytopenia was observed in 14 samples. The T and NT groups differed significantly for K: T mean 4.43 ± 1.8 vs NT mean = 3.36 ± 1.56 sec, p=0.045; and MA: T 47.23 ± 7.59 vs NT 52.37 ± 6.03 mm, p= 0.016, but not for angle. ROC curves for MA and K are shown below.



CONCLUSIONS: TEG parameters, K and MA, can be predictive of thrombocytopenia/ thrombocytopathy in newborns. Further study is needed to determine the utility of these TEG parameters to predict the need for platelet transfusion in these patients.

144
5:30pm

House Officer

Attitudes of Renal Transplant Centers toward Safe Living Practices in Pediatric Transplant Patients

Rasheda Z. Amin, Lauren A. Weintraub.
Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA.

BACKGROUND: Published data regarding safe living practice recommendations after kidney transplant is lacking. Even KDIGO (Kidney Disease: Improving Global Outcomes), whose intent is to standardize post-transplant management, does not address these needs. As more families seek guidance from multiple modalities, including the internet, consistency amongst practitioners has become vital.
OBJECTIVE: To survey transplant centers regarding recommendations for infection and injury prevention in pediatric renal transplant recipients.

DESIGN/METHODS: A 30-question, anonymous electronic survey was sent to kidney transplant center coordinators who belong to the North American Transplant Coordinators Organization. Questions addressed aspects of infection and injury prevention, including sports, recreation, pets, foods, immunization, airplane travel, and school. Response choices were categorical, either yes/no or time interval-based (multiple choice, from 0-12 months post-transplant).
RESULTS: Responses were received from 92 coordinators, of which 72 (78%) work at either pediatric-only (29%; 21/72) or combined adult/pediatric programs (71%; 54/72). Only 54 (59%) responders completed the survey.
Strong consensus (>90%) was observed for participation in most sports (in favor of gymnastics, skiing, soccer, baseball, biking, basketball). 28% allowed tackle football participation. Polarity existed for wrestling (47% vs. 53%) and martial arts (46% vs. 54%). There was strong agreement regarding dog and cat ownership, although responders were divided regarding birds and reptiles. No consistency was found regarding resumption of airplane travel or school; no single answer exceeded 50% of responses. Most responders (>70%) recommended against tattoos and consumption of raw seafood or cookie batter at any time. By 6 months post-transplant, >70% allow ear piercing, swimming in pools/oceans, and gardening. Discrepancy existed regarding lake swimming. Contrary to the AAP recommendation for all children, only 14% of responders recommended never playing in sandboxes.
CONCLUSIONS: Recommendations for safe living practices after pediatric renal transplant vary among transplant centers. Guidelines are lacking, and data to support individual center recommendations does not exist. As transplant outcomes improve, emphasis on quality of life is gaining importance. Consensus is needed for anticipatory guidance for this population, and studies are needed to test the safety and validity of recommendations.

Neonatology - Clinical Studies I Platform Session

Saturday, March 31, 2012
4:15pm-5:45pm

145
4:15pm

Exploring the Gut Associated Microbiome of Breast Fed VLBW Infants in Relation to the Maternal Microbiome

M. Susan LaTuga, J. Christopher Ellis, C. Michael Cotten, Ronald N. Goldberg, Robert B. Jackson, Patrick C. Seed.
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BACKGROUND: Infants weighing ≤ 1500 grams at birth (very low birthweight, VLBW) experience significant morbidities, including necrotizing enterocolitis and sepsis, which are reduced with breast milk feedings. Breast milk contains live skin and enteric bacteria which may contribute to primary succession in the intestine of the premature infant.
OBJECTIVE: We proposed that breast milk feedings directly seed the infant gut with bacteria preferentially trafficked from the maternal gut through the bloodstream to the mammary gland (enteromammary trafficking). We hypothesized that the intestinal microbiota of VLBW infants would resemble major constituents of their mother's milk, blood, and intestinal microbiota.
DESIGN/METHODS: During the first four weeks of feeding, weekly breast milk and infant stool samples were collected from VLBW infants. A maternal stool and a peripheral blood sample were also collected. We applied direct 16s rDNA amplification of DNA to all samples using universal primers. Amplicons were sequenced using 454 Titanium FLX sequencing. The sequences were analyzed by Mothur and the RDP database.
RESULTS: Samples were collected from 8 mother-infant pairs. Mean gestational age and birthweight were 27 weeks and 771 grams, respectively. In infant stool and breast milk samples, *Staphylococcus* was the predominant genus. While the distribution of organisms in maternal milk samples varied over 4 weeks, the infants stool samples did not reflect these changes but instead remained relatively static. Six of the seven maternal blood samples were dominated by *Escherichia coli* sequences, ranging from 57.0% to 67.3% of the total, in the absence of clinical disease. In contrast to non-pregnant adults, the maternal stool samples were dominated by sequences of Firmicutes, such as *Staphylococcus* (82.7%) with a markedly decreased number of sequences of Bacteroidetes (0.4%), primarily anaerobic organisms.
CONCLUSIONS: Among lactating mothers, the unusual presence of *E.coli* in peripheral blood samples and absence of Bacteroidetes in their stool may reflect a unique metabolic and immunologic state. Based on 16s rDNA sequences of maternal stool, blood, and breast milk as well as infant stool total genomic DNA, the intestinal microbiome of VLBW infants does not reflect maternal enteromammary trafficking, possibly due to prolonged neonatal antibiotic treatment and environmental exposures.

146
4:30pm

Medical Student

Polymorphisms in Oxidative Stress Production Pathway Associated with Necrotizing Enterocolitis

Edward Hurley, Joseph Telliard, Divya Chhabra, Narendra R. Dereddy, Johanna M. Calo, Lance A. Parton.
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BACKGROUND: Oxidative stress has been implicated in many neonatal conditions. Manganese superoxide dismutase (MnSOD) converts the reactive oxidant superoxide anion, to hydrogen peroxide. 8-Oxoguanine glycosylase (OGG1) is an enzyme that repairs DNA damaged by reactive oxygen species.
OBJECTIVE: We hypothesize that single nucleotide polymorphisms (SNPs) in MnSOD and OGG1 will render neonates more susceptible to oxidative stress-related illness. Our primary outcome was the presence of bronchopulmonary dysplasia (BPD). Secondary outcome measures were necrotizing enterocolitis (NEC), periventricular leukomalacia (PVL) and retinopathy of prematurity (ROP).
DESIGN/METHODS: Infants were enrolled who weighed <1 kg at birth and had no congenital/chromosomal abnormalities. DNA was isolated from buccal mucosal swabs. Real-time PCR discriminated alleles for the MnSOD and OGG1 SNPs. BPD severity was classified by the the criteria of Jobe and Bancalari. We also tested tracheal aspirates with an ELISA for the presence of 8-oxoguanine (8-OHdG), which is made when reactive oxygen species attack guanine.
RESULTS: There were no associations between MnSOD and OGG1 SNPs and the presence of BPD, ROP or PVL. We did find associations with NEC for the MnSOD (rs4880) CC-genotype (p=0.002), MnSOD (rs2758339) GG-genotype (p=0.032) and OGG1 (rs1052133) GG-genotype (p=0.049).

		NEC	No NEC		NEC	No NEC		8-OHdG level
rs4880 (MnSOD)	CC	14	30	C	39	160	CC	513 pg/mL
	CT/TT	22	166	T	33	232	CT/TT	667 pg/mL
		p=0.002			p=0.039			p=0.63

		NEC	No NEC		NEC	No NEC		8-OHdG level
rs2758339 (MnSOD)	GG	10	21	G	23	74	GG	588 pg/mL
	GT/TT	12	75	T	21	118	GT/TT	623 pg/mL
		p=0.032			p=0.126			p=0.92

		NEC	No NEC		NEC	No NEC		8-OHdG level
rs1052133 (OGG1)	CC/CG	15	134	C	24	227	CC	412 pg/mL
	GG	3	5	G	12	49	CG	876 pg/mL
		p=0.049			p=0.042			p=0.09

The 8-OhdG ELISA data showed a trend for the OGG1 SNP (p=0.09). Subjects with the CC-genotype had a mean 8-OHdG level of 412 pg/mL while the CG genotype's mean was 876 pg/mL. The G-allele was associated with NEC (p=0.042). There were no significant associations with MnSOD SNPs and 8-OHdG levels from TAs.
CONCLUSIONS: Three SNPs from genes (MnSOD and OGG1) which lessen the effects of oxidative stress were associated with NEC. TA 8-OHdG levels did not identify ELBW infants at risk for oxidative damage from these SNPs. We speculate that another mechanism beyond pure oxidative stress contributes to the SNP's association with NEC.

147
4:45pm

Release of Pro-Inflammatory Mediators by TA Cells from Premature Infants: Effects of Hyperoxia, Resveratrol and Caffeine

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BACKGROUND: Increased pro-inflammatory mediators in tracheal aspirates (TA) from ventilated premature infants (VPI) are associated with the development of bronchopulmonary dysplasia. The effect of resveratrol (RESV) and caffeine (CAF) on the release of pro-inflammatory mediators by TA cells from VPI is unknown.
OBJECTIVE: To study the effect of RESV and CAF on the release of pro-inflammatory cytokines (IL-1β and TNF-α) by TA cells from VPI.
DESIGN/METHODS: TA cells obtained from 14 VPI were incubated in 3 groups (C=control, Hyperoxia= 95% O2, Hyperoxia+RESV = 95% O2+ RESV) or (C=control, Hyperoxia= 95% O2, Hyperoxia+CAF = 95% O2+ CAF). After 18 hours of incubation, cell culture media was separated and IL-1β and TNF-α were measured using commercially available ELISA kits.
RESULTS: TA cells from 8 VPI were stimulated with hyperoxia and incubated with RESV. Stimulation of TA cells by hyperoxia significantly increased the release of IL-1β and TNF-α. The addition of 5uM of RESV reduced the hyperoxia-induced release of IL-1β and TNF-α.

Effect of RESV (median, 25th-75th percentile)

	Control	Hyperoxia	Hyperoxia+RESV
IL-1β (pg/ml)	317 (62-1254)	*873 (468-1423)	**420 (161-806)
TNF-α (pg/ml)	1151 (323-3188)	*2187 (1189-5282)	**1480 (222-4296)

p<0.05 Control vs Hyperoxia, **p<0.05 Hyperoxia vs. Hyperoxia+RESV

TA cells from 6 VPI were stimulated with hyperoxia and incubated with CAF (20ug/ml). Again, stimulation of TA cells by hyperoxia significantly increased the release of IL-1β and TNF-α. However, the addition of CAF did not diminish the release of inflammatory mediators.

Effect of CAF (median, 25th-75th percentile)

	Control	Hyperoxia	Hyperoxia+CAF
IL-1β (pg/ml)	128 (116-192)	*848 (494-6600)	892 (318-6600)
TNF-α (pg/ml)	748 (226-6378)	*1806 (1382-12000)	1699 (1426-12000)

*p<0.05 Control vs Hyperoxia

CONCLUSIONS: Exposure to hyperoxia increased the release of IL-1β and TNF-α by TA cells from VPI. Hyperoxia-induced release of pro-inflammatory mediators were suppressed by RESV but not by CAF. We speculate that RESV may reduce the hyperoxia induced acute lung injury in VPI.

148
5:00pm

Antibiotic Prescribing for Hospital Acquired Pneumonia in Four Tertiary NICUs

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BACKGROUND: Antibiotic resistance is a growing problem in the NICU. Hospital acquired pneumonia is a potential reason for initiating broad spectrum antibiotics but has not been extensively studied in the NICU.

OBJECTIVE: To determine the incidence, microbiology, and treatment for hospital acquired pneumonia in 4 tertiary NICUs.
DESIGN/METHODS: Data were prospectively obtained as part of a larger study of antimicrobial stewardship in 4 tertiary care NICUs - Columbia University, Christiana Care, Cornell and Children's Hosp. of Philadelphia. Infants hospitalized ≥ 4 days at each center between May, 2009 and April, 2011 were included. Data were prospectively entered by trained research personnel. Hospital acquired pneumonia was diagnosed by the medical team caring for the infant at each site. Choice of antibiotic coverage, length of antibiotic coverage, mechanical ventilation, and cultures were also recorded.
RESULTS: The study sample included 4443 infants, 46 infants (1%) were diagnosed with hospital acquired pneumonia and received 50 courses of antibiotics. The rate of hospital acquired pneumonia did not differ between study sites (p>.05) but there were differences (p=.03) in duration of antibiotic therapy between sites.

	Site 1 (n=1157)	Site 2 (n=997)	Site 3 (n=821)	Site 4 (n=1458)	Total (n=4433)
EGA (wks)	34.4 ± 4.6	34.6 ± 3.8	37.1 ± 3.1	34.3 ± 4.3	34.9 ± 4.2
Mechanical ventilation (%)	45.5%	33.5%	64%	37%	44%
Hospital acquired pneumonia	11 (1%)	8 (0.9%)	10 (1.2%)	17 (1.2%)	46 (1%)
Duration (days) of antibiotics for hospital acquired pneumonia	11.1 ± 8.8	12.9 ± 9.0	8.1 ± 5.7	6.9 ± 5.0	9.1 ± 4.5

Data are mean ± SD or %

Of the 50 courses of antibiotics, only 2 (4%) were accompanied by a positive blood culture (S. aureus and Enterococcus faecalis), and 18 (36%) by a positive tracheal culture; Staph. aureus (n=6) and Klebsiella species (n=4) were the most common tracheal isolates. At time of diagnosis 34 infants (68%) were receiving mechanical ventilation. Vancomycin and gentamicin were the most commonly prescribed agents at each study site.
CONCLUSIONS: In our large study sample, hospital acquired pneumonia was diagnosed in only 1% of NICU patients. Rates and choices of antibiotic coverage were similar between sites. Importantly, duration of therapy differed between sites and a majority of therapy was not culture based.
Funded by NIH-RO1 NR010821-04

149

5:15pm

Fellow in Training

Endotracheal Bacterial Cultures and Pneumatoceles in Infants in the Neonatal Intensive Care Unit: Is There an Association?

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The Carman and Ann Adams Department of Pediatrics, Division of Neonatal-Perinatal Medicine, Wayne State University School of Medicine, Detroit Medical Center, Children's Hospital of Michigan & Hutzel Women's Hospital, Detroit, MI.

BACKGROUND: Sporadic previous case reports have described pneumatoceles in children in association with necrotizing pneumonia. There is scarcity of data on this association in infants admitted to the NICU.
OBJECTIVE: To describe the clinical characteristics and outcomes of infants admitted to the NICU with a radiographic diagnosis of pneumatocele and examine the association with concomitant positive endotracheal cultures.
DESIGN/METHODS: Retrospective chart review of infants with pneumatoceles, admitted to our 2 NICUs over the last 10 years.
RESULTS: Our cohort (n=27) comprised infants with a mean(SD) gestational age of 27(5) weeks, birth weight of 1045(775) gm and a predominance of females(59%), Cesarean deliveries (52%) and black infants (74%). Endotracheal cultures sent from 25 patients revealed bacteria in 20 (80%). Bacteria included methicillin-resistant Staph aureus(9), Ureaplasma urealyticum(5), Pseudomonas aeruginosa(3), Serratia marcescens(1), Mycoplasma hominis(1) and Staphylococcus epidermidis(1). Positive cultures were noted within 14 days of diagnosis in all except 1 case. All infants were ventilated (SIMV in 82%, high frequency oscillator in 18%) at diagnosis at a mean (SD) age of 18(19) days. Peak mean airway pressure prior to diagnosis was 12(2). Other characteristics are shown in Table.

Placental Chorioamnionitis	11/22 (50%)
Prolonged Rupture of Membranes	6(22%)
Bag & Mask Ventilation at Birth	15(56%)
Antenatal Steroids	22(82%)
Survanta Use	24/25(96%)
Pulmonary Hemorrhage	6(22%)
Total No. of Cysts	2(1)
No. of Days for Resoluion	18(19)
Associated Air Leaks (PIE, Pneumothorax)	14 (52%)
Treatment with Antibiotics	17 (63%)
Treatment Duration in Days	11 (2)
Follow-Up Period in Months	21 (24)

Values expressed as no. (percentage) or mean (standard deviation) as appropriate

Pneumatoceles eventually resolved in 17 (63%) patients at 33(20) days of age but persisted until discharge (3) or death (7) in 10 (37%) patients. Mortality (70 vs 0%, p<0.001) and positive endotracheal cultures (100 vs 67%, p=0.06) were higher in infants with persistent pneumatoceles, compared to those in whom they resolved. Recurrent pneumonias and pneumatocele were noted in 15(56%) and 1(4%) infants respectively.
CONCLUSIONS: In infants with radiologic pneumatoceles, positive endotracheal culture is a frequent association, and correlates with persistence. Although pneumatoceles resolve in the majority of infants, persistence is associated with higher mortality.

150

5:30pm

Traumatic Lumbar Punctures in Infants Hospitalized in the NICU

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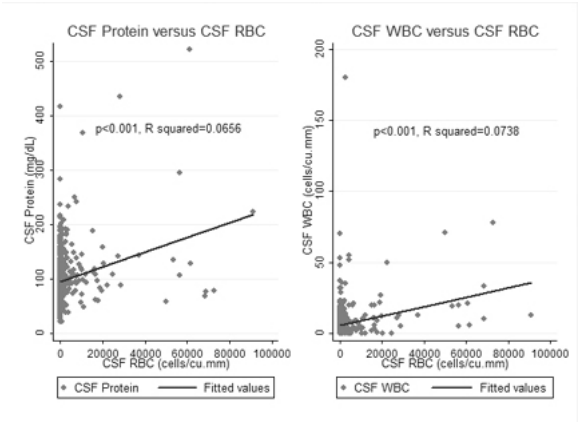
Pediatrics, The Children's Hospital of Philadelphia and the Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA; Pediatrics, Cincinnati Children's Hospital Medical Center and the University of Cincinnati College of Medicine, Cincinnati, OH; Pediatrics, Pennsylvania Hospital, Philadelphia, PA.

BACKGROUND: Traumatic lumbar punctures (LPs) occur frequently during sepsis evaluations in the neonatal intensive care unit (NICU). There are no clear guidelines for interpretation of cerebrospinal fluid (CSF) parameters in infants in the presence of elevated red blood cell counts (RBC) in CSF.
OBJECTIVE: To quantify changes in CSF protein, white blood cell count (WBC) and glucose in the presence of elevated CSF RBC among NICU patients.
DESIGN/METHODS: This was a secondary analysis from a prospective observational study of hospitalized infants < 6 months evaluated for meningitis in 3 NICUs. Patients with potential causes of pleocytosis (e.g., bacterial meningitis, VP shunts) and those with extreme outlying values were excluded. Traumatic LPs were defined as CSF RBC >1000 cells/mm^3. Linear regression was used to determine the association of CSF parameters with increasing CSF RBC.
RESULTS: 496 of 802 infants undergoing LPs met inclusion criteria; 131 (26.4%) had a traumatic LP. CSF protein and WBC were significantly higher in infants with traumatic LPs (p<0.001) (Table). CSF protein increased by 1.3 mg/dL for every 1000 RBCs in CSF (95% CI 0.9-1.8 mg/dL, p<0.001); CSF WBC increased by 3 cells/mm^3 for every 10,000 RBCs in CSF (95% CI 2-4 cells/mm^3, p<0.001, Figure). CSF glucose values were unaffected by CSF RBC.

CSF parameters in infants with and without traumatic taps

CSF parameter, *median (IQR)*	**Non-traumatic taps** (n=365)	**Traumatic taps** (n=131)	**p value***
CSF protein (mg/dL)	85 (62-116)	106 (82-137)	<0.001
CSF WBC (cells/mm^3)	3 (1-6)	6 (2-13)	<0.001
CSF glucose (mg/dL)	50 (43-60)	49 (43-59)	0.306

*Results of Wilcoxon rank sum testing



CONCLUSIONS: We provide prediction rules for interpretation of CSF protein and WBC in hospitalized infants with traumatic LPs. The elevation of CSF WBCs in traumatic LPs does not appear to follow the commonly taught "500 RBCs for every WBC" rule. Our findings may allow more accurate interpretation of CSF parameters in the context of traumatic LPs in high risk, hospitalized infants.

Neonatology - Epidemiology & Follow Up Platform Session

Saturday, March 31, 2012
4:15pm-5:45pm

151

4:15pm

Fellow in Training

Prepregnancy BMI, Race/Ethnicity and Prematurity

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Christiana Care Health System, Newark, DE; Jefferson Medical College, Philadelphia, PA.

BACKGROUND: Maternal obesity is associated with increased health compromise which may lead to an elevation in the risk for prematurity.
OBJECTIVE: To investigate the association between maternal prepregnancy BMI, race/ethnicity and early/late preterm birth.
DESIGN/METHODS: Database of maternal deliveries at Christiana Hospital (level III) from 2009-2010 time period (n=11919). Demographics: GA - term (37-41wks) 90.7%, late preterm (32-36wks) 7%, early preterm (24-31wks) 1.7%; Race/ethnicity - White/Non-Hispanic 60.2%, Black/Non-Hispanic 24.1%, Hispanic 10.3%. Maternal prepregnancy weight - BMI normal 49.7%, overweight 26.2%, obese 24.1%; Maternal Age - teenager 5.5%, AMA 19.6%. Logistical regression was used to determine the association between maternal prepregnancy BMI, race/

ethnicity and preterm birth.
RESULTS:

Maternal Prepregnancy BMI and Race in Term vs Early Preterm Infants

Race	Prepregnancy BMI	OR	95% CI
White/Non-Hispanic	Overweight vs Normal	1.950	(1.154-3.295)
	Obese vs Normal	1.902	(1.088-3.324)
Black/Non-Hispanic	Overweight vs Normal	1.368	(0.780-2.402)
	Obese vs Normal	1.245	(0.716-2.165)
Hispanic	Overweight vs Normal	1.490	(0.295-7.518)
	Obese vs Normal	4.485	(1.139-17.657)

Maternal Prepregnancy BMI and Race in Term vs Late Preterm Infants

Race	Prepregnancy BMI	OR	95% CI
White/Non-Hispanic	Overweight vs Normal	1.588	(1.264-1.994)
	Obese vs Normal	1.451	(1.138-1.851)
Black/Non-Hispanic	Overweight vs Normal	0.946	(0.670-1.337)
	Obese vs Normal	1.156	(0.845-1.582)
Hispanic	Overweight vs Normal	1.666	(0.841-3.302
	Obese vs Normal	2.739	(1.402-5.352)

Unlike White/Non-Hispanic and Hispanic mothers, normal prepregnancy BMI in Black/Non-Hispanic mothers was not associated with lower odds for early/late preterm birth. Black/Non-Hispanic mothers odds of delivering a preterm infant was not significantly increased if overweight/obese. The odds for mothers of the White/Non-Hispanic population for delivering an early and late premature infant was significantly increased when overweight/obese. Analysis controlled for maternal age, weight gain during pregnancy, insurance status and smoking. There was no interaction between BMI and age.
CONCLUSIONS: A normal prepregnancy BMI is protective for preterm birth in the White/Non-Hispanic and Hispanic population, but not for the Black/Non-Hispanic population. Addressing weight disorders in White/Non-Hispanics and Hispanics may be successful in reducing preterm birth, however, a more global approach may be needed for the Black/Non-Hispanic population.

152
4:30pm

Fellow in Training

Ovulation Induction Is Associated with Small for Gestational Age Neonates

Loren M. DeLuca, Nathan Fox, Robert S. Green, Annemarie Stroustrup, Matthew Harris, Kathleen Gibbs.
Pediatrics, Mount Sinai School of Medicine, New York, NY; Obstetrics and Gynecology, Mount Sinai School of Medicine, New York, NY.
BACKGROUND: In the United States, 30 per 1000 livebirths are twins; 2/3 of these are a product of assisted reproductive technology (ART). Previous studies have reported an increased risk of adverse outcomes in all pregnancies resulting from ART including an association between in vitro fertilization (IVF) and small for gestational age (SGA) neonates.
OBJECTIVE: To compare the incidence of SGA in twins by method of conception.
DESIGN/METHODS: A retrospective cohort study was conducted. Modes of conception considered were spontaneous conception (SC), ovulation induction (OI) or IVF. Subjects were delivered by a high-risk obstetric practice between 2005-2011 at Mount Sinai Hospital. Maternal and neonatal data were recorded. Our primary outcome was the incidence of SGA from the three modes of conception. SGA was defined as birth weight <10th percentile. Chi square, ANOVA, and logistic regression were used in the analysis.
RESULTS: Records of 772 infants from 394 mothers of twin pregnancies were reviewed. In univariate analysis, twins conceived by OI had an increased incidence of SGA (28%) when compared to both SC (15.6%) and IVF (16.4%) groups, (p=0.02). In multivariable modeling adjusting for gestational age, gender, chorionicity, and maternal age, SGA was more common in the OI group (odds ratio (OR) 2.144 95% CI 1.17-3.39, p=0.014). Inclusion of fetal reductions, gestational hypertension, preeclampsia, and gestational diabetes into the multivariate analysis did not significantly change the results.
CONCLUSIONS: When adjusted for gestational age, gender, chorionicity, and maternal age neonates conceived by OI had a greater incidence of SGA. However, IVF was not associated with an increased risk of SGA as previously suggested in other studies. Larger prospective studies would help define the true risk factors for SGA in ART. The results of this and future studies are crucial for counseling families undertaking ART.

153
4:45pm

Correlation of Outcomes among Twins: Implications for Inclusion of Multiple Births in Clinical Trials

Lawrence Rhein, Al Ozonoff, Reese Clark.
Newborn Medicine and Respiratory Diseases, Boston Children's Hospital, Boston, MA; Clinical Research Program, Boston Children's Hospital, Boston, MA; Pediatrix Medical Group, Sunrise, FL.
BACKGROUND: Up to one third of preterm infants who are admitted to neonatal intensive care units (NICUs) are twins or higher order multiple births. Twins or multiple births are therefore common targets for inclusion in clinical trials. However, inclusion of these infants requires proper statistical interpretation, as the outcomes of twins are not completely independent. In outpatient follow-up clinics, many sets of twins seem to have disparate pulmonary outcomes, suggesting that the assumptions of high correlation between twins may not be as necessary.
OBJECTIVE: The objective of this study was to determine whether sets of twins could be considered independent in terms of commonly utilized pulmonary outcomes.
DESIGN/METHODS: Using deidentified data from the Pediatrix Clinical Data Warehouse, we studied twin pairs (n=3206) born less than 32 wks EGA and compared each to one another and to matched controls. Twin A was matched with an unrelated singleton for maternal age group, race, admission year, gestational age, gender, and birthweight within 250 grams. We then calculated correlation coefficients for different pulmonary outcomes using Spearman rank correlations.
RESULTS: All outcomes showed significantly stronger correlation between Twin A/Twin B compared to Twin A/Control (Table 1). Most outcomes showed no significant difference in strength of correlation between Twin A/Control versus Twin B/Control.

Correlations Between Twins and Matched Controls

DEMOGRAPHIC	TWIN A		TWIN B		CONTROL	
	mean or n	sd or %	mean or n	sd or %	mean or n	sd or %
Gestational Age (wks)	28.6	2.3	28.6	2.3	28.6	2.3
Birthweight (kg)	1.22	0.36	1.21	0.38	1.22	0.36
OUTCOME	TWIN A/ TWIN B	<- COMPARISON ->	TWIN A/ CONTROL	<- COMPARISON ->	TWIN B/ CONTROL	
	n, corr		n, corr		n, corr	
Max FIO2 Day 0 or 1	2798, 0.52	p<0.0001	2640, 0.10	p=0.55	2645, 0.11	
Max FIO2 Day 28	2280, 0.57	p<0.0001	1953, 0.38	p=0.046	1956, 0.34	
Max FIO2 36wk PMA	1330,0.58	p<0.0001	872, 0.23	p=0.32	900, 0.20	
Diuretics Use	521, 0.56	p<0.0001	367, 0.03	p=0.26	384, 0.08	
Dexamethasone Use	106, 0.71	p<0.0001	42, 0.2	p=0.24	36, -0.11	

CONCLUSIONS: Despite perceived differences in pulmonary outcomes between siblings in twin gestation, we noted significantly higher correlations in pulmonary outcomes between twin preterm siblings compared to matched unrelated controls. Inclusion of twin preterm infants in clinical studies will require statistical corrections to account for this lack of independence of outcomes.

154
5:00pm

House Officer

Preterm Twins: Is Twin B at Risk for Poorer Developmental Outcome Than Twin A?

Alyssa Marshall, Nancy L. Brodsky, Hallam Hurt.
Crozer-Chester Medical Center, Upland, PA; Neonatology, The Children's Hospital of Philadelphia, Philadelphia, PA.
BACKGROUND: While studies have shown that Twin B is at higher risk for perinatal morbidity and mortality, long-term effects of birth order on overall development have not been thoroughly investigated.
OBJECTIVE: For preterm twin pairs admitted to the intensive care nursery, to determine if Twin B differs from Twin A in developmental outcome as measured by the Bayley Scales of Infant and Toddler Development III (BSID).
DESIGN/METHODS: Data were available for 43 sets of preterm twins who were born between 2004 and 2009, admitted to the ICN of the Hospital of the University of Pennsylvania, qualified for follow up, and had a BSID administered at 14–31 months of age (corrected age to 24 mos.). Twins were compared for gender, delivery type, Apgars, intrauterine growth restriction (IUGR), intraventricular hemorrhage (IVH), periventricular leukomalacia (PVL), and chronic lung disease (CLD) using Wilcoxon Signed Ranks and McNemar tests. Birth weight (BW) and BSID scores were analyzed using paired t-tests. Repeated Measures ANOVA was used to evaluate the influence of birth order and gestational age (<32 weeks, 32-34 weeks, >34 weeks)on outcome.
RESULTS: Mean gestational age (GA) was 31 ± 3 weeks (24-36 weeks); mean BW of Twin A was 1.6 ± 0.5 kg and of Twin B 1.5 ± 0.5 kg (p=0.50). Mean adjusted age at testing was 21 ± 4 months. Twins A and B were similar in delivery type, Apgar scores, IUGR, IVH, PVL, and CLD (all p≥0.06). Mean BSID scores were similar for Twins A and B for Cognitive, Language, and Motor Composites (all p≥0.42).

BSID Composite Scores of A & B twins

	A twins	B twins	p-value*
Cognitive	99.x ± 17.x	98.x ± 13.x	0.70
Language	91.x ± 16.x	92.x ± 14.x	0.42
Motor	95.x ± 13.x	96.x ± 13.x	0.63

*Paired t-tests

Twins A and B also were similar on Expressive and Receptive Communication, and Fine and Gross Motor subscales (all p≥0.07). By Repeated Measures ANOVA neither birth order nor GA was associated with BSID scores (p≥0.50).
There were 11 twin pairs with BW discordance of >20%. For 6 of the pairs, twin A was larger, for 5 B was larger. BSID Composite scores were similar in larger and smaller twins (p≥0.24).

BSID Composite Scores in Discordant Twins

	Larger twin	Smaller twin	p-value
Cognitive	93.6 ± 10.7	90.4 ± 20.2	0.55
Language	84.3± 15.5	82.2 ± 14.1	0.54
Motor	92.3 ± 12.2	87.8 ± 13.7	0.24

CONCLUSIONS: Based on birth order alone, preterm B twins in this cohort were not at risk for poorer developmental outcomes than A twins.

155
5:15pm

Fellow in Training

Predicting Readmission for Premature NICU Graduates

S. Schell, M. Grzybowski, J. Kase, B. Parvez, Y. Tong, S. Roy, H. Brumberg.
Division of Newborn Medicine, Maria Fareri Children's Hospital, Valhalla, NY; Department of Epidemiology, Michigan State University, Lansing, MI.
BACKGROUND: There is a correlation between hospital readmission (HRA) & prematurity. Little is known regarding predictive factors for HRA among NICU patients (pts).
OBJECTIVE: To determine risk factors (RF) in preterm neonates (PN) that predict HRA within 6 months (m) of NICU discharge (d/c).
DESIGN/METHODS: This is a 2 yr prospective analysis of PN (≤36wks) d/c'd from Maria Fareri Children's Hospital (MFCH) Level 4 regional referral center NICU. Exclusion criteria were transfer prior to d/c home or death. The primary outcome was HRA to MFCH within 6m of d/c. Data included demographics & neonatal morbidities during hospitalization, at d/c & at HRA. χ^2, t-tests, ANOVA & multivariate logistic regression (MLR) were used. Unadjusted & adjusted bivariate analyses for gestational age (GA) & birthweight percentile (BWP) by Fenton Growth Chart were done & adjusted results with p's<0.2 were considered for MLR, where backward regression & the

change-in-estimate methods developed the best model.
RESULTS: 504 pts with 13% HRAs were included. GA was 32±3wks (mean±SD), BW 1750±720g & time to HRA 60±49d. Common reasons for HRA were apparent life threatening event, respiratory illness & elective surgery. Although short term respiratory factors such as days on a ventilator, were associated with HRA (p<0.05), variables at d/c did not contribute, including apneic events prior to d/c, home oxygen (hO2) or monitor. Although non-significant, pts with bronchopulmonary dysplasia d/c'd on hO2 were 40% less at risk for HRA. HRA pts spent on average 25d longer in the NICU & 21d longer on O2. Controlling for GA & BWP, MLR identified RF for HRA: congenital abnormalities (ABN) (OR, 95%CI) (3.1, 1.4-6.9), endocrine/metabolic ABN (3.1, 1.4-6.5) & gastrointestinal ABN (2.9, 1.2-6.4); apnea prior to d/c remained non-significant (0.9, 0.8-1.1). The model strongly discriminated HRA status (c-statistic=0.73, p<0.0001). With an *a priori* HRA rate of 13%, the model classified 71% correctly with 57% sensitivity & 74% specificity.
CONCLUSIONS: As expected, pts requiring longer in-hospital respiratory support had more HRAs. However, hO2 & monitors did not lead to HRA. This may be due to closer outpt follow-up. One strategy that may safely decrease length of stay is d/c'ing pts sooner on hO2. Apneic events did not lead to HRA, suggesting HRA is unrelated to maturational issues. At d/c, understanding these factors can define a high-risk group in need of additional anticipatory management to prevent HRA.

156
5:30pm

Undergraduate Student

Effect of Socioeconomic Status (SES) on Language Outcome of Preterm Infants at Toddler Age

Katherine T. Wild, Nancy L. Brodsky, Laura M. Betancourt, Hallam Hurt.
Georgetown University, Washington, DC; Division of Neonatology, Children's Hospital, Philadelphia, PA.

BACKGROUND: It is well established that preterm infants are at risk for poor developmental outcomes including language. Socioeconomic status (SES)also is associated with poor developmental outcomes but less is known regarding the influence of SES on language in prior preterm infants.
OBJECTIVE: To assess SES effects on language outcome of preterms at toddler age.
DESIGN/METHODS: For this report insurance status was used as a proxy for SES. Using data accrued at our follow-up clinic for children born at ≤32 weeks since 2006, we matched 65 children with Medicaid-type insurance (M-Ins) with 65 with private insurance (P-Ins) for: gestational age (GA), birth weight (BW), chronic lung disease (CLD), periventricular leukomalacia (PVL), left and right intraventricular hemorrhage (IVH-R,L), and age at Bayley Scales of Infant Development III (BSID).
For bivariate analyses, paired t-tests, McNemar, and Wilcoxon ranks tests were used as appropriate.
RESULTS: M-Ins vs P-Ins were similar in GA 29.3±3.5 vs 29.3±3.7 wks; BW 1328±444 vs 1344±428 gm; and age at BSID 22.9±3.7 vs 22.4±3.5 mos, as well as all other matched characteristics (all p >0.17). BSID Language Composite scores were lower in M-Ins than P-Ins with a clinically significant effect size of 0.93 (p<0.001). Receptive and Expressive scores also were lower in M-Ins than P-Ins (both p<0.001); Cognitive and Motor Composite scores in M-Ins and P-Ins differed as well (p≤0.043).(Table)

BSID Scores by Insurance Type

	Insurance		p-value
	Medicaid-Type	Private	
Language Composite	87.9 ± 11.3	101.9 ± 13.6	<0.001
Receptive	7.6 ± 2.4	10.5 ± 2.2	<0.001
Expressive	7.9 ± 2.8	9.9 ± 2.5	<0.001
Cognitive Composite	94.0 ± 13.2	106.0 ± 12.4	<0.001
Motor Composite	96.7 ± 12.1	100.7 ± 10.5	0.043

For Language Composite, 45% of M-Ins were moderately/mildly delayed versus 8% of P-Ins. By repeated measures ANOVA, SES (p<0.001) but not GA group (dichotomized as ≤29 or >29 wks.) (p=0.86) or SESxGA group (p=0.79) was associated with Language Composite; thus in this cohort SES may have had a greater influence on language than prematurity.
CONCLUSIONS: Low SES status is associated with poorer language function in preterm children, with recipients of Medicaid-type insurance scoring significantly lower on BSID Language Composite and Receptive and Expressive subscales than those with Private insurance. We suggest: 1) SES be considered in any interpretation of preterm language outcome; 2) early language interventions be considered for low SES preterm toddlers.

Neurobiology II
Platform Session

Saturday, March 31, 2012
4:15pm-5:45pm

157
4:15pm

Fellow in Training

Neurogenesis in the Germinal Matrix and Cortical Subventricular Zone of Premature Infants

Sabrina K. Malik, Praveen Ballabh.
Division of Newborn Medicine, Maria Fareri Childrens Hospital, Valhalla, NY; Cell Biology and Anatomy, New York Medical College, Valhalla, NY.

BACKGROUND: Neuroimaging studies have demonstrated that children born premature exhibit impaired cortical gray matter growth in infancy, which is still discernible in childhood and adolescence. The neocortex is formed by neurons produced deep within the brain in the germinal matrix (ganglionic eminence, GE) and cortical subventricular zone (CSVZ). Even though neurogenesis is believed to be largely complete at midgestation, it is possible that neurogenesis is still ongoing at low level in the third trimester. Thus, perinatal insults might impact this late neurogenesis, particularly the development of upper cortical layers.
OBJECTIVE: To assess neurogenesis in the GE and CSVZ of fetuses and preterm infants of 17-25 gestational weeks.
DESIGN/METHODS: We used human autopsy materials from fetuses and premature infants (n=12) of 17-25 gestational weeks. Cryosections from the frontal lobe of the brain were triple labeled with SOX2 (early neuronal progenitor), TBR2 (intermediate neuronal progenitor), and Ki67 (proliferation marker) antibodies to evaluate neurogenesis. We also labeled brain sections with doublecortin, Ki67 and sytox (nuclear stain). Images were acquired from the GE and CSVZ using Nikon confocal microscope and cells were counted.
RESULTS: Early neuronal progenitors (SOX2+) were significantly more abundant in CSVZ and GE for fetuses (17-22 week) compared with premature infants (23-25 weeks) (P<0.05 both). The density of intermediate progenitor cells (TBR2+) showed an upward trend with advancing gestational age--between 17 and 20 weeks, and subsequently, the density of these cells decreased, becoming almost absent by 25 weeks of gestation in the CSVZ. However, TBR2 (+) cells were not seen in the GE in fetuses and premature infants of 17-25 gestational weeks. The number of proliferating neuronal progenitors (Ki67 +) was reduced with the advancing gestational age after 21 weeks in both GE and CSVZ. Their density was significantly less at 21-25 gestational weeks compared with 17-20 weeks (P<.01 both). The density of migrating young neurons (DCX+) was comparable between subjects of 17-22 and 23-25 gestational weeks in both GE and CSVZ.
CONCLUSIONS: A reduction in the density of neuronal progenitors and their proliferation around ~23 gestational weeks implies a reduction in neurogenesis around the age of viability. However, a continuation of lower level of neurogenesis in premature infants might enhance their vulnerability to perinatal injury and risk of abnormal cortical development.

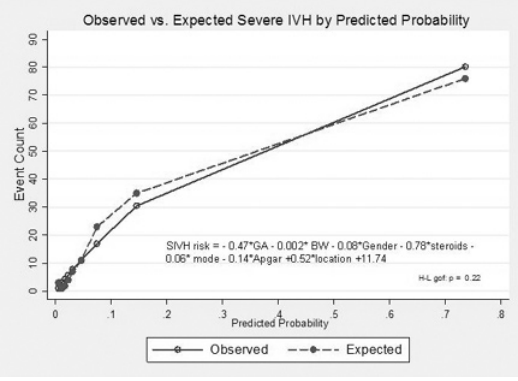
158
4:30pm

House Officer

A Predictive Model for Preterm Infants To Target Indomethacin Therapy for Prevention of Intraventricular Hemorrhage

Samuel V. Gorstein, Paul F. Visintainer, Frank Bednarek, Joseph H. Chou, Elisabeth C. McGowan, Rachana Singh.
Baystate Children's Hospital, Springfield, MA; UMass Memorial Medical Center, Worcester, MA; Massachusetts General Hospital, Boston, MA; Tufts Medical Center, Boston, MA.

BACKGROUND: Severe intraventricular hemorrhage (SIVH) has an incidence of 3-12% in very low birth weight infants (VLBW). Prophylactic indomethacin decreases the incidence of SIVH and reduces white matter injury. It may cause transient impairment of renal and platelet function with potential gastrointestinal complications. Identifying high risk infants may help target therapy to those most likely to benefit.
OBJECTIVE: Develop a predictive model for SIVH using data available by 6 hours of age, to allow early identification of VLBW infants most likely to benefit from prophylactic low-dose indomethacin therapy.
DESIGN/METHODS: A cohort of VLBW infants with gestational age between 23 and 32 weeks (N = 2917) from 4 level III NICUs between 2000 to 2010 was abstracted from the Vermont Oxford Network database to develop this model. Infants with any exposure to indomethacin or ibuprofen therapy, congenital anomalies or chromosomal syndromes were excluded. Data included gestational age, antenatal steroids, mode and location of delivery, gender, birth weight, 5 minute Apgar score and admission temperature. Logistic regression was performed from all combinations of any 3 NICUs to develop the model which was then validated on data from the remaining center. After validation, data from all 4 NICUs was used to develop the final model.
RESULTS: ROC area of the predictive model using all four datasets was 0.85 (95% CI: 0.81- 0.88). Gestational age, antenatal steroids, location of birth and 5 minute Apgar score were significantly associated with SIVH (p < 0.05). Birth weight and admission temperature did not reach statistical significance.



CONCLUSIONS: We have developed a statistically valid model for predicting the risk of SIVH usable within the first 6 hours of life which may help identify infants most likely to benefit from prophylactic indomethacin therapy. Future studies will utilize the model to target indomethacin therapy and assess neurodevelopmental outcomes.

159

4:45pm

Correlations in Neurobehavioral Functioning as Measured by System Scoring of the Assessment of Preterm Infants' Behavior (APIB) with Infants 35-46 Weeks Post Conceptual Age (PCA)

Gretchen Lawhon, Kee Pyon, Olayemi Ola, Nicole Kemble, Sonia Imaizumi, Gary Stahl.

Pediatrics/Neonatology, Cooper University Hospital, Camden, NJ; Pediatrics, Cooper University Hospital, Camden, NJ.

BACKGROUND: APIB evaluations (Als et al., MRDD Research Reviews 2005;11:94-102) of infants provide screening for neurological abnormalities and facilitate parental understanding of their infants' growth and development. Infants are evaluated two weeks after discharge to support the transition to home and community. The APIB system scoring at varying PCA 35-46 weeks (w) may show differences reflecting the infants' neurobehavioral organization.

OBJECTIVE: To determine the correlation of APIB system scores to varying PCA of preterm infants.

DESIGN/METHODS: Preterm infants evaluated with the APIB during January 2008-June 2011 were included in the study. Relevant demographic and clinical data were collected. The systems were scored on 9-point scales, with 1 representing well organized and 9 poorly organized behavior. These infants were stratified into 4 groups based on their PCA at the time of the APIB: PCA1= ≤37w; PCA2= 38-40w; PCA3= 41-43w; and PCA4= ≥44w.

RESULTS: A total of 430 infants (mean±SD; gestational age: 31.6 ± 3.4 w; birth weight: 1648 ±617 grams) were evaluated and the following systems scored (Table 1): physiological, motor, state, attention, regulatory, and examiner facilitation. Significant differences were found for all systems when compared over all PCA groups. Further pair-wise comparisons showed that the systems of the PCA3 and PCA4 groups were similar (Table 1).

Table 1: System scores (mean±SD) and pair-wise comparisons over PCA groups.

System	PCA1	PCA2	PCA3	PCA4	Pair-wise
	N=85	N=197	N=104	N=44	p<0.05
Physiological	5.14±0.52	4.98±0.69	4.66±0.84	4.43±1.09	PCA1 vs 3 & 4; PCA2 vs 3 & 4
Motor	5.12±0.66	4.93±0.68	4.66±0.99	4.50±1.19	PCA1 vs 3 & 4; PCA2 vs 3
State	4.17±0.56	3.96±0.57	3.63±0.79	3.52±1.00	PCA1 vs 3 & 4; PCA2 vs 4
Attention	5.45±0.98	4.95±1.05	4.37±1.07	4.09±1.31	PCA1 vs 2 & 3 & 4; PCA2 vs 3 & 4
Regulatory	5.19±0.66	4.97±0.58	4.67±0.91	4.43±0.85	PCA1 vs 3 & 4; PCA2 vs 4
Examiner facilitation	5.24±0.57	4.96±0.70	4.69±0.86	4.57±0.87	PCA1 vs 2 & 3 & 4; PCA2 vs 4

CONCLUSIONS: The decrease in the APIB system mean scores with increasing PCA demonstrates an improvement in neurobehavioral organization and maturation over time. The similarity of system scores between the PCA3 and PCA4 groups may indicate a period of stable integration of systems prior to further maturation.

160

5:00pm

Neuromotor Outcome of Young Children Whose Mothers Reported Loss of Fetal Activity

Andrew Adesman, Sarah A. Keim.

Pediatrics, Cohen Children's Medical Center of NY, New Hyde Park, NY; Center for Biobehavioral Health, Nationwide Children's Hospital, Columbus, OH.

BACKGROUND: Loss of fetal activity (LFA) during pregnancy is considered a potential red flag of obstetric complications and/or fetal compromise. Few analyses have examined the neuromotor consequences of maternal reports of the loss of fetal activity during pregnancy.

OBJECTIVE: Using data from the U.S. Collaborative Perinatal Project (CPP), a large, prospective cohort study of pregnancy and child health, our objective was to examine the early neuromotor outcome of children whose mothers reported loss of fetal activity.

DESIGN/METHODS: A multivariate statistical analysis was performed on 59,407 pregnancies from the CPP; we limited analyses to 29,979 pregnancies. Exclusions included: implausible gestational age estimate (>44 wks), multiple gestations, and women for whom fetal activity data was not collected or missing. Separate analyses were done for mothers who reported loss of fetal activity >1 time in the 2nd trimester (MRLFA2, N=432) and >1 time in the 3rd trimester (MRLFA3, N=1074) when queried at each prenatal visit. The primary outcome variables were motor milestones at 4 months and 1 year, hypotonia at age 1 year and 4 years, and fine motor (FM) or gross motor (GM) delay at age 4 years. Multivariate linear and logistic regression was performed; models were adjusted for gestational age, smoking, sex, SES, race, parity, and maternal age.

RESULTS: At 4 months, infants with MRLFA2 were more likely to be unable to sit with support at 4 months with head erect and steady (adjusted Odds Ratio (aOR) 2.0, 95% CI [1.4, 2.8]. At 1 year, infants were more likely to be unable to walk, stand, pull-up, and creep if MRLFA2 (aOR 2.4, [1.1, 5.1] or if MRLFA 3 (aOR 1.8, [1.0, 3.3]. There was no increase in hypotonia at 1 or 4 years among children whose mothers reported loss of fetal activity, and results were imprecise (e.g., any hypotonia at age 1: aOR 2.0, [0.7, 5.6]. FM delay was more common in MRLFA3 (aOR 1.8, [1.0, 3.1] but not MRLFA2 (aOR 0.8, [0.3, 2.6]); GM delay was not associated with FLA in the 2nd or 3rd trimester.

CONCLUSIONS: Maternal report of loss of fetal activity in the second trimester is associated with motor milestone delay at 4 and 12 months. LFA in the 3rd trimester was not associated with early delays, but mild FM delays at age 4years.

161

5:15pm

Fellow in Training

Hyperthermia, Not Hyperoxia, Exacerbates Hypoxic-Ischemic Brain Injury in the Term-Equivalent Neonatal Rat

Matthew A. Rainaldi, Susan J. Vannucci, Gillian Brennan, Shyama D. Patel, Jeffrey M. Perlman.

Pediatrics, Weill Cornell Medical College, New York, NY.

BACKGROUND: Hypoxic-ischemic (HI) brain injury in the newborn is an important cause of short and long-term morbidity and mortality. Clinical and experimental data suggest that variations in both oxygen and temperature may modulate the extent of brain injury during the immediate reperfusion period. The impact of concurrent hyperthermia and hyperoxia on the extent of brain injury during reperfusion is unclear.

OBJECTIVE: The study objective was to determine the effect of hyperthermia and hyperoxia, alone and in combination, on brain injury following HI in the term-equivalent rat pup.

DESIGN/METHODS: Postnatal day (P) 10-11 Wistar rat pups underwent unilateral common carotid artery ligation plus hypoxia (8% O2/ balance N2) for 60 minutes. Following HI, rat pups were exposed to normoxia/normothermia (21% O2/36.5°C, n = 35), hyperoxia/normothermia (95% O2/36.5°C, n = 10), normoxia/hyperthermia (21% O2/38.5°C, n = 10), or hyperoxia/hyperthermia (95% O2/38.5°C, n = 17) for 2 hours. After 72 hours, the animals were sacrificed; brains were removed and frozen in isopentane (-30°C). 18 µm coronal cryosections were stained with H&E. Extent of damage of the ipsilateral hemisphere was measured using ImageJ, NIH software; infarct area % was calculated after correction for edema. Data was analyzed using ANOVA and Wilcoxon rank-sum tests.

RESULTS:

Brain Damage in Recovery Groups

Recovery group	n	Mean infarct area (%) ± SEM	Deaths during recovery
Normoxia-normothermia	35	61.0 ± 2.9	0
Hyperoxia	10	59.4 ± 6.7	0
Hyperthermia	10	73.2 ± 3.1*	0
Hyperoxia-hyperthermia	17	72.7 ± 2.8**	2

*P=0.03; **P=0.02 vs control group

Rats recovered in a hyperthermic, or hyperthermic-hyperoxic, environment had a similar mean infarct area that was larger than those recovered in normoxia-normothermia (P = 0.02). Rats recovered in a hyperoxic environment showed no difference in infarct area % vs. the normothermic-normoxic recovered rats. Additionally, 2 hyperthermic-hyperoxic rats died during the recovery period.

CONCLUSIONS: Elevated temperature during the recovery following hypoxia-ischemia caused a significant increase in infarct size, independent of inspired oxygen concentration. Hyperoxia alone had no effect on infarct size. Hyperthermia should clearly be avoided during resuscitation/post-resuscitation care of asphyxiated newborns. The precise role of supplemental oxygen during this period requires further study.

162

5:30pm

Fellow in Training

Monitoring Cerebral Autoregulation in Neonatal HIE

J. A. Howlett, F. J. Northington, M. M. Gilmore, J. M. Jennings, A. Tekes, T. A. Huisman, C. U. Lehmann, E. R. Jackson, C. M. Parkinson, A. C. Larson, J. L. Jamrogowicz, J. K. Lee.

Neonatology, Johns Hopkins, Baltimore, MD; Pediatric Anesthesiology and Critical Care Medicine, Johns Hopkins, Baltimore, MD; Pediatric Radiology, Johns Hopkins, Baltimore, MD; General Pediatrics and Adolescent Medicine, Johns Hopkins, Baltimore, MD.

BACKGROUND: Cerebral autoregulation maintains relatively constant cerebral blood flow across blood pressure changes. Little is known about blood pressure ranges that support autoregulation in neonatal hypoxic ischemic encephalopathy (HIE).

OBJECTIVE: We propose a novel method of autoregulation monitoring with near-infrared spectroscopy (NIRS) that can identify optimal mean arterial blood pressure (MAP) ranges that support autoregulation.

DESIGN/METHODS: Term infants with HIE had autoregulation monitoring with the cerebral oximetry index (COx) during therapeutic cooling. COx is calculated by a correlation coefficient between MAP and cerebral oximetry. COx ranges from -1 to +1. COx is negative/near-zero values during functional autoregulation and becomes more positive with impaired autoregulation.[1] "Optimal MAP" with most robust autoregulation was defined as the 5-mmHg MAP bin with an identifiable COx nadir. (Fig.1) Infants received brain MRIs after rewarming.

RESULTS: In 13 infants, Apgar scores at 1, 5, and 10 mins were 3(±2), 4(±2), and 6(±2). Cord blood gas pH was 7.00(±0.08). COx identified an optimal MAP range with optimal autoregulation in 8/13 (62%) infants during hypothermia, 7/12 (58%) infants during rewarming, and 8/11 (73%) infants during normothermia. Optimal MAP was 55(±10) mmHg during hypothermia, 50(±9) mmHg during rewarming, and 53(±8) mmHg during normothermia. During hypothermia and rewarming, some infants spent a greater percentage of time with blood pressure that deviated from the optimal MAP range. (Fig. 1c) Brain MRIs obtained on day of life 10(±3) showed abnormalities in 10 infants (77%).

CONCLUSIONS: Autoregulation can be continuously monitored with COx using NIRS, enabling clinicians to target optimal blood pressure ranges to support autoregulation. This is particularly relevant during periods of greater hemodynamic variability, such as during hypothermia and rewarming.

Refs:

1. Lee JK, et al. Critical Care Medicine 2011.

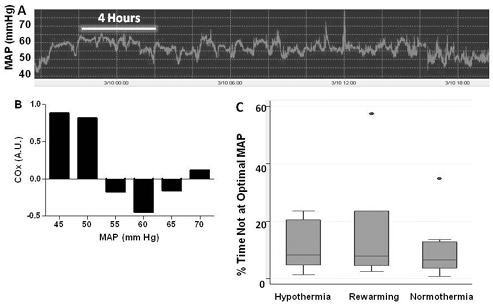


Figure 1. (A) Mean arterial blood pressure (MAP) recording during 24h of therapeutic hypothermia in a neonatal patient with HIE. (B) The cerebral oximetry index (COx) was most negative at the MAP bin of 60 mmHg. Therefore, this patient's "optimal MAP" where autoregulation was most robust occurred at MAP 60 mmHg. (C) In patients with an identifiable optimal MAP, more time was spent with blood pressure outside the optimal MAP range during hypothermia and rewarming.

Pulmonary Injury Platform Session

Saturday, March 31, 2012
4:15pm-5:45pm

163
4:15pm

Medical Student

Inhibition of Stretch-Induced Lung Differentiation Via Transient In Utero Knockout (TIUKO) of the Cystic Fibrosis Conductance Regulator (ASCFTR) Alters Short-Term Lung Structure in Lungs of Sprague-Dawley Rat Pups Exposed to Birth Hyperoxia

Alyssa Nastro, Rachael Grodick, J. Craig Cohen, Shetal Shah.
Pediatrics, Stony Brook University School of Medicine, Stony Brook, NY; Pediatrics, Thomas Jefferson School of Medicine, Philadelphia, PA.

BACKGROUND: The Cystic Fibrosis Conductance Regular (CFTR) is integral to stretch-induced lung development. Transient expression of antisense-CFTR (ASCFTR) in fetal life results in increased fibrosis in adult rats. Hyperoxia causes inflammation, and re-modeling, leading to simplified alveolarization and vascularization. The effects of hyperoxia lung structure in the first month of life are undefined in animals with inhibition of stretch-induced differentiation.

OBJECTIVE: To determine the effect of birth hyperoxia on lung histology of rat pups exposed to TIUKO of CFTR.

DESIGN/METHODS: Four groups of time-pregnant Sprague-Dawley rat pups underwent TIUKO of CFTR by anti-sense CFTR (ASCFTR) using an adeno-associated virus vector at 16 days gestation or control. Litters were placed in either room air (RA) or 100% hyperoxia x24 hours after birth. Lungs were fixed-inflated harvested after hyperoxia, day of life 12 & day of life 28. Five to 10 Hematoxylin and Eosin sections were made from each of 5 animals at x10 magnification for point-counting morphometry. Volume densities of airway, parenchyma & vessels & the alveolar/parenchyma (A/P) ratio were calculated. ANOVA testing was used to determine significance.

RESULTS: On day 1, birth hyperoxia increased the percentage of lung parenchyma in the TIUKO group (36.5±5.0% vs. 48.5±9.3%, $p<0.05$). The TIUKO plus RA group also exhibited a higher percentage of parenchyma that the control (EGFP) plus hyperoxia group (50.6±9.1% vs. 36.5±5.0%, $p>0.05$). On day 1 the percentage of lung air space decreased in the TIUKO group compared to room air controls (45.8±11.2% vs. 58.8±9.3%, $p<0.05$). The control hyperoxia group also exhibited more air space than the TIUKO RA group on day of life 1 and 28 (Day 1: 60.4±6.6% vs. 45.8±11.2%, Day 28: 55.8±9.6% vs. 41.9±12.2%, $p<0.05$ for both). On day 1, the addition of hyperoxia in the TIUKO group decreased lung vascularity compared to hyperoxia controls (7.8±2.3% vs. 2.2±1.5%, $p<0.05$).

No differences in lung parenchyma, blood vascularity & alveolar space were seen on day of life 12. No differences in A/P ratio were seen at each of the 3 time points.

CONCLUSIONS: TIUKO of the CFTR gene results in an abnormal lung structure immediately after birth and is altered after 24 hours of hyperoxia. Altered histology partially normalizes with time.

164
4:30pm

Fellow in Training

Intra-Nasal Lipopolysaccharide (LPS) Alters Lung Cellular Differentiation (CD)14 and Toll-Like Receptor (TLR) 2 Levels in Three-Week Old Rats Exposed to Birth Hyperoxia without Affecting CD4 and CD8 Positive T Cells or TLR 4 Levels

Surabhi Jain, Shetal Shah, Avinash Chander, Pavan Vasa.
PEDIATRICS, Stony Brook University Hospital, Stony Brook, NY.

BACKGROUND: Hyperoxia induces endothelial cell injury predisposing newborns to lung inflammation, which contributes to bronchopulmonary dysplasia. Premature infants exposed to hyperoxia at birth exhibit increased mortality because of late-onset respiratory pathogens or systemic bacteremia, possibly through impaired T cell recruitment into the lung. TLR 4 is a membrane receptor which plays a role in $CD4^+$ and $CD8^+$ T Cell recruitment in response to LPS and in anti-oxidant defense. Birth hyperoxia reduces lung TLR4 levels and $CD4^+$ T cells immediately post-exposure. Intra-nasal LPS increases the acute systemic cytokine response following birth hyperoxia. However, the lung immune response after late-onset infection following birth hyperoxia is not known.

OBJECTIVE: The purpose of this study was to determine the long-term effect of birth hyperoxia on lung cells expressing TLR4, TLR2, CD4, CD8, CD3, CD14 and CD45 proteins.

DESIGN/METHODS: Newborn rat pups were exposed for 24 hours to 100% O_2 (hyperoxia) or room air. Animals were returned to normoxia for 3 weeks, when all animals received intra-nasal LPS (10ug) or saline (Control). Lungs were harvested 24 hours later and analyzed by immunohistochemistry for indicated proteins. Quantitative microscopy was performed from 30-40 images in each case. Results were normalized for cell number. Statistical analysis was performed by ANOVA or Student's t test. $P<0.05$ was considered significant.

RESULTS: TLR2 levels were lower in the LPS plus hyperoxia in comparison to the LPS group ($p<0.01$). LPS increased CD14 level as compared to the control saline ($p<0.05$). The levels of TLR4, CD4, CD8, CD3 or CD45 cells were similar in all experimental groups.

CONCLUSIONS: Birth hyperoxia does not significantly alter lung levels of TLR4, CD4 and CD8 cells in 3-week old rats, suggesting that the previously reported short-term effect of hyperoxia on cellular immunity improves over time. We speculate the observed hyperoxia-induced serum inflammatory responses following late onset infection are not solely dependent on TLR4 levels.

165
4:45pm

Researcher

Circulating Muc1 as a Novel Biomarker for Tobacco Smoke (TS)-Induced Lung Injury

J. Wu, T. L. Hubert, S. Baker, V. Zuluaga-Ramirez, K. C. Kim, M. R. Wolfson.
Physiology, Temple Lung Center, Center for Inflammation, Translational and Clinical Lung Research, Temple Univ Sch of Med, Philadelphia, PA; Pediatrics & Medicine, Temple Univ Sch of Med, Philadelphia, PA.

BACKGROUND: Muc1, a membrane-tethered mucin expressed on the mucosal surface of epithelial cells in the lung, consists of a large ectodomain, a single-pass transmembrane region, and an intracellular cytoplasmic tail (CT). Muc1 is involved in TLR signal transduction, progression and resolution of inflammatory responses. TS is a pleiotropic toxin that causes epithelial cell injury. The developing lung is vulnerable to TS induced injury.

OBJECTIVE: To test the hypothesis that TS upregulates Muc1 CT in the lung and to determine if corresponding changes in plasma Muc1 CT track TS-induced lung injury.

DESIGN/METHODS: Sprague-Dawley rats were exposed to room air (n = 6; control) or TS (n = 6; Scireq *InExpose*; 300 mg/m^3; 3R4F cigarettes, 2x daily, 50 min/session, up to 7 wks). Lung mechanics (Scireq *flexivent*^{TM}) were measured during spontaneous breathing. At the end of the protocol and following deep anesthesia, blood samples, bronchoalveolar lavage fluid (BALF: right lung), and contiguous left lung samples were snap frozen or formalin-fixed for biochemical and histological analyses, respectively. Muc1 was analyzed in plasma, lung homogenate, and BALF with a customized ELISA using an antibody (CT33) against Muc1 CT; data is expressed as %control. Histomorphometry and goblet cell metaplasia (PAS+ cells) were assessed by image analysis.

RESULTS: Over 7 wks of TS exposure, resting resistance and response to methacholine challenge were greater, whereas inspiratory capacity and compliance were reduced (all $p < 0.05$) compared to controls. By 7 wks, Muc1 CT levels in TS exposed animals were greater in lung (146%; $p < 0.01$), BALF (137%; $p < 0.05$), and plasma (236%; $p < 0.001$) than in control animals. Quantitative histomorphology demonstrated a time-dependent increase in goblet cells with airway epithelial denudation and alveolar enlargement in TS-exposed as compared to controls.

CONCLUSIONS: TS induced marked functional and histological changes in the lung with concomitant goblet cell metaplasia and increased expression of Muc1 by 7 wks. Corresponding changes in Muc1 in tissue homogenate and BALF are consistent with lung epithelial cell damage. This study is the first to report a parallel increase in plasma Muc1 due to TS, strongly suggestive of a defect in epithelial barrier function. Plasma Muc1 CT monitoring may provide a practical biomarker reflecting genesis of lung injury with a functional and histological phenotype. (N0014-10-0761; HL 81825; N0014-10-1-0928).

166
5:00pm

House Officer

Birth Hyperoxia Alters T-Cell Subsets in the Lungs of Sprague-Dawley Rat Pups Exposed to Transient In Utero Knockout of the Cystic Fibrosis Conductance Regulator Protein

Eunice Hagen, Shetal Shah, Avinash Chander, Craig Cohen.
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BACKGROUND: Hyperoxia causes histologic lung changes, contributing to chronic lung disease. It also alters TLR4 levels with subsequent T-cell subsets changes in rat pups. The cystic fibrosis transmembrane conductance regulator (CFTR) is critical in lung embryologic development. Transient disruption of CFTR expression during gestation results in structural and functional changes to adult rat lungs. However, effects of hyperoxia on lung T-cell subsets in rats exposed to TIUKO of CFTR is unknown.

OBJECTIVE: To determine effects of birth hyperoxia on T-cell subsets (CD3, CD4, CD8, CD14 and CD45) in lungs after TIUKO.

DESIGN/METHODS: 4 litters of Sprague-Dawley rats received intra-amnionic injection at gestational age e16 of recombinant adenovirus containing the CFTR gene cloned in antisense direction or control. At birth, rats were exposed to 100% hyperoxia or room air x 24hrs. Lung tissue was harvested at 3 time points: post-birth hyperoxia, 12 days & 28 days post-birth hyperoxia. Immuno-histochemistry was performed to assay for levels of above-noted CD proteins of interest. Signal intensity was measured from microscopic images standardized to DAPI nuclei stain. One way ANOVA testing was used for analysis.

RESULTS: Immediately post-hyperoxia, CD3 & CD14 levels were lower in both TIUKO

& hyperoxia rats, but exhibited no combined reduction with both insults ($p<0.05$). CD4 was unchanged with either TIUKO or hyperoxia, but increased in TIUKO rats exposed to hyperoxia ($p<0.05$). CD8 levels increased with TIUKO & decreased with TIUKO & hyperoxia ($p<0.05$) but were unchanged with hyperoxia alone.
On day of life 12, TIUKO prevented reductions seen in CD3 & CD45 levels with hyperoxia ($p<0.05$). CD4 was decreased with hyperoxia or TIUKO ($p<0.05$). CD8 decreased after TIUKO & increased in TIUKO hyperoxia rats when compared to control.
CD8 and CD45 levels increased in TIUKO rats exposed to hyperoxia compared to control levels at 28 days ($p<0.05$). These combined insults also increased CD4 levels. Hyperoxia increased CD3 in only TIUKO rats at this time point. Over time, levels of CD3 & CD4 were altered in TIUKO rats exposed to hyperoxia. CD14 & CD45 were altered more by hyperoxia than TIUKO, which preferentially affected CD8 cell lines.
CONCLUSIONS: Alteration of CFTR expression by TIUKO alters lung T-cell subset of Sprague-Dawley rat pups & influences development of these subsets over time.

167

5:15pm

Short Term Oxygen Exposure Soon after Birth ('Resuscitation') Alters Cell Cycle & DNA Repair Gene Expression in Adult Mice

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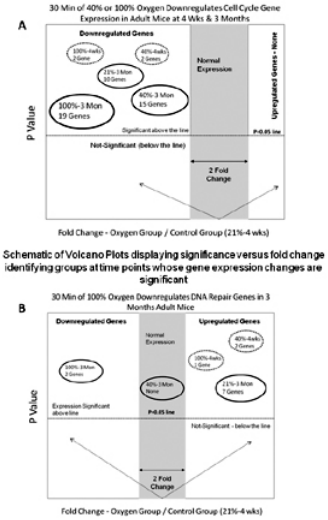
BACKGROUND: Premature infants are sensitive to the toxic effects of O_2. We have shown O_2 increases systemic oxidant stress & oxidant lung injury in a premature lamb resuscitation model (Patel A et al, 2009). Oxidant stress alters cell proliferation & apoptosis & may lead to long-term consequences in growth & development.
OBJECTIVE: To study the effects of very short-term O_2 exposure on expression of cell cycle and DNA repair genes in adult mice at 4 wks and 3 months (mon) of age.
DESIGN/METHODS: Time-dated pregnant C57/BL6 mice were observed Q3h on the day of delivery. Newborn mice litters were randomized to receive 21%, 40% or 100% O_2 for 30 min (N=6 in each group), as close to birth as possible & no later than 6h of life. Mice were recovered in room air & sacrificed at 4 wks or 3 mon of age. Whole lung Cell Cycle (CC) & DNA repair gene expression profiling (GEP) (84 related genes for each) was done by real-time, reverse transcriptase, quantitative PCR (SA Biosciences, MD). Data was analyzed using PCR array data analysis web portal (SA Biosciences). A fold change of > 2 and a $p < 0.05$ was considered significant. All results were compared to the control group (21%-4wks).
RESULTS: Schematic of the volcano plot displaying significance *versus* fold change is shown below.



Schematic of Volcano Plots displaying significance versus fold change identifying groups at time points whose gene expression changes are significant

The number of CC genes down-regulated increased over time (Fig A). 10 CC genes were down-regulated in 21%, compared to 15 in 40% and 19 in 100% O_2 group at 3 mon (Fig A). DNA repair genes were up-regulated in both 40% (Rad23b; Xrcc3) and 100% O_2 group (Rad23b) at 4 wks (Fig B). 40% group had GEP similar to 21%, however, 100% group had two of them down-regulated significantly (Fig B).
CONCLUSIONS: 40% O_2 group had DNA repair GEP similar to 21% O_2 group; however, 100% O_2 had down-regulation of DNA repair genes at 3 mon. Cell cycle genes were downregulated in adult mice following resuscitation with O_2, with maximum downregulation in 100% O_2. We speculate that 21%-40% O_2 may be appropriate for resuscitation of premature newborns (NRP Grant-53831).

168

5:30pm

Fellow in Training

High Flow Nasal Heliox Improves Work of Breathing and Attenuates Lung Injury in the Newborn Porcine Lung Injury Model

Romal Sekhon, Haritha Vellanki, Yan Zhu, Anne Hesek, Jordan Wang, Maria Elena Rodriguez, Marla R. Wolfson, Thomas H. Shaffer.
Nemours Lung Research, A. I. duPont Hospital for Children, Wilmington, DE; Physiol, Med, & Peds; Center for Inflammation, Translational, and Clinical Lung Research, Temple Univ Sch of Med, Philadelphia, PA; Neonatology, Thomas Jefferson Univ Hosp, Philadelphia, PA.

BACKGROUND: Respiratory distress in the newborn is characterized by elevated work of breathing and respiratory support requirements. High flow nasal cannula (HFNC) has been shown to improve ventilation and oxygenation by nasopharyngeal dead space washout and to lower work of breathing indices in the spontaneously breathing newborn. Heliox, a low density gas mixture, facilitates the distribution of inspired gas, decreases resistance to airflow, reduces the work of breathing and has been shown to attenuate lung inflammation during the treatment of acute lung injury.
OBJECTIVE: To demonstrate the effectiveness of HFNC/Heliox to decrease resistive load, decrease work of breathing indices, improve ventilation and attenuate lung inflammation during spontaneous breathing in the lung injured newborn pig.
DESIGN/METHODS: Spontaneously breathing neonatal pigs were anesthetized, lung injured with oleic acid, supported with 4 L/min HFNC, and randomized to Nitrox (n = 7) or Heliox (n = 7). F_IO_2 was titrated for pulse oximetry (SpO_2) 95 ± 2% for 4 hr. Vital signs, blood gas chemistry, tracheal pressure, and thoracoabdominal motion were measured serially. Phase angle, phase relation, the change in tracheal pressure (ΔPt) and ventilatory efficiency index (VEI) were calculated. Interleukin - 6 (IL - 6) and interleukin IL - 8 (IL - 8) were measured by ELISA in lung tissue homogenate.
RESULTS: By 4 hrs post injury, animals treated with HFNC/Heliox demonstrated lower work of breathing indices reflected by lower ΔPt ($p < 0.05$), phase angle ($p < 0.05$), and phase relationship ($p < 0.05$) with greater VEI ($p < 0.01$) compared to HFNC/Nitrox. PaCO2 was similar in both groups. The Heliox group showed less inflammatory injury reflected by lower IL - 6 ($p < 0.02$) and IL - 8 ($p < 0.02$) in lung tissue.
CONCLUSIONS: HFNC/Heliox decreased respiratory load, reduced resistive work of breathing indices and attenuated lung inflammatory profile while ventilation was supported at less pressure effort in the presence of acute lung injury. These data suggest that HFNC/Heliox may be a useful adjunct to improve the energetics of breathing and attenuate progressive inflammatory responses in the newborn lung. (P20 RR020173; N0014-10-0761).

Poster Session II
Emergency Medicine

Saturday, March 31, 2012
6:00pm-7:30pm

169

Fellow in Training

Emergency Department Visits for Bronchiolitis in the United States, 2006-2008

Todd A. Florin, Katie L. Hayes, Sage R. Myers, Monika K. Goyal, Elizabeth R. Alpern.
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BACKGROUND: Acute bronchiolitis is the most frequent cause of infant hospitalization in the United States (US) with costs of >$500 million annually. Despite this healthcare burden, there have been no recent national estimates of emergency department (ED) utilization for bronchiolitis.
OBJECTIVE: To describe the epidemiology of ED visits for bronchiolitis in the US.
DESIGN/METHODS: Data were from the 2006-2008 Health Care Utilization Project-Nationwide Emergency Department Sample, a stratified random sample of ED visits. Analyses were limited to patients <2 years. Cases were identified using ICD-9 codes of 466.x and 487.1. Rates were calculated using US Census data of children <2 years. National estimates were obtained using validated patient visit weights. Analyses used chi-square, t-test and ANOVA.
RESULTS: Approximately 1.2 million ED visits for bronchiolitis occurred from 2006 to 2008, comprising 6% of all ED visits for children <2 years. The annual ED visit rate was 47.4 per 1000 US population under 2 years in 2006, 47.6 per 1000 in 2007 and 48.3 per 1000 in 2008. 21.5% of bronchiolitis cases were hospitalized compared to 5.2% of those without bronchiolitis ($p<0.001$). Compared to children without bronchiolitis, children who present to the ED with bronchiolitis are more likely to be <1 year (69.9% vs. 52.8%, $p<0.001$), male (58.1% vs. 54.2%, $p<0.001$), geographically from the south (39.6% vs. 37.2%, $p<0.001$), have Medicaid (60.5% vs. 56.3%, $p<0.001$), and present in the winter (55.9% vs. 28.1%, $p<0.001$). An average of $320.7 million was spent on ED visits for bronchiolitis each year, and charges for bronchiolitis comprised 9% of total ED charges for children <2 years. Mean ED charges per visit were significantly higher in patients with bronchiolitis compared to those without bronchiolitis ($1040 vs. $728, $p<0.001$).
CONCLUSIONS: Patients with bronchiolitis represent a substantial proportion of children <2 years who are admitted to the hospital from the ED. ED charges for bronchiolitis averaged more than $320 million annually, with significantly higher mean ED charges in patients <2 years with bronchiolitis compared to those with other complaints. Bronchiolitis continues to represent a significant healthcare burden, and thus further research is necessary to understand the factors resulting in ED utilization and admission for bronchiolitis, with the ultimate goal of reducing unnecessary utilization and decreasing costs.

170

General Pediatric and Emergency Medicine Providers' Self-Reported Practices and Attitudes Surrounding Concussion Management

Mark R. Zonfrillo, Christina L. Master, Matthew F. Grady, Kristy B. Arbogast.
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BACKGROUND: While emergency departments and primary care practices frequently serve as the first point of entry for the care of pediatric concussion patients, physicians and practitioners in these settings may not have adequate training or management tools necessary to provide standardized and evidence-based evaluation and management.
OBJECTIVE: To determine the self-reported practices and attitudes surrounding concussion diagnosis and management in a single, large pediatric care network.

DESIGN/METHODS: A cross-sectional survey was distributed to general pediatric and pediatric emergency medicine physicians and advanced providers in a single, large pediatric care network. For all survey participants, practices and attitudes about concussion diagnosis and treatment were queried.
RESULTS: 148 of 280 (52.8%) of eligible providers responded to the survey. 91% (95% CI 86-95%) had cared for at least 1 patient for an acute presentation or routine follow-up for concussion in the three months prior to the survey. A Likert scale from 1-'not a barrier', to 5-'significant barrier' was used to assess providers' barriers to educating families about the diagnosis of concussion. Providers selected 4 or 5 on the scale for the following barriers and frequencies: inadequate training to educate 16% (95% CI 11-23%), inadequate time to educate 15% (95% CI 12-24%), not my role to educate 1% (95% CI 0.4-5%). Compared to emergency medicine providers, primary care providers were more likely to endorse inadequate training as a barrier to patient education for concussion (p=0.02). 96% (95% CI 91-98%) of the 104 providers without a provider decision support tool (such a clinical pathway or protocol) specific to concussion, and 100% (95% CI 94-100%) of the 57 providers without discharge instructions specific to concussion believed these resources would be helpful. There were no other significant differences based on gender or years in practice.
CONCLUSIONS: While pediatric primary care and emergency medicine providers regularly care for concussion patients and value their role in concussion management, they may not have adequate training, time, or infrastructure to systematically diagnose and manage these patients. Provider education, decision support tools, and patient information specific to concussion could help enhance and standardize concussion management.

171

Resident Doctor

Retention of Pediatric Advanced Life Support (PALS) Course Concepts among Pediatric Health Care Providers

Roy M. Vega, Adegbenga A. Olayemi, Babajide E. Faditan, Ariolis C. Grullon, Richard Neugebauer.
Pediatric Emergency Department, Bronx Lebanon Hospital Center, Bronx, NY; Epidemiology, Columbia University, New York, NY.

BACKGROUND: PALS is designed to teach rapid assessment of pediatric patient cardiopulmonary status. Each pediatrician and pediatrician in training is mandated to get PALS training every 2 years.
OBJECTIVE: To evaluate the retention of critical PALS course content among pediatric health care providers, and their confidence in performing skills during a code.
DESIGN/METHODS: An anonymous self-administered survey containing multiple choice questions (MCQs) testing PALS concepts as well as on subjective confidence judgment using the Likert scale 1-4 (not confident to very confident)was applied to a convenience sample of pediatric residents and attending physicians. The MCQ section contained 15 questions and the pass mark was 12 (80%)equivalent to the actual PALS pass score. Descriptive analysis with frequencies was performed using SPSS V.16.0. ANOVA test analysis was performed to compare the confidence levels among participants with the number of mock and real code experience.
RESULTS: There were a total of 32 respondents, 22 residents, and 10 attendings. Prior PALS training was reported by 97%. Of the participants 32%,36%,26%,3% had their last life support training at less than 6months, 6months to 1 year, 1 to 2years and more than 2 years respectively. Amongst the respondents, 39% and 33% participated in more than five mock codes and real codes respectively, whereas 61% and 77% has less than 5 mock and real codes respectively,within the last 3 years.
Of the participants, 23% and 26% reported to be confident in leading a code and in intubation respectively. Almost all respondents were confident in using bag and mask ventilation and using defibrilator. Amongst the respondents, 72% of the participants passed the MCQ test.
ANOVA test showed that there is positive correlation between the number of mock and real code participation and confidence in performing PALS skills.
CONCLUSIONS: The retention of the PALS course content among the residents and attending physicians is insufficient. Continued exposure to mock codes will allow pediatricians gain confidence and enable them to perform skills effectively when needed during a real code.

172

Fellow in Training

The Epidemiology of Pelvic Inflammatory Disease in a Pediatric Emergency Department

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BACKGROUND: Lower abdominal pain and genitourinary problems are common chief complaints in adolescent females presenting to emergency departments (ED). Pelvic inflammatory disease (PID) is a potentially severe complication of lower genital tract infections, which involves inflammation of the female upper genital tract secondary to ascending sexually transmitted infections (STI). PID has been associated with severe sequelae including infertility, ectopic pregnancy, and chronic pelvic pain.
OBJECTIVE: To describe the prevalence and microbial patterns of PID in a cohort of adolescent patients presenting to an ED with lower abdominal or genitourinary complaints.
DESIGN/METHODS: This is a secondary analysis of a prospective study of females ages 14-19 years presenting to a pediatric ED with lower abdominal or genitourinary complaints between August 2009 and January 2010. Diagnosis of PID was per 2006 CDC guidelines. Patients underwent *Chlamydia Trachomatis* (CT) and *Neisseria Gonorrhea* (GC) testing via urine APTIMA Combo 2 Assay and *Trichomonas vaginalis* (TV) testing using the vaginal OSOM Trichomonas rapid test. Descriptive statistics were performed using STATA 11.0.
RESULTS: 328 patients were enrolled during the study period. The prevalence of PID in this cohort was 19.5% (95% CI 15.2%, 23.8%). Of the patients with PID, 37.5% (95% CI 25.3%, 49.7%) had positive testing for STI: 25% (95% CI 14.1%, 35.9%) with CT, 7.8% (95% CI 1.1, 14.6%) with GC; 12.5% (95% CI 4.2%, 20.8%) with TV, and 7.8%% (95% CI 1.1%, 14.6%) with co-infections identified. A diagnosis of PID was significantly associated with STI (p<0.01). Of patients with PID, 84.4% (95% CI 75.2, 93.5%) received antibiotics consistent with CDC recommended treatment guidelines in the ED. Patients who presented with lower abdominal pain as their chief complaint were more likely to have PID than patients with genitourinary complaints (OR 3.3, 95% CI 1.7,6.4).
CONCLUSIONS: A substantial number of adolescent females presenting to the ED with lower abdominal pain were diagnosed with PID, with microbial patterns similar to those previously reported in largely adult, outpatient samples. Furthermore, appropriate treatment for PID was observed in the majority of, though not all, patients diagnosed with PID.

173

House Officer

An Effort To Cut down Excessive Use of Computer Tomography (CT) Scan in Patients with Closed Head Trauma in Pediatric Emergency Room (ER)

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BACKGROUND: The use of CT scan for evaluation of children with closed head trauma is increasing. With increasing risk of radiation associated pathology, a decision to obtain neuroimaging for such cases must balance with the criteria to select the patient.
OBJECTIVE: 1) To assess the appropriate use of head CT scans in our Pediatric ER based on the AAP guidelines for head trauma.
2) To increase the awareness of indications of head CT in Pediatric head trauma.
DESIGN/METHODS: Retrospective chart review of all children with closed head trauma less than 18 years who presented to the pediatric ER during the period September-December, 2010 were reviewed. Data collection included age of the patient, Glasgow Coma Scale, indications for performing CT, results of CT scan and disposition of the patient.
RESULTS: Our sample size was 70 with 72.8% males with a median age of 9.5 years and 27.2% females with a median age of 8 years. Out of 70 cases 27.1% were less than 2 years while 72.9% were more than 2 years of age. Only 24.2% of the cases fulfilled the criteria recommended by AAP for head CT scan in closed head trauma in children. Out of these only 8% cases had positive findings on CT scan.
CONCLUSIONS: Our study showed that a majority of CT scans (75%), done in Pediatrics ER were not recommended as per the AAP guidelines. Hence we recommended use of clinical acumen and follow revised guidelines in Pediatric ER while ordering CT head for closed head trauma. We also recommend that history and physical findings to be clearly documented in ER charts with explanation to justify the steps taken in management and indications for special studies. We are continuing to collect data to look if the above mentioned interventions help reduce the number of CT scans in future.

174

Fellow in Training

Acute Chest Syndrome: A Continued Concern in the Modern Era

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Division of Pediatric Emergency Medicine, Boston University School of Medicine/ Boston Medical Center, Boston, MA; Division of General Pediatrics, Boston University School of Medicine/Boston Medical Center, Boston, MA; Division of Pediatric Radiology, Albert Einstein College of Medicine/Children's Hospital at Montefiore, Bronx, NY; Division of Pediatric Emergency Medicine, Albert Einstein College of Medicine/Children's Hospital at Montefiore, Bronx, NY.

BACKGROUND: Acute chest syndrome (ACS) is the leading cause of death among children with sickle cell disease (SCD), with a historical incidence of 4 to 21 events/100 person-years. In children, ACS commonly presents with fever, but few other symptoms. In the era of advances in preventative care including routine pneumococcal vaccination, the rate of ACS is unknown.
OBJECTIVE: To determine the rate of ACS among febrile children with SCD presenting to the pediatric emergency department (PED) and to describe the clinical presentation of ACS.
DESIGN/METHODS: Subjects ≤ 21 years old with SCD with a history of temperature >38.5°C within 24 hours of the visit were enrolled in this prospective study at 2 urban PEDs. The unit of analysis was a febrile episode, thus subjects could enroll >1 time. All subjects received a chest x-ray. Subjects were excluded for history of ACS within 6 weeks of PED visit. Respiratory exams were performed by a PED attending or fellow. Data historically associated with ACS were collected from the medical record: presenting symptoms; past medical history; current medications; exam findings; and laboratory data (e.g. cough, pain, prior ACS, hydroxyurea, crackles). All x-rays were read by an attending pediatric radiologist. ACS was defined as a new pulmonary infiltrate in a febrile SCD child.
RESULTS: 71 febrile episodes from February-October 2011 were analyzed. 69% had hemoglobin (Hb) SS and 25% had Hb SC disease; the mean age was 7.3 years; 51% was female. The rate of ACS was 21% (15/71). The mean age of a child with ACS was 5.7 years. 73% of children with ACS had cough and 20% had chest pain, while 3 subjects (all ≤3 years old) had no respiratory signs or symptoms. 20% of subjects with ACS had asthma, one of whom was wheezing in PED. 53% of those with ACS had no prior history of ACS. None of the subjects who were receiving chronic transfusions (n=4) had ACS. This study is ongoing for a 14-month interval to reduce potential seasonal bias.
CONCLUSIONS: ACS is common in this sample of children with SCD and fever despite recent advances in preventative care. Clinicians should maintain a high level of concern for ACS in the febrile child with SCD. Further investigation into potentially modifiable risk factors for ACS is needed.

175

Fellow in Training

Ultrasound Findings of the Elbow Posterior Fat Pad in Children with Radial Head Subluxation

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BACKGROUND: In young children with a non-mobile elbow, it can be difficult to differentiate radial head subluxation (RHS) from elbow fracture by clinical exam alone. Preliminary data demonstrate that the presence of an elevated posterior fat pad (PFP) or lipohemarthrosis (LH) of the PFP on ultrasound (US) is highly sensitive for fracture at the elbow, but it is not known whether these findings are present in children with RHS.

OBJECTIVE: To determine if there are US findings of the elbow PFP in patients with the clinical diagnosis of RHS.

DESIGN/METHODS: This was a prospective study of children presenting to an urban emergency department with suspected RHS. Pediatric emergency medicine (PEM) physicians had been given a one-hour didactic and hands-on training session on musculoskeletal US including the elbow. Prior to performing reduction for RHS, PEM physicians performed a brief, point-of-care (POC) elbow US using a high-frequency transducer probe in both longitudinal and transverse views to evaluate for an elevated PFP and LH. Successful clinical reduction with spontaneous movement of the injured extremity served as the gold standard for RHS. Clinical telephone follow up was performed to ascertain outcomes. Recorded images and clips were reviewed by an experienced PEM sonologist.

RESULTS: 34 patients were enrolled with a mean age of 22.8 (± 11.6) months. The mean time to presentation was 5.4 (± 5.9) hours, and 8/34 (24%) children had a prior history of RHS. The majority of patients (29/34, 85%) had a normal POC elbow US. 4/34 (12%) patients had an elevated PFP and 1/34 (3%) had LH. There was no correlation between duration of symptoms or number of reduction attempts and positive findings on US. Clinical reduction was successful in 100% of patients, and there were no complications reported on follow up. The kappa for inter-observer agreement was 0.58 overall.

CONCLUSIONS: The majority of children with RHS have a normal PFP on elbow ultrasound, but elevated PFP and LH are possible findings.

176

Fellow in Training

Video Discharge Instructions for Fever and ED Recidivism

Nina I. McFarlane-Johansson, Zoe Casey, Danielle Miano, Renee Silvis, Vladimir Rozvadovsky, Andrew Mikhalyuk, Sharon R. Smith.
Pediatric Emergency Medicine, Connecticiut Children's Medical Center, Hartford, CT; Molecular and Cell Biology, University of Connecticut, Storrs, CT.

BACKGROUND: Fever is a very common reason for children to come to the Emergency Department (ED). Although ED providers try to allay parental fear by answering questions about fever and giving good discharge instructions (DCI), many children still return to the ED. Parental concerns about fever add to a growing problem throughout EDs in the country such as overcrowding and lack of resources.

OBJECTIVE: To evaluate the effect of video discharge instructions on 72 hour ED recidivism for children with febrile illnesses.

DESIGN/METHODS: A randomized prospective convenience study of children presenting to the ED were enrolled. Children 8 weeks and until the 19th birthday with documented fever were enrolled. Critically ill children and those with chronic medical conditions were excluded. Patients were randomly assigned to one of two study groups: video + written fever specific DCI and only written DCI. Each DVD had both English and Spanish versions. Parents assigned to the video group watched the DVD in the ED and took it home along with written instructions. 72 hour recidivism for fever was confirmed by chart audit. Follow up phone calls asked about any other ED visits and usefulness of the instructions (DVD and/or written).

RESULTS: To date 215 children were enrolled. Children had a mean age 2.5 years (SD 2.8), 51.6% were female; 66.5% had public insurance, 29.3% had private insurance and 9% were self pay; 40% were white, 38% were black, and 50% were Hispanic. The average triage temperature was 102.4 F (SD 1.4). The median parental age was 29.4 years (SD 7.1). Majority of the parents had high school education or some college background. The 72 hour recidivism rate for children with written only DCI was 5.5%, and for children with both written and the DVD was 3.8% (p=0.7). Black children returned less frequently compared to other races, 2.6% vs 5.0% (p=0.5). Age, gender, insurance status, and parental education did not affect recidivism rates or reported usefulness of the DVD. 62% of parents reported the written instructions as very useful, and 63% reported DVD as very useful.

CONCLUSIONS: DVDs with fever specific discharge instructions did not significicantly decrease the 72 hour recidivism rate for fever as compared to written instructions. Fever specific instructions whether written or DVD resulted in < 6% recidivism rate. The majority of parents reported both written and DVD fever specific instructions as very useful.

177

Fellow in Training

Documenting Pediatric Sexual Abuse Screening in the Pediatric Emergency Department

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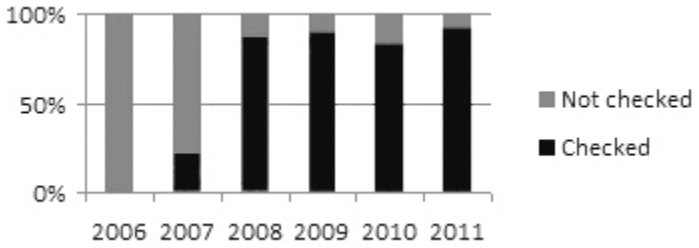
BACKGROUND: Child sexual abuse is an increasing problem. Emergency Departments (ED) are required by the Joint Commission on Accreditation of Healthcare Organizations to screen for child sexual abuse.

OBJECTIVE: To evaluate the utilization and effectiveness of adding a radio button for suspected abuse to the triage portion of the ED electronic medical record.

DESIGN/METHODS: A retrospective chart review of ED patients from 2006-2011 was conducted. The study population included all patients who presented to the pediatric ED with chief complaint of sexual abuse and/or physical screening related to sexual abuse. The primary outcome was the proportion of children who had the "suspected abuse" box checked. Supplemental analyses included gender, age, insurance, race, time of presentation, and discharge disposition.

RESULTS: There were 244 visits between April 2006 and August 2011. 85.3% were female and 14.6% were male. There were 34.9% Hispanics, 33.9% whites and 20.5% blacks. The graph shows the proportion of radio buttons checked and not checked by year. The frequency of documenting suspected abuse increased significantly after adding the radio button ($p < 0.001$). Boys were screened positive more often than girls 82% vs 63%. Documentation was similar for all race/ethnicity, age, and insurance status.



Graph: utilization of screening box from 2006-2011

CONCLUSIONS: Adding a radio button to the ED electronic medical record in triage signficantly improved documention of suspected abuse. Although, compliance with documenting suspected abuse improved and was maintained over 5 years, there is still room for improvement. Suspected abuse documentation for girls may be less than boys because there is an assumption they will undergo more evaluation. Further interventions could be done to improve compliance with this regulation.

178

Fellow in Training

Clinical Signs and Symptoms Associated with Intussusception in Young Children Undergoing Ultrasound in the Emergency Room

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Emergency Department, Women and Chidren's Hospital, Buffalo, NY.

BACKGROUND: Intussusception is a common cause of intestinal obstruction in young children that can lead to severe complications such as bowel ischemia, necrosis and death if not diagnosed expediently.

OBJECTIVE: Previous studies have evaluated patients with confirmed intussusception and outlined various signs and symptoms common in patients with the disease. The purpose of this study was to evaluate all patients suspected of having the disease based on clinical presentation, and identity which signs and symptoms were associated with the disease.

DESIGN/METHODS: Retrospective review of 203 charts from 2008–2010 of patients aged 2 months to 5 years who had an abdominal ultrasound to evaluate for intussusception. Charts were reviewed for signs and symptoms previously shown to be associated with the disease.

RESULTS: 203 patients (mean age 21.5 months, 53% male) were evaluated and 41 (20%) were found to have intussusception. Of the 18 signs and symptoms evaluated only crying, rectal bleeding, pallor and palpable abdominal mass were indicators of disease confirmation. 86% of patients with intussusception presented to the ER with crying compared with 66% of patients without the diagnosis ($\chi^2 = 5.9$, $p = 0.015$). 15% of patients with intussusception presented with pallor compared with only 5% of patients without the diagnosis ($\chi^2 = 5.0$, $p = 0.025$). 36% of patients with intussusception had rectal bleeding while only 17% of patients without intussusception presented with rectal bleeding ($\chi^2 = 8.4$, $p = 0.004$). 15% of patients with intussusception had a palpable mass on exam while only 4% of patients without intussusception presented with an abdominal mass ($\chi^2 = 6.0$, $p = 0.014$). In logistic regression, crying (adjusted OR =5.1, 95% CI: 1.3, 20.1), bleeding (adjusted OR =4.7, 95% CI: 1.6, 13.3), and abdominal mass (adjusted OR =29.0, 95% CI: 3.7, 228.7) remained statistically significant after adjusting for age and gender.

CONCLUSIONS: Only crying, rectal bleeding, and a palpable abdominal mass were indicators for distinguishing patients with intussusception confirmation on ultrasound from those who were ruled out. Some of the most common signs and symptoms of intussusception, such as colicky abdominal pain, vomiting and lethargy, were not significantly associated with a positive ultrasound. Additional research is needed to clarify which signs and symptoms are most useful for identifying patients with intussusception.

Saturday, March 31, 2012
6:00pm-7:30pm

179

House Officer

Weight Gain in the First Six Months of Life in Children Born to Mothers with Gestational Diabetes Mellitus Treated with Insulin, Glyburide or Diet

Tommy Galanis, Fernanda Kupferman, Susana Rapaport, Kelly Cervellione, Shelly Soni, Judith Eng, Ekaterini Kokkali, Lily Q. Lew.
Pediatrics, Flushing Hospital Medical Center, Flushing, NY; OB/GYN, Flushing Hospital Medical Center, Flushing, NY; Pediatrics, Jamaica Hospital Medical Center, Jamaica, NY; The George Washington University, Washington, DC; Touro College, NY, NY.

BACKGROUND: Infants born to mothers (M) with gestational diabetes mellitus (GDM) have increased risk of macrosomia and obesity. Past research has indicated that birth weights (BW) are similar between infants born to M with GDM treated with insulin (I) or glyburide (G). Relationships between trajectory of growth over the first six months of life and method of treatment of GDM and their possible effects on future obesity have not been studied.

OBJECTIVE: To evaluate the pattern of weight gain in the first six months of life in infants born to M with GDM treated with I, G, or diet (D) compared to infants born to M without GDM (C).

DESIGN/METHODS: This was a retrospective cohort chart review. Infants born at Flushing Hospital Medical Center between Jan 2007-March 2011 to M diagnosed to have GDM between 24-28 weeks gestational age (GA) were included. We excluded infants with prematurity, intrauterine growth retardation, fetal anomalies, from multiple gestations and pre-pregnancy M's body mass index (BMI) >40Kg/m2. Independent variables were GA, gender, ethnicity, infant feeding and treatment used in M with GDM. Infants were divided into groups according to M's mode of therapy for GDM either I, G or D. Weights recorded at birth, 2 weeks and at 1, 2, 4 and 6 months were compared between groups and with C. Data were analyzed with SPSS software with frequencies, means and standard deviations for descriptive statistics. ANOVA was used to compare weights among the four groups. Chi-squares were used to compare categorical variables among groups (p-value <0.05 was considered significant).

RESULTS: A total of 84 subjects were included in the analyses (21 each in I, G, D and C). No significant differences were noted in GA, M's BMI, gender or infant feeding among groups (p>0.05). Groups differed in gravida (X2=31.49, p=0.03) and ethnicity (X2=30.27, p=0.003). Analysis showed a significant main effect for timepoint as children weight increased over time (F=134.83, p<0.001). No significant difference was found among all groups for BW or weight gain in the first six months of life (F=0.63, p=0.85). Addition of gravida and ethnicity as covariates did not change the results.

CONCLUSIONS: Mode of treatment of GDM did not influence weight gain of offspring during the first six month of life.

180

Medical Student

Effects of Two Novel Inactivating Glucokinase Mutations on Clinical Phenotypes and Enzymatic Activity

Rosemary Peterson, Carol Buettger, Puja Patel, Nkecha Hughes, Franz Matschinsky, Diva D. De Leon.
University of Texas Southwestern Medical Center, Dallas, TX; Perelman School of Medicine at the University of Pennsylvania, Philadelphia, PA; The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Heterozygous inactivating mutations in glucokinase (*GCK*) cause a subtype of maturity-onset diabetes of the young, MODY2. MODY2 is characterized by mild, non-progressive, asymptomatic hyperglycemia.

OBJECTIVE: To describe the phenotype and genotype of two children with novel inactivating mutations in *GCK* who presented with symptomatic hyperglycemia, and to functionally characterize the two mutant enzymes.

DESIGN/METHODS: Chart review and gene sequencing were used to characterize the two cases. Wildtype and mutated *GCK* were expressed in E. coli, purified, and functionally characterized.

RESULTS: Case 1 presented at age 8 years with enuresis, glucosuria and mild hyperglycemia. His HbA1c was 6.6%. Family history was positive for type 2DM in the mother and maternal grandmother. Mutation analysis identified a heterozygous missense mutation in *GCK* (p.Asn231Asp). At age 12 he progressed to symptomatic hyperglycemia -- polyuria, polydipsia and weight loss, with HbA1c of 7%. Diabetes autoimmune panel was positive. Low-dose insulin therapy stabilized his HbA1c. Case 2 is a 10-year-old with symptomatic hyperglycemia since infancy treated with insulin since age 5 years. At the time of evaluation, HbA1c was 6%. Diabetes autoimmune panel was negative and there was a strong family history of type 2 DM in the mother, maternal grandfather and great grandmother. Mutation analysis identified a heterozygous missense mutation in *GCK* (p.Leu306Pro). Her insulin was discontinued without deterioration of glycemic control. Both mutations were expressed and analyzed. At physiological glucose concentrations, the specific activity of Asn231Asp-*GCK* was 100-fold less than WT-*GCK* and Leu306Pro-*GCK* exhibited no detectable phosphorylation of glucose. These findings suggest that these mutations are likely to result in significant hyperglycemia *in vivo*.

CONCLUSIONS: GCK-MODY may present with symptomatic hyperglycemia in children and may be misdiagnosed as type 1 diabetes. Mutation analysis to establish the genotype is crucial for management and prognostic purposes. It is unclear if autoimmunity played a role in the deterioration of glycemic control in case 1; further follow-up is required.

181

Fellow in Training

Pituitary Volume Correlates with IGF-1 but Not with Peak Growth Hormone Response to Stimulation

Molly O. Regelmann, Bradley Delman, Elizabeth Chacko, Evan Graber, Elizabeth Wallach, Dennis Chia, Michelle Klein, Rachel Annunziato, Robert Rapaport.
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BACKGROUND: The evaluation of children with growth failure includes assessment of the growth hormone (GH)-insulin-like growth factor-1 (IGF-1) axis, GH stimulation testing (ST) and, when clinically indicated, magnetic resonance imaging (MRI) of the pituitary gland. Data on morphology of the pituitary gland and mean sagittal adenohypophysial height but not pituitary volume (PV), have been reported in children with GH deficiency (GHD). In a previous preliminary presentation, we have demonstrated, in a limited cohort (n=69), that IGF-1 correlates with MRI PV. Reports comparing pituitary volume (PV) and peak growth hormone (PGH) response to ST are lacking.

OBJECTIVE: We hypothesized that PV correlates with PGH to ST, as well as with IGF-1.

DESIGN/METHODS: We performed a retrospective chart review of children followed for growth failure. Inclusion criteria for the study were MRI of the pituitary read by the same neuroradiolgist (BD), GH ST, and GH and IGF-1 measured by the same laboratory (Esoterix Inc., Calabasas Hills, CA). PV was calculated using (4pi/3)*(L*H*W). Pearson correlations compared PGH and IGF-1 SD as continuous variables with PV; t tests were used to compare PGH groups (<10ng/mL, ≥10ng/mL) with PV.

RESULTS: A total of 161 patients (42 females, 119 males), with an average age of 11.4±2.5 years were reviewed. PV correlated with IGF-1 (r=0.376, p<0.01), IGF-1 SD (r=0.274, p <0.01), IGFBP-3 (r=0.300, p=<0.01), bone age (r=0.475, p<0.01), height SDS (r=0.310, p<0.01) and BMI SDS (r=0.177, p=0.026). No significant correlations were found for PV and PGH as a continuous variable or in subgroup analyses, prepubertal males (PPM), prepubertal females (PPF), pubertal males (PM) and pubertal females (PF).

Mean Pituitary Volumes

	PPM (n=50)	PPF (n=31)	PM (n=69)	PF (n=11)
PGH <10	221.15±90.68	220.65±65.76	299.26±81.75	368.43±242.48
PGH ≥10	220.28±88.54	249.22±65.43	300.13±98.82	256.88±38.44

CONCLUSIONS: We confirm that IGF-1 correlates with PV. PGH did not correlate with PV. This finding may be consistent with hypothalamic, and not the pituitary, dysfunction being the cause of GHD in most patients. Additional analyses need to be performed to help elucidate the reported findings.

182

Fellow in Training

Glucocorticoid-Induced Hyperglycemia (GID) in Patients Admitted to a Children's Hospital over a 3 Year Period

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BACKGROUND: Steroids are widely prescribed to treat a variety of inflammatory conditions, but adverse effects like glucocorticoid-induced diabetes (GID) continue to be a major limiting factor in their use. Very little data on GID have been collected in children and there is little consensus on treatment.

OBJECTIVE: We aim to describe the characteristics of children with GID and the treatments utilized.

DESIGN/METHODS: This was a retrospective chart review and descriptive analysis of endocrinology consults for GID completed at a major children's hospital from July 2009 to July 2011.

RESULTS: A total of 82 consults were reviewed. Mean age was 14 with a BMI z-score of 0.23. Primary underlying diagnoses included bone marrow transplant (BMT), cancer, solid organ transplant, cystic fibrosis (CF), and asthma. 41% of all subjects had a family history of diabetes but only 11% had acanthosis nigricans. 68% were treated with insulin. Please see the table below.

Group	BMT	Oncologic	Transplant	CF	Asthma	Other
N	12	16	17	18	11	8
mean BMI z-score	-0.12±1.07	1.05±0.94	-0.23±1.46	-0.614±1.46	1.33±1.33	0.72±1.01
+family history	6 (50%)	7 (44%)	8 (47%)	5 (28%)	5 (45%)	1 (20%)
+acanthosis nigricans	0 (0%)	1 (6%)	2 (12%)	0 (0%)	6 (55%)	0 (0%)
mean Hba1c	5.7±0.64	7.28±1.70	6.46±2.08	6.7±1.05	6.07±0.95	6.2±0.95
Mean blood glucose	238±87	273±75	268±106	187±61	187±61	219±45
No treatment	2 (17%)	3 (19%)	2 (12%)	7 (39%)	8 (39%)	1 (20%)
Median max total daily dose of insulin (units/kg/day)	0.96	0.8	1.1	1.3	0.4	0.72
Mean days on steroids+insulin	61±123	12±13	28±50	10±12	1.8±2.5	24±31

CONCLUSIONS: The majority of GID was assosciated with four major diagnostic categories: asthma, cystic fibrosis, organ transplant, and cancer. While a family history of diabetes was common in all groups, most children with GID did not exhibit the typical high risk profile for pediatric type 2 diabetes, with relatively normal BMI's and a low prevalence of acanthosi s nigricans. Of the groups examined, asthma patients were most likely to have a high BMI and acanthosis nigricans, and received steroids for a shorter period of time and were less frequently treated withf insulin. In comparison, transplant patients developed GID after a longer duration of steroid treatment and more frequently required insulin. We are examining our treatment data to determine if the response to therapy can be predicted from the underlying illness, demographic or biochemical data at the time of presentation.

183

House Officer

The Effect of Visit Frequency and Glycated Hemoglobin Monitoring on Glycemic Control in Type I Diabetes

Thao-Ly Phan, George Datto, Jobayer Hossain, Stephen Lawless, Lloyd Werk.
General Pediatrics, Nemours AI duPont Hospital for Children, Wilmington, DE; General Pediatrics, Nemours Children's Clinic, Orlando, FL.

BACKGROUND: The ADA recommends quarterly visits and HbA1c testing in diabetics. The value of routine visits and HbA1c testing has not been well studied.

OBJECTIVE: To determine the effect of visit and HbA1c testing frequency on glycemic control in Type I Diabetes (T1DM).

DESIGN/METHODS: We conducted a retrospective cohort study of 1449 patients (mean age 11.4 years,SD3.3) with T1DM followed at 5 Pediatric Endocrinology clinics from 2008 to 2011. We utilized mixed effect models to determine individual and population changes in HbA1c over time and with visit frequency and hierarchical cluster analysis to generate 3 homogenous groups: patients with an increase in HbA1c (n=237), no change in HbA1c (n=842), and decrease in HbA1c (n=370) over the study period. Study variables were compared between groups.

RESULTS: Mean %HbA1c increased from 8.26 (SD1.48) in 2008 to 8.55 (SD1.44) in 2011. There was a 0.41 (SE0.03) per year increase, but a 0.10 (SE0.01) per visit decrease in population %HbA1c ($p<0.01$). With each increase in quarter per year with visits (Fig 1) and HbA1c measured (Fig 2), there was a decrease in the proportion of patients with an increase in HbA1c. Patients with an increase in HbA1c were older, had lower initial HbA1c, and were more likely to be Black or Hispanic, have a psychiatric disorder, or have Medicaid ($p<0.05$).

Figure 1. The Effect of Number of Quarters per Year with Office Visits on Change in HbA1c

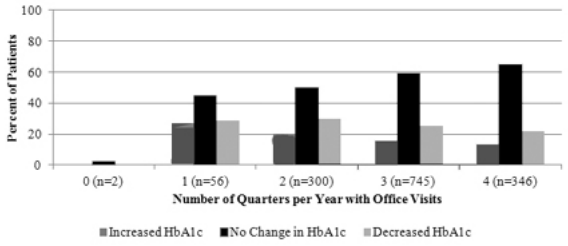
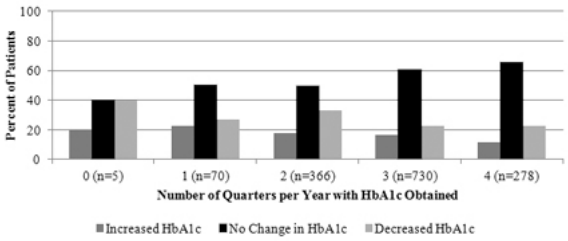


Figure 2. The Effect of Number of Quarters per Year with HbA1c Obtained on Change in HbA1c



CONCLUSIONS: Consistent with ADA guidelines, quarterly visits and HbA1c testing is associated with glycemic control in pediatric T1DM patients. Certain populations are at risk of poor glycemic control and may warrant increased support.

184

House Officer

Neonatal Outcomes of Mothers Treated with Glyburide and Insulin for Gestational Diabetes

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Pediatrics, St. Barnabas Hospital, Bronx, NY; OB-GYN, St. Barnabas Hospital, Bronx, NY.

BACKGROUND: Gestational diabetes (GDM), defined as carbohydrate intolerance during pregnancy, is associated with adverse neonatal outcomes including hypoglycemia, macrosomia, shoulder dystocia, clavicular fractures, brachial plexus injury, respiratory distress, and jaundice. Research has shown that these complications can be prevented by good glycemic control with diet, physical activity, and insulin or oral antidiabetic agents. Unfortunately, studies comparing insulin to oral medications focus mainly on maternal glycemic control with neonatal morbidity only examined as a secondary outcome.

OBJECTIVE: To compare neonatal outcomes in mothers with GDM treated with glyburide or insulin during pregnancy and who delivered at an inner city Bronx hospital serving an ethnically diverse population. This study aims to determine if glyburide is equally effective as insulin in preventing neonatal complications.

DESIGN/METHODS: Retrospective study performed among women diagnosed with GDM treated with insulin or glyburide during their pregnancy. 107 women who received either glyburide or insulin between March 2007-June 2011 were identified by chart review; 58 subjects were in the glyburide group and 49 in the insulin group. Neonatal outcomes were compared between the two groups.

RESULTS: Between March 2007-June 2011, 143 women with GDM delivered at St. Barnabas Hospital; 58 (40%) received glyburide, 49 (34%) received insulin, and 36 (25%) were on dietary modification. Babies born to mothers treated with either insulin or glyburide were included in the study. The 2 groups (glyburide treated vs. insulin treated) were similar in maternal age (31.41±7.21 vs. 30.82±5.82, years), race (76.5 vs. 71.4, % Hispanic), and gestational age (37.88±3.07 vs. 37.23±3.71, weeks). There were no significant group differences in birthweight, method of delivery, Apgar scores at 1 and 5 minutes, CBG, and adverse outcomes (hypoglycemia requiring dextrose infusion, incidence of NICU admission, need for respiratory support, and length of hospital stay). There were 2 fetal deaths reported, one from each study group.

CONCLUSIONS: These data suggest that glyburide is equally as effective as insulin in preventing neonatal complications in a population composed primarily of Hispanic and African-American babies. Further studies may be needed to confirm the implication that glyburide can be safely considered as an alternative first-line therapy to insulin.

185

Fellow in Training

Maternal Pre-Pregnancy Body Mass Index Increases Admission to Neonatal Intensive Care Unit

Julia D. Ryan, David A. Paul, Robert Locke, Amy B. Mackley, Matthew Hoffman.
Neonatology / Pediatrics, Christiana Care Health System, Newark, DE; Pediatrics, TJU/Jefferson Medical College, Philadelphia, PA.

BACKGROUND: More than 1/3rd of childbearing aged women are obese. Maternal obesity has implications for the fetus/neonate that can require admission to a Neonatal Intensive Care Unit (NICU). NICU admission costs over $3000 per day and some infants require admission over several weeks. Aside from the health utilization, NICU admission can alter early bonding between parents and infant.

OBJECTIVE: The purpose of this study is to investigate the relationship between maternal pre-pregnancy BMI, advanced maternal age, and race/ethnicity, on the odds of a term infant being admitted to the NICU.

DESIGN/METHODS: Retrospective analysis of mothers who delivered a term singleton infant at Christiana Care Health System (n=10,126) between 2009-2010. Factors included prepregnancy BMI, age, race/ethnicity, insurance (public vs. private) and previous c/section.

RESULTS: Obese women (BMI >30) had increase odds of term NICU admission (1.60; 1.34-1.88). There was a trend towards increased NICU among overweight (BMI=25<30) mothers (OR 1.16;0.98-1.39). Maternal age, previous c/section, and race/ethnicity were not significant predictors of term NICU admission when controlling for BMI.

Table 1: Variables and Analysis Predicting Term NICU Admission

Variable	p value	OR	95% CI
Obese (vs. Normal)	0.000	1.595	1.340-1.883
Overweight (vs. Normal)	0.082	1.167	0.098-1.387
Public Insurance (vs. Private)	0.006	1.254	1.069-1.472
Teenage mother (vs. age 20-34)	0.79	1.291	0.971-1.716
AMA (vs. age 20-34)	0.891	1.013	0.844-1.216
Previous cesarean (vs. no previous cesarean)	0.516	0.941	0.782-1.131
Non-Hispanic/Black (vs. non-Hispanic/White)	0.369	0.894	0.701-1.141
Hispanic (vs. non-Hispanic/White)	0.711	1.033	0.870-1.226

Obesity was associated with higher rates of early term (37-38 wks gestation) NICU admission compared to late term (39-41 wks gestation) (OR 2.02;1.60-2.55). There was a interaction between obesity and AMA for increased odds of term NICU admission among Hispanics and non-Hispanic/White, but not non-Hispanic/Black. Obese mothers were more likely to be discharged from the hospital prior to their neonate (OR 1.37; 1.14-2.82).

CONCLUSIONS: Term infants born to obese mothers are more likely to require NICU services which are costly. Among obese mothers, infant LOS is more likely to exceed maternal LOS. There are complex interactions of maternal BMI, age, and insurance that have an association with term NICU admission rates. Maternal obesity is a contributing factor amenable to intervention.

186

Fellow in Training

Successful Treatment of Neonatal Severe Hyperparathyroidism with Cinacalcet Monotherapy

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BACKGROUND: Neonatal Severe Hyperparathyroidism (NSHPT) is a life-threatening form of Familal Hypocalciuric Hypercalcemia (FHH). Both NSHPT and FHH are caused by inactivating mutations of the *CASR* gene encoding the calcium sensing receptor (CaSR). Current standard therapy for NSHPT is parathyroidectomy, often preceded by bisphosphonate therapy.

OBJECTIVE: To characterize the molecular basis for NSHPT in an affected newborn and to describe the response to monotherapy with cinacalcet, a calcimimetic.

DESIGN/METHODS: After obtaining informed consent/assent, blood was obtained from the proband and parents and genomic DNA was isolated. The *CASR* gene was amplified by PCR and sequenced directly. Clinical, biochemical and radiologic features of bone and mineral metabolism were monitored.

RESULTS: The patient was an AGA male born at 37 weeks to a 25-year-old G1P1 mother; pregnancy was complicated by oligohydramnios and mild hypocalcemia. On DOL 2 the baby had an episode of apnea and was transferred to our NICU where radiographs showed diffuse demineralization and multiple healing fractures. Serum calcium (Ca^{2+} 1.99 mmol/L) and intact PTH (1154 pg/mL, nl <56 pg/mL) were markedly elevated and serum phosphorus (2.9 mg/dL) and 25(OH) vitamin D (10.9 ng/mL) were both reduced. Renal function was normal, but urinary calcium excretion was low (urinary Ca/Cr ratio 0.08 mg/mg; FeCa 0.003). The family history revealed hypercalcemia in half-brother, father, paternal grandfather and paternal aunt. The patient was treated with normal saline and cinacalcet (0.4 mg/kg/day). Four days after beginning cinacalcet the iPTH had declined to 108 pg/ml and the serum calcium (Ca^{2+} 1.11 mmol/L) and phosphorus (5 mg/dL) had normalized; urine Ca/Cr was unchanged. After 6 weeks of therapy, serum calcium and PTH remained normal and radiogaphs showed marked improvement in bone mineralization. Genetic analyses showed that the patient and his father were both heterozygous for a R185Q *CASR* mutation and the mother was homozygous for wild type alleles.

CONCLUSIONS: We describe the first use of cinacalcet as monotherapy for severe hypercalcemia in a newborn with NSHPT. Based on our studies, cinacalcet reversed hypercalcemia by lowering PTH levels and did not increase renal calcium clearance. Bone mineralization was improved by normalization of PTH levels with no additional fractures. The rapid and sustained response to cinacalcet suggests that a trial of calcimimetic therapy should be considered in NSHPT to avoid parathyroidectomy.

187

Fellow in Training

Vitamin D Status and Metabolic Risk Factors in a Cohort of Severely Obese Children and Adolescents

Chelsea Gordner, Nancy Dunbar, Holley F. Allen, Paul Visintainer, Chrystal Wittcopp.

Baystate Pediatric Endocrinology, Baystate Children's Hospital, Springfield, MA.

BACKGROUND: Cross-sectional data in adults support a link between hypovitaminosis D and obesity, hypertension, diabetes, and cardiovascular disease. Cross-sectional NHANES data in adolescents from 2001-2004 identified an inverse relationship between vitamin D and BMI, systolic blood pressure and fasting glucose. We elected to retrospectively study the relationship between 25-OHD levels and metabolic risk factors in our obese population.

OBJECTIVE: To assess the relationship between 25-OHD and metabolic risk factors in a cohort of obese children and adolescents.

DESIGN/METHODS: 90 children ages 4 through 21 with a diagnosis of obesity (BMI>95th %ile) and a 25-OHD level measured during the study period from April 2008 to April 2010 were retrospectively studied. Any patient with known malabsorptive disorder, parathyroid disease or non-essential hypertension was excluded. The primary analysis was the relationship between 25-OHD and the following metabolic risk factors: BMI, BP, cholesterol fractions, HbA1c and HOMA-IR.

RESULTS: Mean age of our cohort was 12.9±3.6 (SD) yrs with 48% female and 52% male. Mean BMI was 35.3 ±8.5 (SD) and BMI z score was 2.4 ±0.5. Ethnicity profile was 47% Caucasian, 27% Hispanic, 22% African American and 4% Asian. The prevalence of pts with a 25-OHD<30 ng/mL was 78.8% with 51.5% of pts with 25-OHD<20 ng/mL and 5.1% with 25-OHD<10 ng/mL. Only 4 pts were on vitamin D supplementation. Mean 25-OHD levels did not change significantly between seasons (p=0.62). Mean summer 25-OHD levels were 22.7±10.0, fall 22.0±9.2, winter 19.3±8.2, and spring 21.8±9.7. When adjusted for season, BMI and age, no association was found between 25-OHD and BMI z-score, lipid levels, BP, HbA1c or HOMA-IR. Subgroup analysis of pts with 25-OHD<20ng/mL did not identify a significant relationship between 25-OHD and these parameters.

CONCLUSIONS: Vitamin D insufficiency was exceedingly common in our cohort of severely obese children and adolescents in Massachusetts but, surprisingly, 25-OHD levels did not vary by season. We did not find any relationship between 25-OHD levels and BMI, lipid levels, BP, HbA1c or insulin resistance. This differs from much of the literature, is difficult to explain and is somewhat provocative. Perhaps vitamin D sufficiency does not influence predictors of metabolic risk in obese children and adolescents.

188

Fellow in Training

Papillary Thyroid Cancer Presenting with Subclinical Graves' Disease

Emily Frydman, Chelsea Gordner, Holley F. Allen.

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BACKGROUND: The prevalence of thyroid CA in Graves' disease has been reported to range from 0-10% with many authors suggesting an increased prevalence of differentiated thyroid CA in Graves' patients. A number of studies have also suggested increased aggressiveness of thyroid CA in Graves' disease patients as a result of thyroid stimulating antibodies. We now present a case of aggressive papillary thyroid cancer presenting in an adolescent female with subclinical Graves' disease.

OBJECTIVE: To highlight the importance of imaging in Graves' patients who present with thyroid asymmetry on physical exam.

DESIGN/METHODS: A 15 yr old previously healthy female presented for sports physical and was noted to have an asymmetrically enlarged thyroid gland. Labwork identified suppressed TSH of 0.02mIU/ml (0.4-4.0), normal FT4 1.24ng/dL (0.7-1.8), normal total T3 148 ng/dL (80-180), positive thyrotropin receptor Ab 2.54 IU/l (0-1.75) and anti-thyroglobulin Ab 304 Iu/ml (0-40) , prompting referral to pediatric endocrinology. She denied any heat intolerance, palpitations, muscle weakness or weight loss. Family history was significant for Hashimoto's thyroiditis but there was no history of Graves, thyroid CA or history of radiation exposure. Physical exam identified an enlarged, firm, nontender right thyroid lobe. Left lobe was firm but not enlarged on exam. There was no cervical lymphadenopathy. Thyroid uptake and scan showed heterogeneous uptake of 30.1% (10-30) with a cold nodule in the inferior pole of the right thyroid lobe. Thyroid US identified an irregular 5.2cm heterogeneous mass with hypervascularity and a separate 3.8cm mass lateral to the right internal jugular vein with no fatty hilum. Several benign appearing lymph nodes were noted in the right neck at levels II and III. FNA of the lateral neck mass was consistent with papillary carcinoma. CT chest did not identify any distant metastasis. The patient underwent a total thyroidectomy, central and lateral neck dissection.

RESULTS: Final histology revealed papillary thyroid CA, diffuse-sclerosing variant with the largest focus measuring 2.7 cm and diffuse infiltration throughout both lobes. Extrathyroidal extension was present and 23/44 lymph nodes were positive. The final tumor designation was pT3pN1b.

CONCLUSIONS: This case reminds clinicians to consider imaging when presented with an asymmetric thyroid exam in patients with Graves' disease. The aggressive nature of papillary carcinoma in the pediatric population should not be understated.

189

Medical Student

Fighting Obesity: A Call for Prevention

Michelle Chien, Gary A. Emmett, Lauren M. Daley, Bonita Falkner, Samuel Gidding, Scott W. Keith.

Thomas Jefferson University, Philadelphia, PA; Pediatrics, Nemours Foundation/ Thomas Jefferson University, Philadelphia, PA; Medicine, Thomas Jefferson University, Philadelphia, PA; Biostatistics, Thomas Jefferson University, Philadelphia, PA.

BACKGROUND: Obese adolescents are at risk for premature onset of metabolic and cardiovascular disease in young adulthood. The risks for these conditions are greater among minorities. With continued high rates of pediatric obesity, prevention is vital.

OBJECTIVE: To examine frequencies of cardiovascular risk factors in a cohort of African American (AA) adolescents.

DESIGN/METHODS: Biomarkers of metabolic syndrome (MS) and inflammation were obtained in a cross-sectional study of AA adolescents. Subjects were stratified by their body mass index (BMI) into 3 groups: normal weight = BMI <85th percentile, overweight = BMI ≥85th percentile and <95th percentile, and obese = BMI ≥95th percentile.

RESULTS: Compared to normal weight, obese adolescents had significantly elevated parameters of MS, including systolic blood pressure, insulin resistance estimated by homeostatic model assessment (HOMA), and triglycerides. Biomarkers of inflammation including interleukin-6 (IL-6), plasminogen activator inhibitor 1 (PAI1), and high sensitivity C-reactive protein (hsCRP) were also significantly higher in obese compared to normal weight adolescents (table 1). The sample of overweight adolescents in this study was insufficient to determine if there was a significant increase in risk factors.

Table 1

		Mean Values			
Variable	Control BMIFA<85th	Control BMIFA<85th	Obese BMIFA≥95th	Control-Overweight p-value	Control-Obese p-value
SPB (mmHg)	111.2	113.6	115.9	.29	.003
Fasting Insulin (µU/ml)*	4.9	6.0	11.4	.094	<.001
HOMA (mg/dl)*	1.2	1.4	2.7	.184	<.001
Triglycerides (mg/dl)*	53.3	62.7	68.0	.021	<.001
IL-6 (pg/ml)*	2.3	2.7	3.0	.165	.002
PAI1 (ng/ml)	40.6	56.1	74.0	<.001	<.001
hsCRP (mg/dl)*	0.3	0.4	1.4	.503	<.001

*denotes geometric mean value

CONCLUSIONS: Obese AA adolescents have significantly greater MS risk factors and biomarkers of inflammation. Effective long-term interventions to reverse obesity among adolescents are very limited. Prevention of childhood-onset obesity is the most effective option. Measuring each patient's height and weight and calculating BMI at every patient encounter is a cost-effective strategy to increase practitioner awareness of developing overweight /obesity while it still may be preventable.

190

House Officer

Understanding the Association between Literacy and BMI in Overweight Children

Jennifer Gittleman, Tara Ketterer, Iman Sharif.

Pediatrics, Nemours/A.I. duPont Hospital for Children, Wilmington, DE.

BACKGROUND: We have previously demonstrated an inverse relationship between health literacy and BMI amongst overweight children. This pilot study explored candidate variables that could confound or moderate the relationship between literacy and BMI in children.

OBJECTIVE: To 1) test the relationship between child health literacy and a) physical activity and b) screen exposure; 2) to test child BMI status as a moderator of those relationships.

DESIGN/METHODS: We conducted an anonymous cross-sectional survey of children/parents in the waiting room of a general pediatrics clinic in Philadelphia. Each child/parent was adminisered the Newest Vital Sign (NVS; scored 0-6, >4= adequate literacy). Children were interviewed about the #days they participated in light and vigorous physical activity, hours of weekday television viewing(TV) and video/computer time. Child BMI was measured, and BMI percentile was calculated. Demographic data were collected.

Bivariate statistics explored simple correlations; linear regression was used to determine the predictors of child health literacy.

RESULTS: We surveyed 115 children; 55% African-American, 45% White; 50% male, 43% overweight. 56% of parents had more than a high school education; 54% scored "adequate literacy" by NVS; African-American parents scored lower than Whites (mean 3.1 vs. 4.3, p=0.0001).

Parent NVS score trended inversely with child hours of TV exposure (rho=-0.16, p=0.09) and positively with child vigorous activity (rho=0.15, p=0.10), but did not vary with light activity or video/computer time.

Child age ranged from 8-19 (mean 11.8, SD 2.8); child NVS score ranged from 0-6 (median=2) and correlated with age (rho=0.49, p<0.00001). Child NVS and TV exposure were inversely correlated amongst overweight children (rho=-0.27, p=0.06), but not for the overall sample of children (rho=0.03, p=0.73).

In adjusted analysis, Child NVS amongst overweight children was associated with child age (B=0.24, p<0.0001) and hours of TV exposure (B=-0.29, p=0.01). R-squared for this model was 0.29. Physical activity and video/computer time, and parent literacy/education/race did not add to the model.

CONCLUSIONS: Amongst overweight children, NVS decreases with TV viewing. NVS is a marker of cognitive functioning; studies in adults/adolescents report on congnitive decline in the setting of obesity. This study suggests a deleterious cognitive effect of TV exposure during the metabolic state of overweight; longitudinal studies will need to test this hypothesis.

Poster Session II
Gastroenterology / Nutrition / Hematology Oncology

Saturday, March 31, 2012
6:00pm-7:30pm

191

House Officer

Can a Questionnaire Be Used as a Screening Tool To Evaluate for Vitamin D Inadequacy?

Charu Gupta, Fernanda Kupferman, Susana Rapaport, Lily Q. Lew.
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BACKGROUND: There is increasing recognition of the importance of Vitamin D (25OHD) in our general well being. There are no guidelines as to when to test for its adequacy. Attempts have been made to develop a screening questionnaire in adults to predict deficiency. To date no such questionnaire exist for children.

OBJECTIVE: To determine if a particular question or set of questions addressing known risk factors for 25OHD deficiency could identify children with its inadequacy.

DESIGN/METHODS: We conducted a cross sectional study at Flushing Hospital Medical Center between August and October 2011 of children 4-8 year-old seen for a health maintenance visit. Children with diarrhea in the 2 weeks prior to the visit, chronic renal or gastrointestinal disorders, or on steroids, antiepileptic or antihypertensive medications were excluded. Demographic data was collected by chart review. The parents were requested to complete a questionnaire regarding intake of 25OHD in diet, as supplement or by sun exposure. After obtaining consent, 25OHD levels were drawn and measured using liquid chromatography/ tandem mass spectrometry at Quest diagnostics. Levels of 25OHD <15 ng/ml were considered deficient, 15-20 ng/ml insufficient and >20 ng/ml sufficient. Data were analyzed using t-tests and chi-squares, p value <0.05 was considered significant.

RESULTS: We found 0% deficiency and 16 % insufficiency of 25OHD levels during the months studied. T-test comparisons of 25OHD levels for age and BMI were not significant (p >0.05). Chi-square comparisons of 25OHD for gender, skin color, amount of sunscreen used, duration of sun exposure, milk intake, supplementation and knowledge of source were also not significant, as were regressions comparing 25OHD levels with sunscreen, sun exposure, milk intake and supplements.

Mean, standard deviation and P values

	Total subjects (n=50)	Sufficient (n=42)	Insufficient (n=8)	P value [a]
Age (years)	5.43 ± 1.14	5.37 ±1.10	5.76± 1.40	0.38t
Female	28 (56%)	23 (54.8%)	5 (62.5%)	0.69p
BMI	17.80 ± 3.07	17.78 ± 3.02	17.91 ± 3.50	0.91t
25OHD	26.62±5.47	28.04 ± 4.74	19.12 ± 1.35	<0.001 t

[a] Comparison between sufficient and insufficient groups, t-student t-test, p- Pearson's Chi Square.

CONCLUSIONS: In 4-8 year-old inner-city children, we found no deficiency of 25OHD during the months studied. No particular question or set of questions were found to be predictive of 25OHD insufficiency, necessitating the continued need for serum 25OHD levels in case of suspected inadequacy.

192

Medical Student

Familial Haploidentical (FHI) T-Cell Depleted (TCD) Stem Cell Transplantation (SCT) in High-Risk Sickle Cell Disease (SCD) (IND 14359)

Kavita Radhakrishnan, Julie-An Talano, Erin Morris, Mitchell S. Cairo.
Pediatrics, New York Medical College, Valhalla, NY; Pediatrics, Medical College of Wisconsin, Milwaukee, WI.

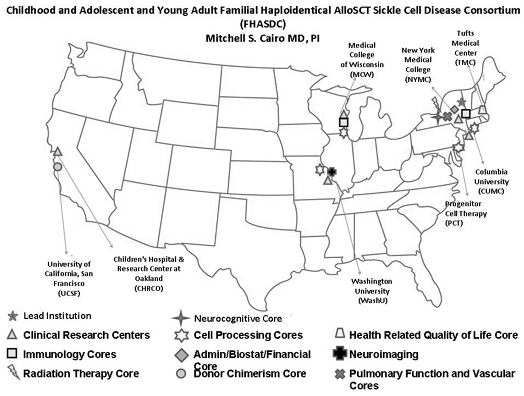
BACKGROUND: SCT has been highly successful for poor-risk SCD but only 14-18% of patients have an HLA-matched unaffected sibling (Freed/Cairo, BMT, 2011). Alternate allogeneic donors include matched unrelated adult donors (MUD) and umbilical cord blood (UCB) donors (Cairo,BBMT,2008). Due to patient demographics MUDs are limited in worldwide registries and results of unrelated UCB transplants have been dismal to date (Ruggers/Cairo,Hematologica,2011).

FHI TCD SCT utilizing one step CD34 selection (Miltenyi Biotec) is an alternative. Recently 16/22 high risk thalassemia patients achieved engraftment without aGVHD and 90% OS using this method (Sodani,Blood,2010).

OBJECTIVE: This study seeks to employ a similar approach in high-risk SCD patients.

DESIGN/METHODS: Patients 2-20.99 years of age with SCD who have had a stroke, two consecutive abnormal TCDs, >3 pain crises in 2 years, or >2 episodes of acute chest without an 8/8 HLA MUD will be enrolled. Patients will receive hydroxyurea (60mg/kg), azathioprine (3mg/kg), fludarabine (30mg/m2), busulfan (4mg/kg), cyclophosphamide (50mg/kg), thiotepa (10mg/kg), R-ATG, and TLI (500cGy) followed by FHI TCD AlloSCT. GVHD prophylaxis will consist of tacrolimus. Apheresis-CD34-enriched cells will be separated by the CliniMACS with a target dose of 10.0 x 106 CD34+ cells/kg containing 2.0 x 10^5 CD3+ T cells/kg.

RESULTS: We have developed a FHI TCD Consortium of five clinical and four processing sites, and cores in donor chimerism, HLA antibodies, immunology, cell processing, biostatistics, neuroimaging, neurocognition, quality of life (QOL), pulmonary function, pulmonary vascular, radiation, and a patient advocacy group (http://www.mcw.edu/HaploSCDConsortium.htm).



CONCLUSIONS: We seek to develop a unique opportunity for high-risk SCD patients to be cured of this debilitating disease, potentially improving organ function, QOL, and neurocognition while providing a universal allogeneic donor source for many more at-risk SCD patients.

193

Resident

Importance of Gastric Emptying Studies in Determining the Association between Failure to Thrive and Gastroparesis in Children

Sinora Shrestha, Sravan Reddy Matta, Radha Nathan, Izabella Mullokandov.
Department of Pediatrics, Brookdale University Hospital and Medical Center, Brooklyn, NY; Department of Radiodiagnosis, Brookdale University Hospital and Medical Center, Brooklyn, NY.

BACKGROUND: Failure to thrive is a condition commonly encountered by primary care physicians. Prompt diagnosis and early intervention is essential for preventing malnutrition and developmental sequelae. Delayed gastric emptying (gastroparesis) is associated with significant morbidity in children. Clinicians therefore need a high index of suspicion to avoid missing the diagnosis.

OBJECTIVE: To determine the association between failure to thrive and gastroparesis in children less than 18 months using gastric emptying studies.

DESIGN/METHODS: We conducted a retrospective chart review of children (less than 18 months) who presented with failure to thrive (with symptoms of vomiting, early satiety, refusal to feed and abdominal pain) to Brookdale University Hospital between 2007 and 2010. Gastric emptying studies were done with standard Technetium 99m sulfur colloid (dose of 0.2-0.3 mCi) mixed with age appropriate standard meal (infant formula, cereal). The duration of study varied from 90 minutes to 2-4 hours. Dynamic 90 frame images (60 seconds/frame) were taken during the study. Gastric emptying studies were done as a part of investigation for failure to thrive after all other investigations like upper GI series, and breath hydrogen test were found to be negative.

RESULTS: Thirty-two children with failure to thrive were identified. Among them, 26 presented exclusively with vomiting, 4 with early satiety and vomiting, 2 with abdominal pain and vomiting. Both preterm and term infants were included in the study and racial differences were not considered. Males and females were in equal numbers (16). Out of 32 patients, 18 (56.25%) were found to have positive gastric emptying study (14 had moderate delay and 4 had significant delay). It was also noted that there was no significant difference between the clinical presentation among term and preterm children.

CONCLUSIONS: Our study showed a positive association between failure to thrive and gastroparesis in children less than 18 months using gastric emptying studies, irrespective of gestational age and sex. Hence, we suggest including gastric emptying studies as a part of workup for children less than 18 months with failure to thrive presenting with gastrointestinal symptoms. Furthermore, the results of this study highlight the need for multicenter prospective studies.

194

20cal/oz vs 24 cal/oz Preterm Formula (PTF) Trophic Feeds in Very Low Birthweight (VLBW) Infants

Ursula Nawab, Colleen Tsarnas, Emily Hiriak, Zubair Aghai, Janet Larson.
Pediatrics/Neonatology, Thomas Jefferson University, Philadelphia, PA.

BACKGROUND: Establishing enteral feeds in VLBW infants is crucial for feeding tolerance, improved postnatal weight gain and neurodevelopment. Poor enteral nutrition is associated with prolonged TPN and central line days leading to an increase in infection and postnatal growth restriction. Historically, feeds start at 20cal/oz PTF and advanced to 24 cal/oz. Lower calorie formulas fail to provide adequate nutrition and do not effectively stimulate intestinal motility. Minimal osmolarity differences exist among PTF. Feeding intolerance or adverse outcomes, such as necrotizing enterocolitis (NEC), should not be different between 20 cal/oz PTF(PTF20) and 24 cal/oz PTF(PTF24).

OBJECTIVE: To evaluate associations between the type of PTF used for trophic feedings and postnatal weight gain, feeding intolerance and NEC.

DESIGN/METHODS: Retrospective chart review of inborn VLBW infants in a level 3 intensive care nursery at TJUH between 1/2009-11/2011. Feeding practices were not based on protocols and therefore vary by attending. Two trophic feeding practices have emerged. All exclusively formula fed infants were followed for growth, feeding tolerance and neonatal outcomes.

RESULTS: 17 VLBW infants received only formula for trophic and nutritional feedings. 8 infants received PTF20 while 9 infants received PTF24. No differences between gestational age and birth weight were noted. PTF24 demonstrated trends to start feeds earlier (3.3d v 5.5d) and reach full feeds sooner. Earlier discharge was also seen with PTF24. Growth rates were similar (18.3g/d PTF20 vs 17.3 g/d PTF24). There were no significant differences between adverse outcomes including NEC and presumed sepsis While residuals (<2ml) were high in both (71% PTF24 and

75%PTF20); there was no association with significant abdominal pathology.

PTF (cal/oz)	GA (median)	BW(g)	Time to FF (d)	Weight @ 34wk (g)	PMA @ D/C (wk)	LOS (d)	Central Line days
20	30	1158	21.5	1820	39	78	21
24	29	1236	14.4	2005	36	52	7.5

CONCLUSIONS: PTF24 was safe and well tolerated by VLBW infants. No harm was associated with the use of PTF24. Gastric residuals (<2ml) are normal in first two weeks of life despite formula type. As the numbers were low, only trends could be identified. It appears that infants with the more aggressive enteral nutritional strategy attain full feeds sooner and are discharged earlier. This pilot data will be used to design a larger, prospective, randomized trial.

195

House Officer

Association between Serum 25-Hydroxyvitamin D Levels and Blood Pressure in Young Children

Charu Gupta, Susana Rapaport, Robert Woroniecki.

Pediatrics, Flushing Hospital Medical Center, Flushing, NY.

BACKGROUND: 25-hydroxyvitamin D (25OHD) has been known to have an effect on bone health. Low 25OHD in adults has been associated with higher blood pressure (BP) and cardiac co-morbidities. This association has not been fully verified in healthy inner-city children.

OBJECTIVE: To identify whether lower 25OHD levels are associated with higher BP in children 4-8 years of age in an outpatient setting.

DESIGN/METHODS: We conducted a cross sectional study at Flushing Hospital Medical Center between August and October 2011. Subjects 4-8 years of age seen for a health maintenance visit were recruited. Children with diarrhea in the 2 weeks prior to visit, chronic renal or gastrointestinal disorders, or on steroids, antiepileptic or antihypertensive medications were excluded. Demographic data was collected using chart review. We obtained height (HT), HT Z- score, weight, BP, 25OHD, body mass index (BMI), mean arterial pressure (MAP) and MAP index (MAPI) for each subject (MAPI is subject MAP/95th percentile MAP adjusted for HT, age and gender). BP by Dinamap and 25OHD levels by liquid chromatography/tandem mass spectrometry were collected. Levels of 25OHD less than 15 ng/ml were considered deficient, 15-20 ng/ml as insufficient and >20 ng/ml as sufficient. Data were analyzed using t- test and chi squares with P-value <0.05 to be significant.

RESULTS: We found 0% deficiency and 16% insufficiency of 25OHD in our study population. Children with 25OHD insufficiency were shorter than children with sufficiency (table). We confirmed a positive correlation between HT and systolic BP (SBP) (R2=0.11, p=0.02) but detected no correlation between 25OHD and SBP, MAP or MAPI.

Mean, standard deviation and P values

	Total subjects (N=50)	Sufficient (N=42)	Insufficient (N=8)	P value (a)
25OHD (min, max)	26.62±5.47 (16,40)	28.04±4.74	19.12±1.35	<0.001t
Age (years)	5.4±1.1	5.4±1.1	5.8±1.4	0.38t
Female	28 (56%)	23 (54.8%)	5 (62.5%)	0.69p
BMI	17.80±3.07	17.78±3.02	17.91±3.50	0.91t
Ht centile	54.70±30.97	59.05±29.68	31.87±29.14	0.04t
Ht Z score	0.32±1.08	0.45±0.96	-0.33±1.47	0.06t
SBP (mm Hg)	103.64±7.34	103.73±7.44	103.12±7.25	0.83t
MAP (mm Hg)	75.62±5.11	75.56±5.18	75.95±5.08	0.84t
MAPI	0.89±0.06	0.88±0.57	0.90±0.07	0.55t

a Comparison between sufficient and insufficient groups, MAPI- mean arterial BP index, t-student t-test, p- Pearson's Chi Square

CONCLUSIONS: In our small cohort of 4-8 year-old healthy inner city children, 25OHD levels were positively correlated with height, but were not associated with BP.

Poster Session II
General Pediatrics

Saturday, March 31, 2012
6:00pm-7:30pm

196

House Officer

Maternal Perception of Prenatal Stress and Its Relation with Autism Spectrum Disorder in Offspring

Lavinia D. Ionescu, Fernanda Kupferman, Vanessa Camino, Louis Primavera, Susana Rapaport, Kanchana Roychoudhury.

Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Graduate School of Psychology and Health Science, Touro College, NYC, NY.

BACKGROUND: Though studies have shown some correlation between exposure to stress in pregnancy and development of neurobehavioral problems in the offspring, no specific study was found that assessed maternal perception of stress during pregnancy and its relation to autistic spectrum disorder (ASD).

OBJECTIVE: The purpose of this study was to examine the relationship between perceived prenatal maternal stress and diagnosis of ASD in the offspring.

DESIGN/METHODS: This was a case control study conducted in a community-based hospital in a metropolitan area. After obtaining informed consent, a questionnaire designed to assess prenatal stress was given to mothers of children aged 2-11 years who had been diagnosed with ASD (cases) and mothers of children in the same age group without ASD (controls). This questionnaire examined overall stress during pregnancy as well as personal/family stress, including parity, attitudes towards pregnancy, complications during pregnancy, and previous pregnancy losses. Social stressors, including each partner's education, marital status, migration to the USA, and major life events such as loss of loved one and divorce were also examined. The mothers graded each question on a Likert Scale of 1 to 5 based on the intensity of the perceived stress. Data were then analyzed using percentages for descriptive statistics and Pearson's Chi square ($p<0.05$ considered significant) for comparisons between perceived stress in cases and controls.

RESULTS: A total of 150 subjects were enrolled (75 cases, 75 controls). Overall perceived prenatal stress in cases was significantly greater than in controls ($p=<0.001$). Being pregnant for the first time was also perceived to be a greater stressor in cases in comparison to controls ($p=<0.016$). Living in the USA for less than 5 years before becoming pregnant was also perceived as more stressful in cases than controls ($p=0.008$).

CONCLUSIONS: Overall stress during pregnancy, the stress of a first pregnancy, and stress related to migrating to USA within 5 years of pregnancy were perceived to be higher by mothers of children with ASD.

197

Fellow in Training

Neuromuscular Development and Its Association with Growth and Feeding in Infants with Down Syndrome (DS)

Elif E. Ince, Mary E. Pipan, Waynitra C. Hall, Virginia A. Stallings, Babette S. Zemel.

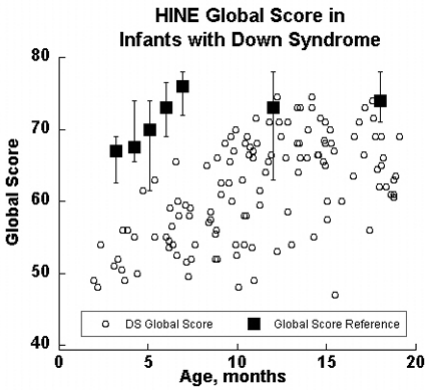
Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Infants with DS often have poor growth, feeding problems, and delayed motor development. This is the first study to use the Hammersmith infant neurologic exam (HINE) to assess neuromuscular development in DS.

OBJECTIVE: To quantify neuromuscular development in infants with DS using the HINE and determine its association with growth and feeding.

DESIGN/METHODS: Infants (3 to 18 mos) with DS were recruited within a tertiary care setting. HINE and growth measurements were performed every 3 months. Feeding and health problems were assessed by questionnaire. Weight, length, and head circumference (HC) z-scores were calculated using WHO standards and corrected age. Effects of neuromuscular status on growth were examined by mixed effects regression analysis.

RESULTS: 59 infants with DS (41% female, 19% African-American, median enrollment age 9 mos) were enrolled. 19% were premature, 64% had cardiac anomalies, and 49% had feeding problems. Infants <12 months did not achieve the median HINE global score for age, and the majority were below the lower bound of published reference ranges.



As expected, delays were noted in sitting (median age 10.3 mos), standing unsupported (n=4, range 13.3 to 18.8 mos), and walking independently (none by 18 mos). Mean (SD) growth z-scores were: weight -0.78 (1.20), length -1.59 (1.22), and HC -1.51 (1.05). Regression analyses revealed a non-linear age-related change in neurologic status and growth. Consequently, all models included age and age-squared terms. HINE global score significantly predicted weight ($\beta=0.04$, $p=0.001$), length ($\beta=0.03$, $p=0.04$), and HC ($\beta=0.02$, $p=0.02$) z-scores. Lower HINE global scores were associated with parental report of trouble swallowing ($\beta=-2.92$, $p=0.004$) and difficulty feeding ($\beta=-1.98$, $p<0.001$).

CONCLUSIONS: Infants with DS had HINE global scores lower than published reference ranges for typically developing infants. Low HINE scores in infants with DS were significantly associated with growth faltering and feeding problems.

198

Neurobehavioral Maturation with Increasing Post Conceptual Age (PCA) as Measured by Serial Assessment of Preterm Infants' Behavior (APIB) System Scoring

Kee Pyon, Gretchen Lawhon, Jaime Jump, Nicole Kemble, Gary Stahl, Sonia Imaizumi.

Pediatrics/Neonatology, Cooper University Hospital, Camden, NJ; Pediatrics, Cooper University Hospital, Camden, NJ.

BACKGROUND: APIB evaluations (Als et al., MRDD Research Reviews 2005;11:94-102) of infants provide screening for neurological abnormalities and facilitate parental understanding of their infants' growth and development. Infants are evaluated two weeks after discharge to support the transition home. Infants are scheduled to be evaluated again within 4-6 weeks to assess ongoing maturation and continue to support parenting. Serial APIB evaluations may show improved system functioning as the infants mature over time.

OBJECTIVE: To determine whether serial APIB evaluations at varying PCA 35-46 weeks (w) reflect maturational differences.

DESIGN/METHODS: Preterm infants undergoing serial APIB evaluations during Jan 2008-June 2011 were included in the study. Relevant demographic and clinical data were collected. The systems were scored on 9-point scales, with 1 representing well organized and 9 poorly organized behavior. These infants were stratified into 3 groups based on the PCA of their first evaluation: PCA1= ≤37w; PCA2= 38-39w; and PCA3= ≥40w.

RESULTS: Serial APIB evaluations were conducted on a total of 174 infants (mean±SD; gestational age: 31.0±2.9 w; birth weight: 1509±461 grams) and the following systems were scored (Table 1): physiological, motor, state, attention, regulatory, and examiner facilitation. The 2nd evaluations were conducted within 2-9 w (median 5 w) after the 1st evaluation. Within each PCA group, comparisons of each system score from the 1st to 2nd evaluation showed significant

improvement (p<0.001) in neurobehavioral organization.

Table 1: System scores (mean±SD) of serial APIB evaluations.

System	PCA1	N=55	PCA2	N=91	PCA3	N=28
	1st evaluation	2nd evaluation	1st evaluation	2nd evaluation	1st evaluation	2nd evaluation
Physiological	5.15±0.49	4.54±0.94	5.19±0.67	4.29±0.79	4.96±0.69	4.18±0.82
Motor	5.05±0.71	4.62±0.83	5.09±0.55	4.33±0.86	4.89±0.83	4.25±0.17
State	4.20±0.65	3.67±0.64	4.01±0.51	3.32±0.89	3.96±0.33	2.96±1.23
Attention	5.45±0.96	4.36±1.11	5.15±1.00	3.64 ±1.08	4.71±1.15	3.54±1.45
Regulatory	5.22±0.71	4.51±0.84	5.11±0.46	4.20±0.86	5.00±0.61	4.07±1.05
Examiner facilitation	5.27±0.59	4.53±0.69	5.14±0.55	4.19±0.76	5.04±0.64	4.04±1.17

CONCLUSIONS: The system scores of the serial APIB evaluations demonstrate measurable maturation that correlates to the infant's increasing PCA. This information can provide anticipatory guidance to parents in their ongoing care of their preterm infants.

199

Functional Disability Following Inpatient Rehabilitation for Isolated Brain and Spinal Cord Injuries in Children

Mark R. Zonfrillo, Flaura K. Winston, Dennis R. Durbin, Margaret G. Stineman.

Center for Injury Research and Prevention, Children's Hospital, Philadelphia, PA; Center for Clinical Epidemiology and Biostatistics, and Department of Rehabilitation Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; Department of Pediatrics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Injury is the leading cause of acquired disability in childhood yet little is known about the disability recovery patterns associated with rehabilitation for traumatic injuries.

OBJECTIVE: To determine the residual functional disability after inpatient rehabilitation for isolated brain and spinal cord injuries in children 7-18 years old.

DESIGN/METHODS: Data from the Uniform Data System for Medical Rehabilitation database, representing more than 850 (~80%) of the United States-based rehabilitation centers, was used. Patients 7-18 years old who underwent rehabilitation for isolated traumatic brain injury (TBI) or spinal cord injury (SCI) from 2000-2009 were included. Injuries were categorized by International Classification of Diseases 9th Revision codes and standardized rehabilitation-center designated impairment codes. Patients with multiple injuries, including the combination of TBI and SCI, were excluded. Functional outcome at the time of discharge was based on the Functional Independence Measure (FIM) instrument, consisting of standardized levels of achievement from grade 1 (need for total assistance for eating, bathing, dressing, bowel/bladder management, walking) to grade 7 (completely independent for all self-care and mobility).

RESULTS: There were 3017 children with isolated brain or spinal cord injuries from 2000-2009. Table 1 lists the distribution of injury type and functional independence grade upon admission and discharge from rehabilitation. The change in grades from admission to discharge was significant for all three injury types (p<0.001 for all three). Similarly, the difference in discharge grades between the three injury types was also significant (p<0.001).

Injury Type	N	Median Admission Grade*	Median Discharge Grade*
Brain Injury	2055	1	4
Paraplegia	472	1	3
Quadriplegia	490	1	1

*Functional independence grade upon admission and discharge from inpatient rehabilitation: grade 1 (total assistance) to 7 (full independence)

CONCLUSIONS: Children with isolated TBI or SCI uniformly have poor functional status upon admission to inpatient rehabilitation. When compared to SCI, children with isolated TBI can be expected to achieve higher levels of physical function by rehabilitation discharge. All these injuries result in moderate or severe long-term disability. These traumatic events during critical stages of development result in a substantial care burden over the course of the lifespan.

200

Medical Student

Children with Head Injury Triaged by a Pediatric After-Hours Call Center

Kathryn C. Hall, Mark R. Zonfrillo, Christina L. Master, Anthony A. Luberti, Kristy B. Arbogast.

Center for Injury Research and Prevention, Children's Hospital of Pennsylvania, Philadelphia, PA; Department of Pediatrics, Children's Hospital, Philadelphia, PA.

BACKGROUND: After hours call centers often represent a first line of triage for pediatric patients sustaining head trauma as many of these injuries occur outside of normal business hours. For the vast majority of mild traumatic brain injury or concussion, appropriate management includes early intervention of cognitive and physical rest with primary care provider follow-up. Further analysis of the patterns of calls pertaining to head injury to a hospital call center can guide allocation of future healthcare resources.

OBJECTIVE: To assess the current call demographics and the disposition patterns for children presenting with head trauma to an after-hours call center within a single, pediatric primary care network of approximately 200,000 patients.

DESIGN/METHODS: This study is a retrospective review of electronic medical records for pediatric patients utilizing the after-hours call center for head trauma. Inclusion criteria were: 1) calls between 7/1/2010-6/30/2011, between the hours of 5pm-9am on weekdays, and anytime during Saturdays, Sundays, and holidays, 2) children 5-18 years old, 3) any telephone encounter for which the Barton-Schmitt head trauma algorithm was used. Patient demographics and management decisions were summarized.

RESULTS: A total of 732 telephone encounters were identified that met the above inclusion criteria. Of these, the mean patient age was 10.0 ± 3.6 years. When compared to the demographics of the entire primary care network, patients utilizing the after-hours call center for head trauma were more likely to be male (65.3% vs. 50.2%, p<0.001), white (61.2% vs. 55.5% p<0.001), and have private insurance (77.9% vs. 70.1%, p<0.001). The busiest months, with approximately 11% of calls for each: May (10.9%), October (11.3%), and November (10.7%). The disposition recommendations for the head trauma-related calls were as follows: 58%-home management, 32%-emergency department, 9%-primary care provider, 1%-call 911, 1%-other.

CONCLUSIONS: Of the 732 head trauma-related calls received by the call center, the typical patient was a 10-year-old white male with private insurance. While the disposition for the majority of the calls was instructions for home care, approximately one-third were directed to the emergency department. Further study can determine whether the home management instructions appropriately utilize health system resources and follow current consensus recommendations for management of mild traumatic brain injury.

201

Domestic Violence Screening in a Resident Continuity Clinic Using Questionnaires

Cynthia DeLago.

Pediatric & Adolescent Medicine, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: The AAP recommends screening for domestic violence (DV) in pediatric offices. Most pediatric practices screen verbally, but this can be prohibitive when older children are present.

OBJECTIVE: To introduce and monitor DV screening using a written questionnaire in an urban, resident continuity clinic.

DESIGN/METHODS: A DV screening program was recently implemented in our resident continuity clinic after developing the following policies and procedures: a validated, written DV screening questionnaire (HITS) is distributed to parents by medical assistants, but only if parents arrive without their partners; parents' responses are reviewed by the child's medical provider, who responds to requests for information or counseling services. Before and after implementation, we surveyed staff about perceptions regarding DV screening. After implementation, parents were surveyed to assess their opinions about screening methods and the program.

RESULTS: 17 clinical staff were surveyed prior to program implementation: 12 (71%) felt DV is somewhat/very much a problem for our patients; all agreed that screening may benefit the children. Most (76%) recognized implementation would increase training requirements but might increase their work performance [16 (94%)]. Post-implementation, some staff expressed concerns about the screening tool including: confidentiality issues for the parent; the perception that parents might have trust issues completing the questionnaire and some were uncomfortable distributing the questionnaire. Some staff used the survey to ask questions about how to handle certain situations. 18 parents completed surveys about DV screening: most (67%) felt the doctor should be asking about DV; 1 preferred oral screening, 3(17%) preferred the written questionnaire, the rest had no preference. Of note, 6 parents screened positive over the past month.

CONCLUSIONS: Written DV screening questionnaires are useful in pediatric settings, but need to be implemented with caution if non-providers are involved. Assessing staff concerns before and after implementation can help identification of barriers to be addressed with additional education and training. Parents are amenable to screening for DV with questionnaires.

202

House Officer

The Use of a Domestic Violence Screening Card To Improve Screening and Referral Rates for Domestic Violence in a Resident Continuity Clinic: A Quality Improvement Project

Stacy B. Ellen, Mario Cruz, Ramona Peralta.

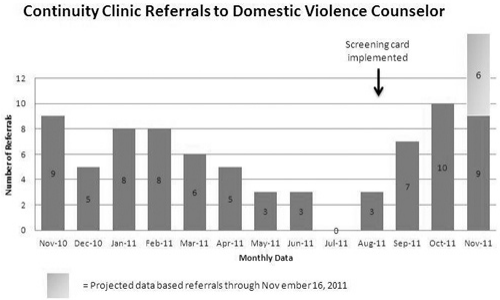
Pediatric Residency Program, St. Christopher's Hospital for Children, Philadelphia, PA; Section of General Pediatrics, St. Christopher's Hospital for Children, Philadelphia, PA; Bilingual Domestic Violence Program, Lutheran Settlement House, Philadelphia, PA.

BACKGROUND: The American Academy of Pediatrics has recommended that pediatricians routinely screen caregivers for domestic violence (DV). Unfortunately, screening for DV in front of children older than 3 years old is not recommended because of concerns that it may traumatize the child and the child may disclose the conversational content to the perpetrator. To address this challenge, we designed and implemented a DV screening card for use by residents when children older than 3 were present.

OBJECTIVE: We hypothesized that DV screening cards, as an adjunct to standard verbal DV screening, would improve DV screening and referral rates from the resident continuity clinic.

DESIGN/METHODS: A laminated 4x6 inch DV screening card, containing a modified version of the 4-item HITS© questionnaire (in English and Spanish), was placed in all patient rooms of a resident continuity clinic. Residents were instructed to administer the screening card when a caregiver presented with a child older than 3 years-old. Caregivers were asked to silently read the questions and respond with a "yes" (positive DV screen) or "no" (negative DV screen). Changes in DV screening rates were determined by resident self report through online surveys. DV referral rates were measured by the absolute number of DV victims referred to the DV counselor before and after implementation of the DV screening card.

RESULTS: Forty-two percent of residents reported using the DV screening card within three months of implementation. Self-reported DV screening rates of caregivers with children older than 3 years-old were unchanged. Referrals to the DV counselor gradually increased over the first 3 months of the intervention.



CONCLUSIONS: After 3 months of implementing DV screening cards in a resident continuity clinic, DV screening rates were unchanged however referrals increased. With improved and more consistent use of DV screening cards, we expect further improvement in DV screening and referral rates.

203

Medical Student

Unsafe Routes to School? Using GIS To Examine the Local Food Environment around Schools in an Inner City Minority Community

Leigh Goldstein, Maida Galvez, Catherine Knuff, Kathleen McGovern, Susan Teitelbaum, Barbara Brenner.
Mount Sinai School of Medicine (MSSM), New York, NY; Department of Preventive Medicine, MSSM, New York, NY; Department of Pediatrics, MSSM, New York, NY.

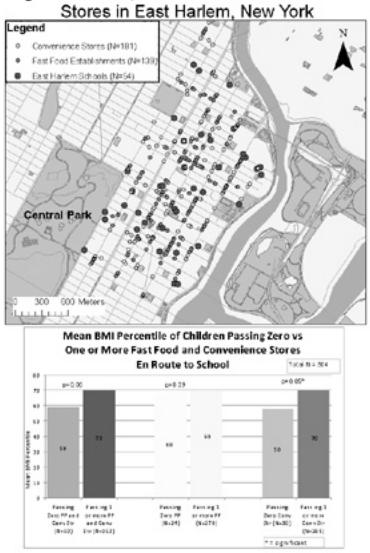
BACKGROUND: Geographic Information Systems (GIS) provide a unique methodology for examining the local food environment that children encounter on a regular basis en route from home to school.

OBJECTIVE: To describe the food environment around schools that children encounter traveling from home to school and to examine associations with body size.

DESIGN/METHODS: Cross-sectional data from 304 children participating in the Growing Up Healthy in East Harlem Study were included in the analyses. Fast food and convenience stores data in East Harlem, NY were collected via a walking survey. Shortest paths between home and school were determined with GIS and the number of establishments along the path was calculated for each child. Age and gender specific BMI percentile for children who did not pass any fast food or convenience stores was compared to those passing one or more using t-tests.

RESULTS: Children traveled on average 447m (6 city blocks) on the shortest path from home to school (range 17-2336m). Mean fast food stores passed was 4 (range 0-19); mean convenience stores passed was 4 (range 0-23) and mean fast food and convenience stores combined was 8 (range 0-36). 6% (n=18) did not pass any of these food sources along this path. Data indicate a trend towards greater body size in those passing 1 or more convenience or fast food stores compared to those passing zero (p=0.06). BMI percentile was significantly greater for those children passing 1 or more convenience stores on the shortest path to school compared to those passing zero (p=0.05) while there was no significant difference for those passing 1 or more fast food stores compared to those passing zero. (See Figure 1.)

Fig. 1. Schools, Fast Food and Convenience Stores in East Harlem, New York



CONCLUSIONS: Inner city, minority children have multiple opportunities to purchase food from fast food and convenience stores en route from home to school. These data suggest interventions targeting the local food environment around schools may be warranted.

204

House Officer

A Comparison of Community-Acquired Methicillin-Resistant *S. aureus* Versus Community-Acquired Methicllin-Sensitive *S. aureus* Disease in Hospitalized Children

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BACKGROUND: The prevalence of community-acquired methicillin-resistant S*taphylococcus aureus* (CA-MRSA) is rising. Like community-acquired methicillin-sensitive *S. aureus* (CA-MSSA), CA-MRSA can cause severe invasive disease. Little is known about the difference in invasiveness and associated outcomes for CA-MRSA and CA-MSSA.

OBJECTIVE: Our primary objective was to determine if CA-MRSA is more likely than CA-MSSA to cause invasive disease. The secondary objective was to determine if among invasive disease CA-MRSA is associated with worse outcomes.

DESIGN/METHODS: This was a retrospective chart review of children less than 21 years admitted to the Children's Hospital at Montefiore between 8/1/2010 and 8/31/2011 and found to have community-acquired *S. aureus* (positive culture within 72 hours of admission or clinical evidence suggesting the disease was community-acquired). Patients who had an indwelling catheter or hardware in place were excluded. Cultures from the nasopharynx, axilla, or rectum were excluded. For those patients admitted more than once, only the first admission was included. Chi Square was used to compare proportions. Kruskal Wallis test was used to compare medians.

RESULTS: 198 patients with CA-*S. aureus* disease were included. Of those with CA-MRSA, 11% had invasive disease (n= 12) and of those with CA-MSSA, 15% had invasive disease (n=13, p=0.54). Among those with invasive CA-MRSA, osteomyelitis was the most common diagnosis (n= 6). Other invasive CA-MRSA included bacteremia (1), pneumonia (2), meningitis (1), epidural abscess (1), and renal abscess (1). Bacteremia (n=8) was the most common manifestation of invasive CA-MSSA, followed by osteomyelitis (3), septic arthritis (1), and parapharyngeal abscess (1). Length of stay (LOS) varied between invasive CA-MRSA and invasive CA-MSSA, with a median LOS of 11 days (IQR 6-17) for CA-MRSA and 7 days (IQR 5-10) for CA-MSSA (p=0.31). LOS was similar between noninvasive CA-MRSA and CA-MSSA, with a median LOS of 3 days (IQR 2-4) for both (p=0.54).

CONCLUSIONS: Noninvasive *S. aureus* disease appears to be a uniform condition. Regardless of whether the disease is caused by a methicillin-resistant strain, LOS is similar. Invasive CA-MRSA may be clinically different from invasive CA-MSSA. Although not statistically significant, the longer median LOS for invasive CA-MRSA is clinically meaningful and suggests more severe disease.

205

House Officer

Prevalence of Toxic Camphor Use in Children under 6 Years of Age

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BACKGROUND: Camphor is a well-established neurotoxin and causes many pediatric emergencies annually. It is found in health products, products for religious practices, unregulated imported products, and pest control products. Ingestion, inhalation, and topical use have been linked to seizures, respiratory problems, coma, and death in children. Camphor is sold legally in concentrations < 11% and is sold illegally in concentration > 11%.

OBJECTIVE: Evaluate the prevalence and methods of camphor use in homes with children under 6 years old.

DESIGN/METHODS: A convenience sample was surveyed anonymously in ambulatory clinics affiliated with an urban community hospital over a six month period. The survey was available in English and Spanish. Caregivers of children < 6 years old were read aloud questions about purpose and frequency of product use and method of use in children.

RESULTS: Ninety-five caregivers were surveyed: 97% were biological parents; mean age was 28±9 years; 50% had at least a high school degree; 96% identified as Hispanic. Mean child age was 3.1±1.9 years. 83 of 95 respondents (87%) reported use of camphor products in the home. Oil, liniment, and cubes/tablets were the most commonly used products, with prevalences of 22%, 82%, and 44%, respectively. Table 1 presents prevalences for specific uses of the 3 products.

Use of Camphor Products in Homes with Young Children

Camphor Product	Prevalence of Use (among n=83 who endorsed use)	Medicinal Use	Use more often when child sick	Use in children < 2 years old	Use by ingestion	Use by inhalation	Use by application to skin
Oil/Tincture	22%	12%	10%	7%	1%	1%	99%
Rub/Liniment	82%	74%	31%	16%	4%	8%	93%
Cubes/Tablet	44%	4%	5%	4%	1%	4%	28%

Camphor oil and tablets, which contain high levels of camphor, were used with notable frequency. Oil and liniment were used for skin application by the vast majority of subjects. Although consumption of camphor is toxic, a small portion of caregivers endorse its ingestion.

CONCLUSIONS: These data suggest that camphor is widely used in homes with children. The high rate of illegally imported and unregulated camphor product use is of enormous concern, given the neurotoxicity of camphor. Topical, inhalational, and ingestion uses, especially in children less than 2 years old, is extremely dangerous. The results of this study create awareness of the hazardous uses of camphor products in children. Pediatricians are urged to proactively warn parents about the dangers of camphor products and to discourage their use.

206

Space and Temporal Cluster of Kawasaki Disease in Florida Panhandle

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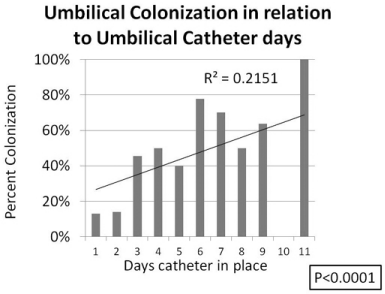
BACKGROUND: The etiology of KD remains somewhat of a mystery. Many genetic, immunologic, infectious and epidemiologic explanations have been proposed in the pathophysiology.

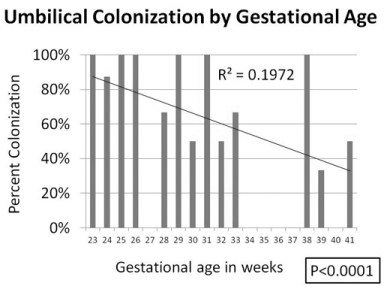
OBJECTIVE: The objective of our study is to analyze for spatial and temporal clusters of KD in the Florida panhandle to enable further study of environmental attributes in clusters.

DESIGN/METHODS: Addresses and date of onset of illness for children admitted with KD to the only Children's Hospital in the Florida panhandle from 2/16/2008 to 9/10/2011 were geocoded electronically using ArcMap®. Base population data for census tracts in the catchment area were downloaded from the 2010 Census website. A shapefile containing the KD count, the base population of children, and geographic coordinates of the census tract was created. The data file was then input into SATSCAN® where spatial and temporal cluster analysis using the Poisson model was performed.

RESULTS: A statistically significant higher than expected time cluster of KD was found from 12/15/2010 to 9/14/2011 (Log likelihood ratio 6.92, relative risk 2.72, p = 0.016; expected 13, actual number of cases was 26). Additionally, there was a spatial cluster (Log likelihood 8.89, p = 0.014; expected 31.5; actual number of cases was 48).

CONCLUSIONS: In this pilot study using SATSCAN® with ArcMap®, there were temporal and spatial clusters detected for KD in the Florida panhandle. Further study of environmental factors during this time and at locations specified may shed light on epidemiologic factors related to KD.





207

The Role of Caregiver Stress and Home Environment on Maternal Care-Seeking Patterns for Acute Child Illness in South Africa

Omolara T. Uwemedimo, Shuaib Kauchali, Jane Kvalsig, Fatimatou Bah, Claude A. Mellins, Stephen M. Arpadi, Murray H. Craib, Leslie L. Davidson.
Department of Pediatrics, Columbia University, New York, NY; Department of Paediatrics and Child Health, University of KwaZulu Natal, Durban, South Africa; Department of Epidemiology, Columbia University, New York, NY; Department of Sociomedical Sciences, Columbia University, New York, NY.

BACKGROUND: Half of all global childhood deaths occur in sub-Saharan Africa (SSA), many attributable to inadequate care-seeking practices for acute illnesses, especially among poor families. Impoverished families are also at greater risk for caregiver stress and chaotic home environment, yet few studies have examined the role of caregiver stress and home environment on care-seeking for acute child illness in SSA.

OBJECTIVE: To examine the effect of caregiver stress and home environment on care-seeking patterns among caregivers in an impoverished, peri-urban area of KwaZulu Natal, South Africa.

DESIGN/METHODS: From September 2008- May 2010, 1437 caregivers of children aged 4-6 years, were screened for CS and CHE using the Parenting Stress Index and the Confusion, Hubbub and Order Scale (CHAOS), respectively. Data were collected on maternal socio-demographics and care-seeking in the past 6 months for any cough, diarrhea or weight loss for >14 days experienced by the index child. The main outcome was whether a caregiver sought treatment for child illness. Associations between CS variables and CHAOS score with care-seeking were assessed using separate logistic regressions, adjusting for maternal income status and education.

RESULTS: Of the 979 caregivers who were birth mothers, 303 (31%) had a child who had experienced at least 14 days of cough, diarrhea, or weight loss in the past 6 months. 33% of these caregivers did not seek care for the reported illness. Compared to mothers who sought care, those who did not seek care were more likely to report inability to make decisions about their child without help (OR 1.69, 95%CI: 1.03-2.77). This association remained significant after adjusting for maternal income status and education (AOR 1.71, 95%CI: 1.04-2.82). In addition, those who did not seek care had a hgher CHAOS score than those who did seek care (OR 1.22, 1.08-1.38), even after adjustment (AOR 1.20, 1.06-1.37).

CONCLUSIONS: Mothers reporting difficulty with parental decision making and a more chaotic home environment were less likely to seek care during child illness, even after controlling for maternal risk factors. Further research is warranted to determine if screening for CS and CHE is of value for identifying mothers at risk for decreased use of essential child health services.

208

Resident

Hospitalization for Diarrhea in Children across the United States – Study from a Nationally Representative Sample

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BACKGROUND: Diarrhea is one of the most common presentations in pediatric practice. Several demographic variables contribute to high hospital admissions for diarrhea in the United States. This enhances the need for a nationally representative sample to do in-depth analysis on hospitalizations for diarrhea.

OBJECTIVE: To examine the hospital utilization for diarrhea and to estimate the burden on health care system in the United States.

DESIGN/METHODS: We used the National Inpatient Sample (NIS) for the year 2007 to analyze the epidemiology of hospitalizations due to diarrheal diseases in the pediatric population (1-17 years) in the US. NIS, which is the largest US all payer database is a part of the Healthcare Cost and Utilization Project (HCUP). The following ICD-9 codes were selected for Diarrhea (787.91, 001, 004, 006, 007, 008, 009). IBM PASW 18.0 was used for data analysis. For each hospitalization, NIS allows a total of up to 15 diagnostic entries.

RESULTS: Age 0 – 17 years: Admissions for diarrhea was 68,919 contributed by 39,864 principal diagnoses and 29,055 secondary diagnoses

Age sub group	Total Number of admissions as principal diagnoses	Proportion of contribution
< 1 year	10,632	26.7%
1-4 years	18,841	47.3%
5-9 years	5,490	13.8%
10-14 years	2,635	6.6%
14-17 years	2,266	5.7%

Males were 54.5% of admissions
Mean length of stay – 2.4 days
Mean charge for hospitalization for admission – US $8314
55.7 % admissions were through ER
Payer 42.5 % - Medicaid, 49.2 % - Private insurance including HMO's
Race: 55.9 % - Whites, 12 % - Afro-Americans, 23.7 %- Hispanics
Admission season: Jan – Mar: 46.1 %, April – Jun: 29 %, July – September: 12.1 %, Oct –Dec: 12.8%
Median household income: 1) Less than $38,999 – 30.9 % 2) $39K - $47,999 – 25 %
3) $48K – $62,999 – 22.2 % 4) > $63K – 21.8 %
Associated diagnoses for principal diagnosis of diarrhea:
Dehydration 68.6%
Vomiting 2.4%
Fever 4%

CONCLUSIONS: The study shows high admission rates among age groups 1- 4 years across the United States. Most cases are admitted during months of January, February and March, with common associated diagnosis of dehydration. This emphasizes the importance of dissemination of information to parents by primary care pediatricians on oral rehydration during diarrheal episodes. Aggressive management of the target population will help us to decrease the morbidity and excess burden on the health care system due to diarrheal diseases.

209

Contribution of the School Food Environment to Snacking Behaviors in NYC Children

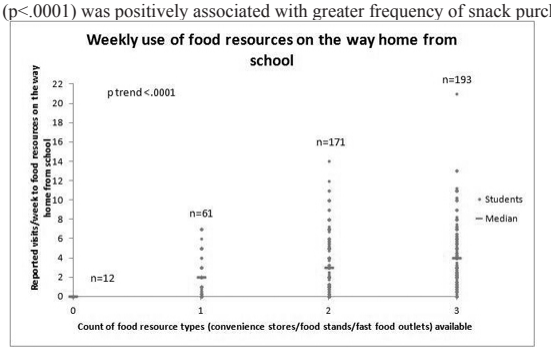
Catherine T. Knuff, Kathleen McGovern, Maida P. Galvez, Barbara Brenner, Susan Teitelbaum.
Preventive Medicine, Mount Sinai School of Medicine, New York, NY; Pediatrics, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Research has shown that access to unhealthy foods is greater for children in low-income minority neighborhoods. This negatively influences dietary quality, placing these children at higher risk for obesity. Snacking may be an important component of these diets.

OBJECTIVE: To examine the availability and use of snack food resources on the way home from school (convenience stores, food stands and fast food outlets) and vending machines in school by low-income minority children in NYC.

DESIGN/METHODS: Interview data collected when the children (N= 454) were between 6 and 8 years old were used. Food resource and vending machine availability, frequency of use and purchases were collected by in-person interviewer-administered questionnaire with the participants and their parent or legal guardian in their language of choice (English/Spanish). The association between access to resources and use was calculated by p trend analysis.

RESULTS: Availability and use of food resources on the way home from school was high (99% of students have at least 1 food resource, 89% use at least 1). Conversely, vending machine availability (40%) and use (17%) was low. Access to a variety of vending machines (p<.0001) and food outlets (p<.0001) was positively associated with greater frequency of snack purchases.



Purchases of sugar-sweetened drinks and junk foods predominated over more healthy options. Convenience stores were used by the greatest number of children (71%) in comparison to the other resources. The most common foods reportedly consumed were sweets (n=347), ice cream (n=306) and chips (n=289) and the most common drink juice (n=321), but purchases differed by food resource.

CONCLUSIONS: Food resources on the way home from school are a common choice for unhealthy snack purchases among low-income minority children in NYC. Interventions targeting snacking behaviors on the way home from school may help address concerns about overall dietary quality that contribute to the obesity epidemic.

210

House Officer

Improving Blood Pressure Screening: A Quality Improvement Project Using a Novel EHR Tool at a Multi-Center Academic Community-Based Health Network

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Pediatrics, Columbia University, New York, NY; Biomedical Informatics, Columbia University, New York, NY.

BACKGROUND: Because the long-term effects of hypertension are significant, the AAP recommends annual blood pressure (BP) screening starting at age 3. To date, there is limited data on clinician measurement of BPs and recognition of abnormal BPs. This recognition is complicated by the need to calculate BP percentiles (BP%) with the use of tables or online calculators. The

use of a simple tool to calculate BP% in the electronic health record (EHR) may be of benefit in the clinical setting.
OBJECTIVE: To assess the effect of a quality improvement (QI) project, which included a novel EHR tool, on rates of BP screening and BP% documentation.
DESIGN/METHODS: A resident led QI project was implemented in July of 2010 at one of four inner-city academic community health centers serving mostly low-income, Latino families with Medicaid. It was then spread to all sites in July 2011. We report on data collected at 2 of the sites. The change package included provider education about the current BP screening guidelines, medical assistant (MA) training in BP measurement technique, and an EHR tool that calculated BP% and recorded it in the medical record by pressing the "F6" button on the computer keyboard. A BP was taken by a MA using an automated cuff, or by the provider using a manual cuff, during well child visits for children aged 3 to 21. Chart reviews were done to determine provider use of the EHR tool as well as rates of BP documentation pre and post-intervention. Chi-square analysis or where appropriate, Fisher's Exact test were used to assess for change in provider behavior.
RESULTS: 442 charts were reviewed (241 pre and 201 post-intervention). The average age was 9.4 and 53.5% were female. There was a significant increase in BP screening from 90% pre-intervention to 98% post-intervention (p- value .0002). We also documented a significant usage of the EHR tool to document BP% (75%). Pre-intervention no BP% were documented.
CONCLUSIONS: Yearly BP screening according to AAP guidelines and the documentation of BP% were significantly increased after the QI project. The change package, which included prescreening for BP and the novel EHR tool, were utilized by the majority of providers and spread to other sites. Further studies are necessary to determine if such changes lead to increased recognition and treatment of hypertension.

211

House Officer

Educational Intervention To Improve Knowledge of Pediatric Emergencies and Disaster Preparedness among Pediatric Practitioners

Rochelle K. Kushner, Holley F. Allen.
Pediatrics, Baystate Medical Center, Springfield, MA.

BACKGROUND: Evidence has shown that pediatricians are under equipped to deal with pediatric emergencies in office-based settings. This is due to poor access to supplies, little or no staff training or protocols, and failure to run mock codes. The American Academy of Pediatrics, itself, recognizes the importance of this issue, and has issued several statements accordingly.
OBJECTIVE: To improve the knowledge of pediatric emergencies and disaster preparedness among pediatric trainees and faculty.
DESIGN/METHODS: We conducted a needs assessment among pediatric trainees and faculty in a large teaching hospital to tailor a 4-hour curriculum to remedy perceived knowledge deficits. A 15-item pre/post multiple choice knowledge test and self-efficacy report was administered immediately prior to and after the conference. Quantitative and qualitative analyses identified prior training. Knowledge sub-domains included head injury (3 items), seizures (4 items), anaphylaxis (3 items), bioterrorism (3 items) and disaster response (2 items). We hypothesized a tailored training would improve knowledge and self-efficacy among all sub-domains.
RESULTS: A total of 86 respondents completed the pre-workshop assessment at the start of the session, and 88 completed the post-workshop assessment at the end of the session. *Knowledge:* At time 1, the average respondent correctly answered 8.5 (+/- 2.4) of 15 questions. At time 2, the average respondent answered 12.2 (+/- 2.1) of 15 questions correctly. *Self-efficacy:* After the workshop, significantly more subjects reported being "very" or "extremely" confident handling large-scale public health disasters (52.1% post-workshop vs. 12.7% pre-workshop, P<0.0001) and significantly more respondents reported high confidence handling head injury emergencies (80.7% vs. 40.7%, P<0.0001). Self-efficacy scores correlated positively with overall knowledge scores (r 0.19, p=0.04).
CONCLUSIONS: A 4-hour long workshop significantly improves knowledge and confidence in pediatric emergency and disaster preparedness. The sub-domain with the lowest performance was head injury recognition and treatment; the sub-domain with the highest scores was seizure. Although knowledge gains were apparent for two of three head injury case descriptions, it was suboptimal. More intensive training may be required to improve knowledge of head injury emergencies. Further investigation is needed to determine the long-term retention of this knowledge and confidence.

212

House Officer

A Clinical Prediction Rule To Identify Patients at High-Risk for Community-Acquired MRSA Cutaneous Abscesses

Michael J. Alfonzo, J. Brittany Pardue, Nikhil B. Shah, Mary J. Ward.
Komansky Center for Children's Health, New York Presbyterian Hospital, New York, NY; Pediatrics, Weill Cornell Medical College, New York, NY; Emergency Medicine, Mount Sinai Medical Center, New York, NY.

BACKGROUND: Community-acquired MRSA (CA-MRSA) is the most common cause of skin and soft-tissue infections in many regions of the US. Empiric broad-spectrum antibiotic use may lead to greater bacterial resistance patterns; therefore, judicious use is critical.
OBJECTIVE: Derive a clinical prediction rule to identify patients at high risk for CA-MRSA cutaneous abscesses.
DESIGN/METHODS: A retrospective chart review of subjects under age 21 years treated in the pediatric emergency department of an urban tertiary care center between 1/2008 and 12/2011 was performed. Inclusion criterion: diagnosis of "cutaneous abscess" or "incision and drainage of abscess." Exclusion criteria: (1) no wound culture (2) other skin infection. Potential predictors of CA-MRSA infection included historical, physical examination, and demographic data.

Potential Predictors of CA-MRSA

Demographic and Clinical Factors	MRSA-negative culture (n=99)	MRSA-positive culture (n=93)
Gender	48% male	47% male
Geography (NYC)	34% outer boroughs	45% outer boroughs
Ethnicity (p<.05)	27% Latino	43% Latino
Insurance (p<.05)	51% Medicaid	65% Medicaid
Location of abscess	23% groin	29% groin
Season	39% summer	39% summer
Age (years)	9.6 ± 0.7	9.3 ± 0.7
Duration of abscess (days)	6.3 ± 1.2	4.8 ± 0.5
Size of abscess (cm)	3.6 ± 0.3	3.9 ± 0.3
Fever	27%	32%
Positive hx skin infection	27%	31%
Recent antibiotic use	34%	32%
Multiple abscesses	87%	82%
WBC	14,060 ± 1,128	14,850 ± 871

RESULTS: To date, 192 of 400 subjects have been reviewed. The prevalence of CA-MRSA was 48%. Parameters were analyzed for association using odds ratios. No clinical parameter yielded a significant risk. Two demographic factors were associated with increased risk of CA-MRSA: Latino ethnicity (OR = 2.5, p<.05) and Medicaid insurance (OR = 1.4, p=.05).
CONCLUSIONS: Clinical parameters typically suggestive of CA-MRSA were not associated with positive cultures in this sample. Certain demographic factors suggested increased risk for CA-MRSA. Limitations include reduced statistical power due to small sample size and incomplete data. Future directions include prospective data collection with a larger sample size and multivariate analysis to derive a clinical prediction rule identifying patients at risk for CA-MRSA infection. Defining which patients benefit from broad-spectrum antibiotics may help tailor medical therapies, while lessening risk for increased antibiotic resistance.
*Contributions of the first two authors were equal.

Poster Session II
Neonatology

Saturday, March 31, 2012
6:00pm-7:30pm

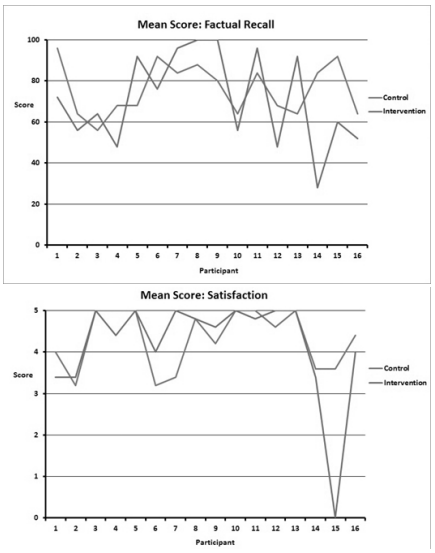
213

Fellow in Training

Can Written Information Improve Factual Recall and Satisfaction Following the Prenatal Consult? A Randomized Controlled Trial

Jennifer Kett, John Larsen, Hany Aly.
Children's National Medical Center, Washington, DC; George Washington University, Washington, DC.

BACKGROUND: How best to guide families when making decisions at the limits of viability remains unknown.
OBJECTIVE: To determine whether the provision of written information about prematurity can improve factual recall and satisfaction following the prenatal consult.
DESIGN/METHODS: We conducted a randomized controlled trial of expectant mothers from 22 to 30 weeks GA. Eligible women received routine prenatal consultation prior to enrollment and randomization. Women in the control group received written information about breast feeding. Women in the intervention group received the same breast feeding information as well as additional written information about prematurity. A survey was then administered to elicit their factual recall and satisfaction.
RESULTS: Thirty-two women completed the survey. This sample size was calculated to detect a difference of 15 points with 80% power. There was no significant difference in mean factual recall score between the groups (control 76%; intervention 71%; p=0.44). There was also no significant difference in mean satisfaction score between the groups (control 4.31; intervention 4.18; p=0.71).



CONCLUSIONS: In this study, providing written information about prematurity to expectant mothers did not improve their factual recall or satisfaction. This finding suggests that written information is not an effective way to deliver information to women in preterm labor. The poor performance of many participants on the test of factual recall indicates that they may not be adequately informed by the prenatal consult, despite their high level of satisfaction.

214

Medical Student

Impact of Physician Awarenessis on Diagnosis of Fetomaternal Hemorrhage

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BACKGROUND: Fetomaternal hemorrhage (FMH) is a poorly understood condition in which the placental barrier allows transmission of fetal whole blood to the mother. As an acute or chronic condition, FMH can cause severe anemia in the fetus resulting in significant illness or death in the perinatal period and lifelong disability. The epidemiology and pathophysiology of FMH are poorly understood. Diagnosis of FMH requires specific blood testing. In this study, we evaluated incidence of FMH in three time epochs, two before and one after increased awareness of the disease by our institution's practicing neonatologists.

OBJECTIVE: To identify the role of physician awareness in the diagnosis of FMH.

DESIGN/METHODS: This is a retrospective cohort study of all neonates with hematocrit (HCT) measured in the first 24 hours of life who were born at our institution in three separate three-year epochs: 1988-1990, 2001-2003, and 2008-2010. Patients were identified from a diagnosis database of clinical and demographic information maintained prospectively of all neonates admitted to our institution's newborn medicine service (NICU and level I nurseries). Those included were diagnosed with congenital anemia based on gestational age-adjusted normal HCT values. The full medical record of all patients diagnosed with congenital anemia was evaluated for accuracy of diagnosis of anemia for gestational age as well as any identified etiology of anemia. Statistical comparisons were made by Student's t-test, ANOVA, and χ^2 test as appropriate.

RESULTS: Of 14,244 live births, 260 (1.8%) neonates with congenital anemia were identified. For the majority, the cause of anemia was not known. Sixteen cases of FMH demonstrated by positive Kleihauer-Betke testing (KB) occurred in our cohort. The incidence of diagnosed FMH among anemic neonates in the first two epochs was 2.4% and 1.9% respectively. In the epoch following an increase in awareness of FMH by neonatologists, the incidence of FMH diagnosed among anemic neonates was 21.8% ($p<0.001$). There were no significant differences in patient population, obstetric practice, or laboratory testing between epochs.

CONCLUSIONS: FMH may be a significant cause of congenital anemia. Diagnosis of FMH is highly dependent on physician awareness. If physicians do not order KB or other definitive testing for FMH in response to a low HCT at birth, the condition will go undetected. This has significant impact on both management of the affected neonate and family planning for future pregnancies.

215

Fellow in Training

Maternal Predictors of Large for Gestational Age (LGA) Infants

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BACKGROUND: LGA infants are at risk for transitional birth disorders and subsequent weight-related health compromise.

OBJECTIVE: To identify maternal risk factors associated with LGA that are amenable to potential health intervention strategies.

DESIGN/METHODS: Database of maternal deliveries at Christiana Hospital (level III) from 2009-2010 time period (n=11134). Demographics: LGA 6.6%; Maternal Age - teenager 5.4%, AMA 19.3%; Race/Ethnicity - White/Non-Hispanic 59.9%, Black/Non-Hispanic 22.7%, Hispanic 10.4%, Asian 5.5%; Maternal prepregnancy weight - BMI normal 48.7%, overweight 24.8%, obese 22.5%. Logistical regression was used to determine maternal predictive factors for LGA.

RESULTS:

Maternal Predictive Factors for LGA Infants

Factor	OR	95% CI
Overweight vs Normal (BMI)	1.427	(1.173-1.737)
Obesity vs Normal (BMI)	2.311	(1.914-2.790)
Weight Gain > IOM Guidelines	1.806	(1.476-2.209)
Smoking	0.737	(0.575-0.946)
Hypertension	0.738	(0.564-0.966)
Private Insurance vs Public Insurance	0.803	(0.657-0.981)
Teenager vs 20-35 age	0.540	(0.312-0.933)
AMA vs 20-35 age	1.230	(1.025-1.476)
Hispanic vs White/Non-Hispanic	0.713	(0.526-0.966)
Black/Non-Hispanic vs White/Non-Hispanic	0.373	(0.291-0.479)
Asian vs White/Non-Hispanic	0.527	(0.342-0.811)

Weight gain during pregnancy above the IOM guidelines, AMA and prepregnancy obesity significantly increased the likelihood of LGA. Black/Non-Hispanics, Hispanics and Asians had decreased likelihood of an LGA infant compared to the White/Non-Hispanic population. Private insurance status reduced the odds of LGA, as did smoking. There were no significant interactions of maternal age x race/ethnicity and prepregnancy BMI x race/ethnicity. LGA infants compared to AGA infants were more likely to be admitted to the NICU (OR 1.54;95%CI 1.23-1.94) for physiologic health compromise after delivery.

CONCLUSIONS: Maternal factors amenable to health intervention strategies have an association with the LGA infant population. Prepregnancy obesity and inappropriate weight gain during pregnancy are significantly associated with an increased odds of delivering a LGA infant. LGA infants have increased odds of being admitted to the NICU, a factor associated with health compromise and increased health utilization. A window of opportunity exists to target these factors to be able to influence and reduce the risk for infants to be large for gestational age.

216

Rapid Cycle Quality Improvement Leads to Increased Admission Temperature in Preterm Infants

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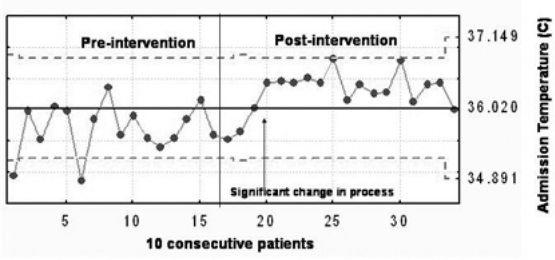
BACKGROUND: Low admission temperatures are associated with increased morbidity and mortality in low birthweight infants. Benchmark data from 2006-2010 in the Vermont Oxford Database show that our rate of hypothermia (T< 36°C) was 61% when compared to a network range of 16-42%.

OBJECTIVE: Our objective was to develop a bundled approach to lower the incidence of admission hypothermia in our population of preterm infants < 31 weeks.

DESIGN/METHODS: Christiana Care Health Systems delivered 7199 deliveries in 2010 and has a level III NICU. A multidisciplinary team performed a root cause analysis to create a bundled approach to reduce admission hypothermia in preterm infants < 31 weeks. Admission temperatures were tracked during the pre- and post-intervention phases. The thermal intervention bundle included a 'timeout' thermal checklist, increasing the delivery room temperature, preheating the radiant warmer, decreasing the time at the point of delivery, changing the transfer technique to the radiant warmer, more effective use of polyethylene wrap and warming of caregivers hands. Statistical process control was used to track changes in admission temperature.

RESULTS: There was a sustained shift in the process towards a higher admission temperature in the post-intervention phase.



The incidence of admission hypothermia (<36 °C) was reduced to 21% (a 58% reduction from baseline) post-intervention.

CONCLUSIONS: Benchmarking, a multidisciplinary approach, and rapid cycle methodology were highly effective at improving admission temperatures in our population of preterm infants. Ongoing monitoring will allow for further refinement of these techniques as we pursue zero tolerance for admission hypothermia.

217

Delivery Room Management of Extremely Low Birth Weight Infants: A Quality Improvement Study

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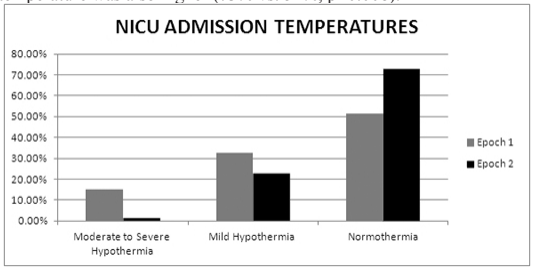
BACKGROUND: Delivery room interventions can significantly impact outcomes of extremely low birth weight (ELBW) infants. Furthermore, admission temperature is inversely correlated with mortality. We developed guidelines to prevent heat loss, reduce oxygen exposure, and better manage respiratory failure in the infant resuscitation room (IRR) in order to improve outcomes of ELBW infants.

OBJECTIVE: To evaluate adherence to and the impact of guidelines for IRR management of infants with birthweight <1250 grams at our institution.

DESIGN/METHODS: The guidelines were implemented through conferences with clinicians, routine use of an IRR checklist, and incorporation of a dedicated IRR nurse. The new protocol standardized heat loss prevention, recommended starting supplemental oxygen at 30% and advised a trial of continuous positive airway pressure (CPAP) for all infants. This observational study compared a historical cohort born 01/2009-06/2010 (n=80, Epoch 1) with a prospective cohort born 10/2010-11/2011, after implementation of the guidelines (n=66, Epoch 2). The primary outcome measure was axillary temperature at admission to the neonatal intensive care unit (NICU). Standard bivariable techniques were used to compare the groups.

RESULTS: Baseline characteristics between the groups were similar. In Epoch 2, average admission temperature was higher (98.1°F vs. 97.6°F, p=0.002). The proportion of infants admitted with normal temperature was also higher (73% vs. 51%, p=0.008).



As a balancing measure, there was no increase in hyperthermia. More patients were tried on CPAP (67% vs. 43%, p=0.004) and average initial oxygen was lower (39% vs. 80%, p<0.001) in Epoch 2. The differences persisted, indicating successful implementation of the quality measures.

CONCLUSIONS: We have demonstrated significantly improved quality of delivery room care for ELBW infants at our institution. Multidisciplinary involvement, continuous education, implementation of a delivery room checklist, and use of an IRR nurse permitted sustained change.

218

Fellow in Training

Factors Responsible for Change in the Physiologic Status of Very Low Birth Weight Infants during Transport

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BACKGROUND: TRIPS (Transport Risk Index of Physiologic Stability) score, which includes 4 clinical indices (temperature, blood pressure, respiratory status and response to noxious stimuli), has been validated as a measure of the physiologic stability of neonates during transport. The contribution of individual factors to the change in the physiologic status of very low birth weight (VLBW) infants during transport has not been explored.

OBJECTIVE: To correlate the transport duration with changes in the physiologic stability (measured in terms of TRIPS score) during transport and to analyze the factors responsible for this change in VLBW infants.

DESIGN/METHODS: Retrospective chart review of 106 VLBW infants. Data was analyzed using 3 groups based on the transport duration.

RESULTS: Our cohort had a mean birth weight of 777 grams (SD 159), median gestational age of 26 weeks (range 23-32 weeks) and 44 (41%) were females. Mean weight at transfer was 1610 grams (SD 924) and mean post-natal age at transfer was 56 days (SD 45).

Change in TRIPS Score in Relation to Transport Duration

Change in TRIPS Score (Post minus Pre-Transport Score)	≤20 Minutes (N=79)	21-40 Minutes (N=13)	>40 Minutes (N=14)	>40 Minutes (N=14)
No Change (0)	25 (31%)	3 (23%)	1 (7%)	0.16
Improvement (<0)	18 (23%)	2 (15%)	0 (0%)	0.13
Deterioration (>0)	36 (46%)	8 (62%)	13 (93%)	*0.004

As the time spent on transport increased, percentage of babies having deterioration in their TRIPS score increased significantly (p=0.004).

Factors Responsible for Cahnge in TRIPS Score

Variable Responsible for Change	Deterioration (N=57)	Improvement (N=20)
Temperature	34 (60%)	13 (65%)
Respiratory Status	4 (7%)	4 (20%)
Blood Pressure	4 (7%)	0 (0%)
Response to Noxious Stimuli	4 (7%)	0 (0%)
Any Combination of Above	11 (19%)	3 (15%)

19% of the cases with deterioration and 15% of the cases with improvement in TRIPS score were accounted by change in more than one TRIPS variables, but temperature change was present in all these patients as well. Overall, temperature change (either alone or in combination with other indices) was responsible for change in TRIPS score (deterioration or improvement) in 79% of patients.

CONCLUSIONS: Percentage of babies having deterioration in their physiologic status measured in terms of TRIPS score, increases with increase in the duration of transport. Change in temperature is the most important factor responsible for change in the physiologic status of VLBW infants during transport.

219

Fellow in Training

Hypothermia in Well Appearing Newborns Triaged to Well Baby Nursery (WBN) Is Common and Is Associated with an Increased Length of Stay (LOS)

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BACKGROUND: Neonatal hypothermia is associated with increased morbidity in premature infants including hypoglycemia, respiratory distress and acidosis. There is a paucity of evidence regarding the impact of hypothermia in well appearing full term infants.

OBJECTIVE: To determine the incidence of hypothermia in newborns ≥ 35 weeks admitted to the WBN and the potential impact on neonatal morbidity. We hypothesize that hypothermic infants will have a longer length of stay (LOS) than normothermic infants.

DESIGN/METHODS: Retrospective chart review of newborns ≥ 35 weeks admitted to WBN in Jan 2011. Data retrieved included: mode of delivery, infants' delivery room temperature (DRTEMP), admission temperature (ATEMP), hypoglycemia (blood sugar < 50mg/dl), respiratory distress, length of stay and transfer to the NICU. Hypothermia was defined as a temp < 36°C.

RESULTS: There were 237 infants of GA 39 ± 1.2 wks, BW 3256 ± 491 grams evaluated. The mean DRTEMP was 36.1°C ± 0.63 and ATEMP 36.4°C ± 0.46. 36% had a DRTEMP < 36°C (n=82) and 15% had an ATEMP < 36°C (n=35). Infants with ATEMP < 36°C had a DRTEMP of 35.7°C ±0.5 compared to those with ATEMP ≥ 36°C whose DRTEMP was 36.1°C ±0.2 (p=0.0002). DR and ATEMPS 1SD < than the mean were 35.5°C and 35.7°C, respectively and used for subsequent analysis.

Infants with a DR temp < 35.5°C had ↑ LOS of ~ 0.6.

DR TEMP < 35.5 (n=39)

	ATEMP <35.7 (n=5)	ATEMP ≥ 35.7 (n=34)
GA (wks)	38.6 ± 1.7	38.8 ± 1.3
BW (gm)	2892 ± 419	3248 ± 510
C-section	4	19
LOS (d)	3.6 ± 0.89	2.97 ± 1*

*p< 0.05

Infants with an ATEMP < 35.7°C had a significantly ↑ LOS of 1 day.

	ATEMP <35.7 (n=15)	ATEMP ≥ 35.7 (n=222)
DR Temp (°C)	35.7 ± 0.6	36.1 ± 0.6*
GA (wks)	38.8 ± 1.3	39 ± 1.2
BW (gm)	3308 ± 704	3257 ± 469
LOS (d)	3.6 ±1.5	2.6 ± 0.93**

* p<.05, **p<.01

Hypoglycemia (n=21) was associated with a lower ATEMP (35.9° ± 0.49 vs. 36.3° ± 0.25, p= 0.0005), ↓GA and smaller BW. Respiratory distress was not affected by ATEMP. NICU transfer (n=4) was not related to DR or ATEMP.

CONCLUSIONS: Hypothermia was noted in 36% of infants in the DR and 15% on admission to WBN. There was no correlation with GA or BW. An ATEMP < 35.7°C increases LOS by one day. Hypothermia was associated with hypoglycemia but was not related to respiratory distress. The mechanism/s contributing to the ↑ LOS is unclear. These preliminary findings may have important financial implications.

220

House Officer

Initial Temperature (TEMP) in the Neonatal Intensive Care Unit (NICU) Following Delivery Influences Early Neonatal Morbidity: Positive Impact of a Practice Plan (PP)

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BACKGROUND: Management strategies to maintain infant TEMP in the optimal range following delivery i.e.36.5 ± 0.5OC is of critical importance with regard to neonatal mortality and morbidity. We have shown that ↓TEMP may increase length of stay (PAS 2012). ↓ TEMP in infants < 28 wks also substantially increases the odds of dying. TEMP > 37 OC may also have adverse consequences.

OBJECTIVE: To determine variation in initial TEMP of infants admitted to the NICU from the Delivery Room (DR) & the impact of a PP to maintain TEMP in the optimal range.

DESIGN/METHODS: Methods Data recorded included: BW, GA, infant TEMP in DR & upon admission (within 15 mins) to the NICU, DR resuscitative events, Apgar scores, respiratory support at 24 hours. PP introduced included occlusive wrap, thermal mattress, cap for all infants < 34 weeks; ≥ 34 wks cap, drying under radiant warmer or skin to skin.

RESULTS: Between June-Oct 2011, 148 infants of BW 2072g, GA 33.8 wks were admitted. The initial TEMP was 36.5 ± 0.5OC (NORM) (n=77) (53%); < 36OC (Low) (n=54) (36%) and > 37OC(ELEV) (n=17) (11%). DR infant TEMPS for the Low, NORM, ELEV groups were 35.8 ± 0.4OC, 36.1 ± 0.6OC, 37.2 ± 0.7OC respectively* (P<0.05). Intubation occurred in 15/54 (27%) Low vs 12/77(15%) NORM TEMP infants (NS) and 8/17(47%) with ELEV TEMP* (P=0.007). For infants with Temp ≤ 35 OC, 5/7 were intubated and received surfactant vs 12/77 (NORM) (p=0.003, OR 2.6(CI 2.3-78). Following the PP introduction TEMP has↑Pre/Post from 36.1± 0.8OC to 36.3± 0.5OC (p=0.07); for GA < 28 weeks from 36± 0.1OC to 37.1 ± 0.9OC (p=0.02), 29-34 wks i.e. 35.8± 0.5OC to 36.1 ± 0.5OC (p=0.004), 35-36wks 35.9± 0.63OC to 36.3 ± 0.48OC (p=0.48); ≥ 37wks 36.6± 0.5OC vs 36.3 ± 0.7OC (NS). The # infants Pre vs Post PP with a T < 36OC ↓ from 44/100(44%) to 10/48(21%) (p=0.006); relative risk reduction (RRR) 0.52, number needed to treat (NNT) 4, as well as # intubated ↓ from 29/100 (29%) to 6/48(12.5%)(p=0.03) RRR 0.56, NNT 6. No change in # with TEMP > 37 OC occurred i.e. 10/100(10%) vs 7/48 (14.5%) (p=0.4).

CONCLUSIONS: 1. Both low and ↑ initial TEMP are common noted in 47% and influenced by infant DR TEMP. 2. Infants with TEMP < 35 or > 37 OC are significantly more likely to be intubated. 3. These preliminary findings also indicate that introduction of a targeted basic PP reduces the # of infants out of the optimal range and is associated with less intubation.

221

Fellow in Training

Early Initiation of Caffeine Therapy within 48 Hours of Life in Extremely Low Birth Weight Newborns: Can It Improve Outcome?

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BACKGROUND: Optimal timing of commencement of caffeine and its effect on outcomes in extremely low birth weight (ELBW) newborns have not been explored.

OBJECTIVE: To determine if commencement of caffeine within 48 hours of life would decrease the incidence of short term morbidities and mortality in ELBW newborns.

DESIGN/METHODS: Retrospective chart analysis of 220 ELBW newborns was done. Data was analyzed using 4 groups according to start of caffeine therapy.

RESULTS:

Baseline Characteristics and Unadjusted Results

	No Caffeine (N=66)	Caffeine≤2Days (N=67)	Caffeine 3-7 Days (N=47)	Caffeine >7 Days (N=40)	P Value
Gestational Age (weeks)	25±2	26±2	26±2	26±3	*0.001
Birth Weight (gm)	687±161	755±137	799±121	750±158	*0.016
Male Gender	41 (62)	41 (61)	18 (38)	20 (50)	*0.045
Black Race	49 (74)	53 (80)	35 (75)	31 (78)	0.811
5 Minute Apgar	6±2	7±2	7±1	6±2	0.106
Antenatal Steroids	54 (82)	53 (79)	38 (81)	31 (78)	0.951
Cesarean Section	43 (65)	43 (64)	32 (68)	27 (68)	0.484
Chorioamnionitis	10 (15)	7 (10)	4 (9)	4 (10)	0.694
Medical Treatment of PDA	11 (17)	14 (21)	11 (23)	7 (18)	0.781
Surgery for PDA	14 (21)	7 (10)	7 (15)	8 (20)	*0.028
BPD	16 (24)	37 (55)	27 (57)	28 (70)	*<0.0001
Severe IVH	13 (20)	9 (13)	7 (15)	8 (20)	0.75
Death	40 (61)	8(12)	3 (6)	4 (10)	*<0.0001
Death and/or BPD	55 (83)	42 (62)	30 (64)	30 (75)	0.058

Values expressed as Mean±SD and as Number (Percentage) as appropriate. P Values calculated using Chi-Square Test, One Way ANOVA and non-parametric Kruskal-Wallis Test

After logistic regression to adjust for the difference in gender, birth weight and gestational age, surgery for PDA did not remain significantly different for 3 caffeine groups in comparison to no

caffeine group. However, outcome of death remained significantly different for all 3 groups in comparison to no caffeine group (all p values <0.0001), with odds ratio of survival being 11 (95% CI; 4-29) for caffeine ≤2 days group in comparison to no caffeine group. In comparison to no caffeine group, odds ratio of developing BPD was 5 (95% CI 2-11) for caffeine ≤2 days group, 6 (95% CI 3-15) for caffeine 3-7 days group and 10 (95% CI 4-24) for caffeine >7 days group. BPD incidence of only 24% in no caffeine group may be due to 50% mortality at <36 weeks corrected gestational age in this group.
CONCLUSIONS: Early initiation of caffeine within 48 hours of life may offer survival advantage with decrease in mortality and incidence of BPD.

222

Fellow in Training

Unplanned Extubations in the NICU – Attempts at Reduction with a Commercial Endotracheal Tube Holder

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BACKGROUND: For critically ill infants, an endotracheal tube (ETT) is a vital part of care. Maintaining ETT position is challenging, especially in unsedated infants. Recurrent unplanned extubations (UPEs) are associated with increased duration of mechanical ventilation, medical complications, and longer hospital stays. There is a paucity of literature on interventions to reduce UPEs in the NICU and no "gold standard" to secure an ETT for a prolonged duration of time.
OBJECTIVE: This study aimed to evaluate the characteristics of infants who experience UPEs and to determine if a commercial neonatal ETT holder could reduce the frequency of UPEs and costs compared to traditional methods using adhesive tape.
DESIGN/METHODS: At Tufts Medical Center NICU, we changed our practice of securing ETTs from a traditional tape around the tube method to a commercial ETT holder, the Neofit (Cooper Surgical, Trumbull, CT) in February 2011. The Neofit holds an ETT in place with velcro and is secured to the cheek with foam pads. This study compared infants intubated with the commercial ETT holder over a period of 6 months to infants who received the traditional tape method in the 10 months prior. Clinical data collected included UPEs, time on the ventilator, gestational age (GA), birth weight (BW), ETT size, and outcome after UPE. To determine if UPE rates differed in the two groups (tape vs ETT holder), Poisson distribution testing was performed.
RESULTS: There were 197 infants in the tape group versus 39 in the Neofit group. The tape group had a mean GA of 32.0 (SD 4.6) weeks and BW 1877g (SD 966) compared to the ETT holder group with a mean GA of 32.3 (SD 5.0) weeks and BW 1816g (SD 900) (p=NS). The Neofit resulted in 11 UPEs per 223.1 intubated patient days (IPDs) (rate of 0.049 UPE/IPD), vs. 49 per 785.2 IPDs using tape (rate of 0.062 UPE/IPD). The ETT holder did not reduce UPEs (p=0.48, 95%CI 0.64-2.70). As the incidence of UPEs was unchanged, the device ($8.50 per unit) was not considered cost effective compared to tape.
CONCLUSIONS: In our NICU, a commercial ETT holder did not decrease the rate of UPEs or reduce costs compared to a traditional taping method. Since UPEs are associated with increased morbidity, further studies and additional methods are needed to secure ETTs in high risk infants for prolonged periods of time.

223

Safety of Chlorhexidine Gluconate (CHG) Use in Preterm Infants in the First 2 Weeks of Life

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BACKGROUND: CHG is a widely used topical antiseptic that is not recommended for use in children less than 2 months of age. CHG is, however, frequently used in Neonatal Intensive Care Units (NICU). Trace amounts of CHG can be absorbed through the skin. Preterm infants in the first 2 weeks of life may be at increased risk of skin irritation and absorption due to immature skin with increased permeability.
OBJECTIVE: Our objective was to assess skin integrety and chlorhexidine absorption through the skin of premature infants <32 weeks gestation and between 48 hours and 14 days of age who were exposed to skin cleansing with 2% CHG prior to placement of a peripherally inserted central catheter (PICC).
DESIGN/METHODS: Blood samples were collected 1-2 hours and then 6-12 hours after chlorhexidine exposure. Residual serum from routine blood draws prior to chlorhexidine exposure and >48 hours after exposure were collected. We developed a liquid chromatography-tandem mass spectrometry (LC-MS/MS) method for the detection of CHG in serum with a limit of quantitation of 12.5 ng/mL. Skin at the PICC site was evaluated for 2 weeks after exposure.
RESULTS: 11 patients were enrolled with a mean gestational age (GA) of 28.6 weeks (range 26.0-31.0), mean birth weight (BW) of 970 gms (630-1540), and mean chronologic age (CA) at time of exposure of 5 days (3-11). CHG was not detected in any pre-exposure samples or at 1-2 hrs after exposure. Three infants had detectable serum concentrations within 6-12 hrs and 2 infants >48hrs after exposure. (Table) There was no identifiable association of GA, BW, or CA and absorption of CHG. No skin irritation was found in any patient.

				CHG concentration (ng/mL)			
Gestational Age (wks)	Birth Weight (gms)	Chronologic age at time of exposure (days)	Sex	Pre-exposure	1-2 hrs	6-12 hrs	>48 hrs
30	1510	3	Male	ND	ND	ND	206
27 2/7	750	4	Male	ND	ND	104	274
29 5/7	1460	5	Female	ND	ND	18	ND
27 6/7	800	7	Female	ND	ND	16	ND

ND – Not detected

CONCLUSIONS: A subset of preterm infants (4/11) exposed to CHG in the first 2 weeks of life showed evidence of CHG absorption. The highest serum concentrations were found >48 hours after a single exposure. Further investigation is needed to define the extent and pharmacokinetics of CHG absorption in this vulnerable NICU population.

224

Neonatal Complications of Obesity in Women with Gestational Diabetes

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BACKGROUND: The increasing prevalence of obesity in the US makes it one of the most common high-risk obstetric situations. Previous studies suggest that maternal obesity may negatively impact neonatal outcomes.
OBJECTIVE: To compare neonatal outcomes in infants born to normal weight, overweight and obese mothers whose pregnancies were complicated by gestational diabetes (GD).
DESIGN/METHODS: We reviewed the charts of 399 women with GD treated in our center from 9/2007 - 3/2010. Women were classified based on body mass index (BMI) - normal=≤24.9, overweight=25-29.9, obese=30-34.9 and morbidly obese=≥35. Maternal and neonatal charts were reviewed for demographic data, maternal management of GD, and neonatal outcomes. Data were analyzed using $\chi 2$, Fisher's exact test, and ANOVA, as indicated. p value <0.05 was used for significance.
RESULTS: The use of medications for management of GD increased with increasing BMI (p=0.0001). The incidence of neonatal hypocalcemia (serum Ca <8) was higher in obese GD mothers as compared to normal/ overweight mothers (p=0.022). However, there was no difference in the incidence of hypoglycemia, NICU admissions or length of hospital stay among the 4 groups.

Maternal and Infant Characteristics

	Normal (n=69; 17%)	Overweight (n=115; 29%)	Obese (n=102; 26%)	Morbidly Obese (n=113; 28%)	p value
Gestational age (wks)	38.68 ±0.36	38.31±0.37	37.87±0.37	38.26±0.37	0.04
Birth weight (gms)	3171±107	3256±120	3266±117	3376±122	0.1865
GD controlled by diet	54 (80.6%)	75 (64.1%)	42 (37.2%)	37 (36.3%)	0.0001
NICU admission	8 (12%)	14 (12%)	19 (17%)	13 (12.8%)	0.667
5-min Apgar <7	10 (14.9%)	21 (18%)	14 (12.4%)	13 (12.8%)	0.618
Hypoglycemia	19 (28.4%)	33 (28.2%)	36 (31.9%)	31 (30.4%)	0.929
Hypocalcemia	1 (1.6%)	1 (1%)	9 (8.6%)	7 (7.4%)	0.022
Hyperbilirubinemia	3 (4.5%)	13 (11.1%)	9 (8%)	7 (6.9%)	0.449
Respiratory problems	3 (4.5%)	7 (6%)	8 (7.2%)	8 (7.8%)	0.852
Hospital stay >4 days	9 (11.9%)	23 (19.7%)	22 (19.6%)	26 (25.5%)	0.197
Race					0.0001
Hispanic	20 (30%)	50 (42.7%)	46 (40.7%)	53 (52%)	
Black	13 (19.4%)	28 (23.9%)	40 (35.4%)	39 (38.2%)	
White	5 (7.5%)	7 (6%)	9 (8%)	6 (5.9%)	
Others	29 (43.3%)	32 (27.4%)	18 (16%)	4 (3.9%)	

CONCLUSIONS: It is reassuring that in a closely monitored diabetic population, neonatal outcomes may not be adversely affected by maternal obesity. The finding of hypocalcemia in the offspring of obese mothers with GD needs to be explored further in a larger population.

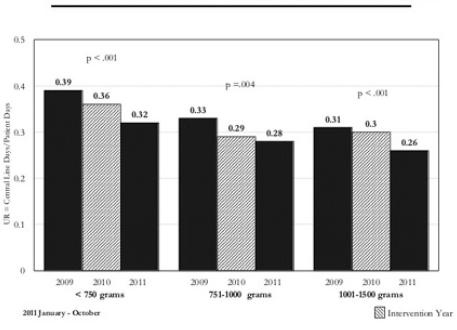
225

Fellow in Training

Implementation of Feeding Guidelines Reduces Central Line Utilization

Kate Tauber, Pauline Graziano, Theresa Loomis, Eileen Graffunder, Michael Horgan.
Pediatrics, Albany Medical Center, Albany, NY.

BACKGROUND: Optimal nutrition in VLBW infants is extremely important for later growth and neurodevelopment. It has been suggested that following a feeding protocol for VLBW infants leads to improved nutritional support, decreased rates of infection, decreased incidence of NEC, and reduced the length of hospital stay. No study thus far has addressed whether feeding guidelines reduce the utilization of central lines.
OBJECTIVE: To investigate whether the implementation of a standardized feeding guideline reduces the utilization of central lines in neonates admitted to the NICU.
DESIGN/METHODS: A retrospective chart review of all infants <1500g admitted to our NICU in 2009, 2010, and the first 10 months of 2011 who required a central line for nutrition. Infants were stratified into 3 weight groups: <750g, 751-1000g, and 1001-1500g. Compliance to the feeding guidelines was assessed during the intervention period, 2010. The day of feed initiation, the day of fortification, and the day to reach full feeds was used to assess compliance. A comparison of proportions was performed for each of the weight groups before and after the feeding guidelines were introduced to see if there was a statistical difference in central line utilization.
RESULTS: Compliance was found to have increased from 50% in the first half of 2010 to 70% in the second half of the year. The mean day of feed initiation decreased from 10 in 2009, to 4 in 2010 and 3 in first 6 months of 2011. Fortification improved, although still not at goal, with a decrease from a mean of 15 days in 2010 to 11 days in first 6 months of 2011. Full feeds were reached by a mean DOL of 28 in 2009 and this decreased to 21 days in 2010 and 17 days in 2011.



This figure illustrates the significant decrease in central line utilization in each of the three weight groups shown above. UR= utilization rate. The p value is comparing 2009 with 2011.
CONCLUSIONS: The implementation of a feeding guideline significantly decreased the utilization of central line days in infants weighing <1500g.

226

House Officer

Change in Blood Transfusion Practices in the NICU Following a QI Project

Rakesh Roshan D'Souza, Imeline Troncales, Felipe Bautista, Agnes Salvador.
Pediatrics, Albert Einstein Medical Center, Philadelphia, PA; Pediatrics/Hematology-Oncology, NYC-Langone Medical Center, Manhattan, NY.

BACKGROUND: Premature infants receive more red cell (PRBC) transfusions than any other hospitalized patient population. In 2007 a quality improvement (QI) study in our NICU showed blood transfusion practices were more liberal than current guidelines, documentation was incomplete, and use of recombinant human erythropoietin (r-HuEPO) was low. As a result, the NICU implemented a new transfusion form and promoted the use of r-HuEPO. This QI study examines NICU transfusion practices four years later.
OBJECTIVE: To assess: (1) adherence to PRBC transfusion guidelines, (2) completeness of the transfusion and consent forms, (3) rate of r-HuEPO use.
DESIGN/METHODS: As part of a larger QI project, we conducted a retrospective chart review of infants born between January and August 2010 with gestational age ≤ 32 weeks and birth wt. (BW) ≤ 1500 g. Infants who expired or transferred out before 2 months were excluded. Results were compared with a similar QI project from 2007. Outcomes measured were rate of transfusion by BW [extremely low birth weight (ELBW), ≤1000 g, and very low birth weight (VLBW), 1001-1500 g], documentation of transfusion and consent forms and use of r-HuEPO.
RESULTS: The sample included 41 infants: mean BW 996 ± 298 g (480-1480 g). 49% were VLBW, 51% were ELBW. In the 2011 QI study there was a significant reduction in the number of transfusions in VLBW group which may be due to increased use of r-HuEPO (43% in ELBW vs 71% in VLBW, p=0.033). Greater adherence to guidelines, better documentation in both transfusion and consent forms were observed in 2011 QI study.

	QI - 2007 N=30	QI - 2011 N=41	p
Patients transfused %	73	68	0.65
Average # transfusions per infant	5.06	4.00	0.59
ELBW	8.06	7.20	0.67
VLBW	1.64	0.60	<0.001
Adherence to transfusion guidelines %	34	88	<0.001
Complete documentation in consent form %	27	66	<0.001
r-HuEPO use %	13	68	<0.001

CONCLUSIONS: The implementation of NICU transfusion form was associated with improved documentation and adherence to transfusion guidelines.The use of the transfusion form, along with increased use of r-HuEPO, was associated with a reduction in PRBC transfusions in premature infants. Although documentation in the consent form increased dramatically, there was still room for additional improvement.

227

Resident

Use and Misuse of Soy Protein-Based Formula in the Newborn Nursery – Physicians', Nurses' and Parents' Perspectives

Waed Jarjous, Sandeep Sadashiv, Shalome D'Souza, Christian Shaw, Agnes Salvador.
Pediatrics, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: In 2008, the AAP updated its guideline on the use of soy protein-based formula in infants who are unable to tolerate cow milk protein-based formula. Although soy formula accounts for 20% of the formula market in the US, there is paucity of data on the utilization soy formula for infant feeding in newborn nurseries.
OBJECTIVE: (1) determine the use and misuse of soy formula in the newborn nursery, (2) assess physician, nursing and mothers' view of soy formula.
DESIGN/METHODS: This study was part of larger QI effort approved by the IRB. It was a retrospective chart review of newborns admitted to the newborn nursery at an urban academic community hospital who were fed and discharged on soy formula. Data included demographics and reasons for soy formula feeding. A survey of the mothers of infants who were fed soy formula as well as physicians and nurses in the newborn nursery was performed.
RESULTS: Between 5-8/2011, 672 babies were discharged from the newborn nursery; mean maternal age was 24.1 yrs, 60% were Black, 18% Latina; 85% had Medicaid. All infants were born at term. 51/672 (7.6%) infants received soy formula in the nursery. At discharge, soy formula was the sole form of nutrition in 72% of these babies, while 38% were fed both human and soy milk. Of infants fed soy formula, 33% of the mothers were primigravida, 49% were Black and 56% Muslim. There was no chart documentation regarding the reason for use of soy formula in the majority (72%) of the babies. Emesis was the most common reason documented for soy formula feeding. Based on surveys, 43% of physicians and 38% of nurses rated their knowledge regarding soy formula as fair to poor, and about half in each group rated their knowledge as good. The top 4 reasons for use of soy formula were: 1) religious, 2) emesis, 3) use of soy formula in another sibling, and 4) family history of allergy. 70% of the mothers surveyed did not have discussion with their caregivers about soy formula and a majority felt that a hand-out would not affect their decision on use of soy formula.
CONCLUSIONS: Despite AAP guideline on the use of soy formula published 3 years ago, there is still inappropriate use of this formula in the newborn nursery. Advocacy towards soy formula use based on AAP guidelines needs to be stressed to health-care providers and mothers. Better documentation of the reasons for the choice of soy formula in the newborn nursery is recommended.

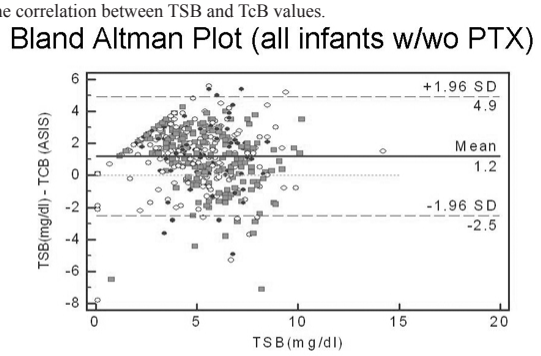
228

Fellow in Training

Correlation of Trends in Transcutaneous Bilirubinometer with Serum Bilirubin in Premature Infants

Felix K. Quist, Roopali Bapat, Helen K. Kuch-Kunich, Kanayo Ezeanolue, Nitin S. Chouthai.
The Carman Ann Adams Department of Pediatrics (Division of Neonatal-Perinatal Medicine), Wayne State University, Detroit, MI.

BACKGROUND: Transcutaneous Bilirubinometry (TcB) has been shown to correlate with total serum bilirubin (TSB) in term and late preterm newborns. There is no published data on the usefulness of TcB in Very Low Birth Weight (VLBW) preterm newborns of African American (AA) population.
OBJECTIVE: Determine the correlation between TcB and TSB in VLBW newborns in presence and absence of phothotherapy (PTX).
DESIGN/METHODS: TcB was conducted at anterior superior iliac spine (ASIS) which was always covered under diaper, temporal region and sternum within 2 hrs of TSB measurements in VLBW newborns < 32 weeks gestation prospectively. Clinical data was acquired by prospective chart analysis. Statistical analysis was conducted using SPSS and Medcalc statistical packages.
RESULTS: Overall 82 newborns and 473 TSB data points were available. 72 (87.8%) of the newborns were AA. Linear regression analysis demonstrated significant correlation (P <0.0001) between TSB and TcB values obtained at ASIS, sternum and temporal region with coefficient of regression (r) values of 0.741, 0.711 and 0.629 respectively. The correlation between TSB and TcB levels remained statistically significant in presence or absence of PTX and at different days of life. TcB performed at ASIS demonstrated best correlation coefficient levels with or without PTX. Logistic regression analysis showed that TSB levels at more than 5 mg/dl can be predicted by using TcB levels at ASIS, sternum and temporal region with Area under curves (AUC) at 0.890, 0.874 and 0.835 respectively. Newborns receiving overhead PTX had significantly lower correlation coefficients as compared to those not receiving PTX or were on biliblanket. Bland-Altman plot confirmed the correlation between TSB and TcB values.



Bland Altman plot demonstrates that TcB levels tend to underestimate TsB levels in VLBW newborns.

CONCLUSIONS: Significant correlation was noted between TSB and TcB values in AA VLBW infants in the presence or absence of PTX. Use of TcB in monitoring of jaundice in VLBW newborns would help decrease the number of blood draws and cost of care.

229

Fellow in Training

Early Enteral Feeding Does Not Prevent Hypoglycemia in SGA Neonates

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BACKGROUND: Evidence-based prevention of neonatal hypoglycemia is not well-defined. Guidelines recently established in 2011 for monitoring at-risk neonates for the development of hypoglycemia recommend initiating enteral feeding within the first hour of life. Despite adoption of these recommendations at our institution, the impact of early feeding on prevention of neonatal hypoglycemia in small for gestational age (SGA) neonates in the first hours of life remains unclear.
OBJECTIVE: To determine the association between early enteral feeding and the incidence of hypoglycemia in SGA neonates.
DESIGN/METHODS: We conducted a single center retrospective medical record review of full term SGA neonates to evaluate the association of hypoglycemia and early enteral feeding. Eligible patients were born between January 1st, 2008 and July 1st, 2011 at 37 to 42 weeks gestation and were classified as SGA, defined as a birth weight less than the 10th percentile on our institution's standardized growth curve. Data collected included the first three point of care (POC) blood glucose values, time to initiation of enteral feeding and type of feeding. The primary outcome was incidence of hypoglycemia, defined as a POC glucose value ≤35 mg/dL.
RESULTS: The records of 460 neonates were reviewed. 203 were included in the final analysis. 94 patients were fed after the initial glucose measurement and 109 were not. The incidence of hypoglycemia in the group that received early enteral feeds was 13% while the incidence in the group that did not was 4% (p=0.02). Within the group that received early enteral feeding, neonates who were breastfed were less likely to become hypoglycemic (6%) than those who received formula (23%). Multivariate regression showed the initial POC value and whether or not the neonate was fed to be significant predictors of the 2nd POC value (p<0.001).
CONCLUSIONS: This study suggests that early enteral feeding does not prevent hypoglycemia in SGA neonates and in our cohort, it *increased* the incidence of hypoglycemia. Early enteral feeds of formula were more likely to precede hypoglycemia, perhaps due to increased insulin secretion. Neonates with lower initial POC values merit closer monitoring as they are at higher risk for lower subsequent POC values, regardless of interventions such as early enteral feeding.

230

Fellow in Training

Perceptions of Palliative Care in the NICU

Sheela Moorthy, Brenda Hussey-Gardner, Christy Sampson-Kelly, David Harness, Alison Falck.

Department of Pediatrics/Neonatology, University of Maryland, Baltimore, MD.

BACKGROUND: The American Academy of Pediatrics supports implementation of an integrated model of palliative care that is offered at diagnosis and continued throughout the illness trajectory, whether the outcome is cure or death. Despite the high morbidity and mortality of NICU patients, palliative care is not consistently embraced as an intergral part of care in the NICU.

OBJECTIVE: To examine perceptions of provision of palliative care as experienced by mothers and healthcare providers of NICU patients with life-threatening illnesses. Subjects explored include communication, choices, comfort, addressing psychosocial and spiritual needs, compassionate care and coordination of care.

DESIGN/METHODS: This qualitative study utilized grounded theory methodology. IRB approval and informed consent were obtained. Semi-structured interviews consisting of 20 open-ended questions were conducted with 6 mothers and 6 health care providers. Health care providers were chosen by participating mothers as key figures during their infant's NICU stay (5 nurses and 1 physician). Interviews were transcribed and manually coded until theoretical saturation was achieved.

RESULTS: Common themes for mothers and healthcare providers included inadequate communication (eg.honesty about infant's condition, difficulty obtaining medical information, inconsistency in physician practice, importance of family meetings), lack of privacy (eg. physical space, comfort during breast feeding) and continuity of care (eg. relationships with nurses and physicians, changes in treatment plan by physicians). Themes unique to mothers included knowledge seeking (eg. fear of NICU equipment, understanding infant's condition), emotional turmoil (eg. guilt, helplessness, hope, fear) and confidence (eg. self-efficacy, trust in the medical team). Themes unique to the healthcare provider include job satisfaction and the role of peer support and debriefing.

CONCLUSIONS: This qualitative study emphasizes the importance of the provision of palliative care in the NICU. Parents and health care providers expressed need for improved communication, continuity of care and respect for privacy. Mothers of NICU patients additionally noted the importance of transparent medical information and the role of psychosocial stressors. Lack of consistent focus on these important components of palliative care emerged as themes. A formalized and structured palliative care program may improve the experience of NICU families.

231

Medical Student

The Effect of Nurse-Staffing on Outcomes in the Neonatal Intensive Care Unit: A Systematic Review

Michael Sherenian, Jochen Profit, Barbara Schmidt, Sanghee Suh, Rui Xiao, John Zupancic, Sara B. DeMauro.

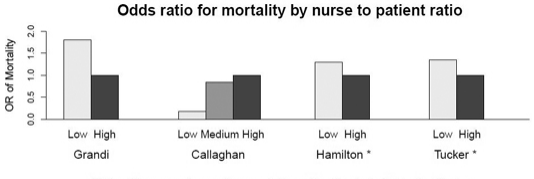
Perelman School of Medicine, University of Pennsylvania and The Children's Hospital of Philadelphia, Philadelphia, PA; Drexel University College of Medicine, Philadelphia, PA; Baylor College of Medicine and Texas Children's Hospital, Houston, TX; Harvard Medical School and Beth Israel Deaconess Medical Center, Boston, MA.

BACKGROUND: Higher nurse-to-patient ratios (NPR) are associated with decreased mortality among adult patients. Reports about how NPR affects neonatal outcomes are conflicting.

OBJECTIVE: To perform a systematic review of the effect of NPR on mortality in neonatal intensive care unit (NICU) patients.

DESIGN/METHODS: Two authors performed the literature search, selected studies for inclusion, and extracted data. Eligible studies reported outcomes of NICU patients, reported NPR, and were published after 1990. We did not specify definitions of NPR or apply restrictions based on language or study design. The primary outcome was mortality before discharge. Formal quality assessment of all studies was performed with the STROBE checklist. We planned to conduct a traditional meta-analysis to produce a weighted estimate of the odds of mortality in the NICU, relative to the NPR.

RESULTS: Two reviewers had 100% agreement about inclusion of studies and 92% agreement about quality of those studies. Only 6 studies met the inclusion criteria. Each study used a different definition for NPR, many of which were based on "expected" number of nurses, weighted by patient mix. Four of the studies used various cutoffs to define high versus low NPR and 2 did not report a cutoff. Therefore, quantitative meta-analysis could not be performed. Among the studies that reported a cutoff, lower NPR was associated with higher mortality in 3 and with lower mortality in 1.



An average of 16 (range 15-17) of 22 STROBE criteria were described completely.

CONCLUSIONS: NPR has a substantial effect on mortality in adult populations. Limited literature with conflicting results prevents us from drawing firm conclusions about the impact of NPR on mortality among neonates. A better understanding of the effect of NICU nurse staffing and nursing quality on mortality and other relevant patient outcomes would impact many aspects of clinical practice, unit organization, and public policy.

232

Fellow in Training

Predicting Respiratory Physiology in Upright Positioning during Infant Car Seat Challenges: Role of Baseline Supine Respiratory Status

Natalie Davis, Mary Lucia Gregory, Wenyang Mao, Lawrence Rhein.

Neonatology, Children's Hospital, Boston, MA; Neonatology, Beth Israel Deaconess Medical Center (BIDMC), Boston, MA; Respiratory Diseases, Children's Hospital, Boston, MA.

BACKGROUND: Observations that premature infants have distinct respiratory patterns when supine versus upright led to recommendations for pre-discharge periods of observation during upright positioning, known as the Infant Car Seat Challenge (ICSC). Despite its widespread use, data supporting validity or sensitivity of ICSCs are lacking. Recorded pulse oximetry allows more rigorous analysis of oxygen saturation (O2sat) patterns in both supine and upright positions.

OBJECTIVE: To utilize recorded oximetry to detect patterns of desaturation when infants are supine that predict subsequent events of desaturation during upright positioning in the ICSC.

DESIGN/METHODS: We enrolled premature infants (GA<37 wks but >30 wks), and recorded O2 sats continuously for 7-day periods once they were >35 wks GA and no longer requiring respiratory support. We performed series of 3 ICSCs approximately 48 hours apart, documenting times when infants were supine and when upright. Time spent upright between ICSCs was excluded from analysis. We identified percentages of supine time each infant spent less than target saturation levels, then included these O2 sat variables in logistic regression analyses using GEE models to identify predictors of failure of the ICSC.

RESULTS: We enrolled 17 infants and performed 49 ICSCs. Mean GA at birth was 33.5 +/ 0.98 wks; mean GA at time of 1st test was 36.1+/-1.0 wks. 7 of the 17 infants failed at least 1 of the 3 sequential ICSCs.

In univariate analysis, no statistically significant predictors of failure of the ICSC were identified. We performed logistic regression analyses using result of ICSC as response variable, to explore the relatonship between O2sat patterns and ICSC result, adjusting for GA, birthweight, gender, race, and delivery method. Percentages of time with O2 sat < 93%, and < 90% (when supine in the hours prior to ICSC testing) did not predict subsequent failure of the ICSC (OR 21.84 [95% CI -51.97-8.30] for O2 sat < 93%), (OR=-44.05 [95% CI -94.78-6.69], for O2sat <90%).

CONCLUSIONS: Recorded pulse oximetry identifies distinct patterns of O2 sat during supine positioning in premature infants. Patterns associated with lower O2 sat when supine were unable to distinguish which infants failed the ICSC. Clarification of O2 sat phenotypes through recorded oximetry analyses may allow better ability to predict infants at risk for respiratory compromise during the ICSC or at rest.

233

Fellow in Training

Epidemiology of Failure of the Infant Car Seat Challenge

Natalie Davis, Audrey Uong, Freeman Condon, Lawrence Rhein.

Neonatology, Children's Hospital, Boston, MA; Neonatology, Beth Israel Deaconess Medical Center, Boston, MA; Respiratory Diseases, Children's Hospital, Boston, MA; New York Medical College, Valhalla, NY; Georgetown University, Washington, DC.

BACKGROUND: The American Academy of Pediatrics recommends that preterm infants undergo a period of observation in a car safety seat to monitor for possible apnea, bradycardia, and desaturations. This test is known as the Infant Car Seat Challenge (ICSC). Little data exists to assist providers in identifying infants that may fail the ICSC and therefore allow more selective testing.

OBJECTIVE: The purpose of this study was to determine incidence and predictors of failure of the ICSC in a large cohort of preterm infants.

DESIGN/METHODS: We performed a retrospective chart review on patients born at Beth Israel Deaconess Medical Center (BIDMC) in Boston, MA, between January 1, 2009 and December 31, 2010 who met criteria for an ICSC (gestational age <37 weeks at birth). We identified 1109 qualifying infants; 861 (78%) were discharged from BIDMC and had available ICSC test results. Univariate and multivariate analyses of demographic and hospital course characteristics were performed.

RESULTS: A small minority of patients (4.8%, n=41) failed the ICSC. In univariate analyses, race, gender, corrected gestational age (CGA) at time of test, or weight at time of test were not significantly different in infants who passed versus infants who failed. There were significant differences in birth GA, birth weight, and chronological age at time of test. Those who passed had significantly lower birth GA, lower birth weight, and older chronological age at time of test (Table 1).

Univariate Analysis of Mean Predictors of Failure

	ICSC Pass	ICSC Fail	p-value
Birth Weight (g)	2239	2487	0.02
Birth GA (weeks)	34.1	35	0.03
Corrected GA at test (weeks)	37.4	37	0.29
Age at test (days)	22.9	13	0.03
Weight at test (g)	2660	2630	0.79

A regression model including all covariates with p<0.1 or potentially clinically relevant variables showed that none were significant predictors of failure (Table 2).

Regression Model of ICSC Failure

	OR	95% CI
Birth Gestational Age (weeks)	1.024	(.987-1.062)
Birth Weight (g)	1	(.999-1.001)
Corrected GA at Test (weeks)	.982	(.944-1.022)
Weight at Test (g)	1	(.999-1)
Male Gender	1.726	(.863-3.454)

CONCLUSIONS: In this large cohort of premature infants, we determined that infants who passed ICSC had significantly lower birth weights and gestational age, and were older in days at time of the testing. However, multivariate analysis was not able to identify specific predictors of failure. Based on our analyses, we were unable to further refine current screening guidelines.

Fellow in Training

Predicting Readmissions for Full Term NICU Graduates

S. Schell, J. Kase, M. Grzybowski, B. Parvez, Y. Tong, S. Roy, H. Brumberg.
Division of Newborn Medicine, Maria Fareri Children's Hospital, Valhalla, NY; Department of Epidemiology, Michigan State University, Lansing, MI.

BACKGROUND: Little is known regarding predictive factors for hospital readmission (HRA) of full term neonates who require intensive care.

OBJECTIVE: To determine risk factors (RF) for full term neonates that contribute to HRA within 6 months of NICU discharge (d/c).

DESIGN/METHODS: This is a prospective analysis of full term (≥37wks) neonates d/c'd from Maria Fareri Children's Hospital (MFCH) Level 4 regional referral center NICU in 2008 & 2009. Subjects were dichotomized by gestational age (GA) [37-38wks (early term; ET) vs. ≥39wks (term; 39+T)]. Exclusion criteria were transfer prior to d/c home or death. The primary outcome was HRA to MFCH within 6 months of d/c. Data included demographics & neonatal morbidities during hospitalization, at d/c & at HRA. χ^2, Fisher's Exact tests, t-tests, ANOVA & multivariate logistic regression (MLR) were used. Unadjusted & adjusted bivariate analyses for GA & birthweight percentile (BWP) by Fenton Growth Chart were done & adjusted results with p's<0.2 were considered for MLR, where backward regression & the change-in-estimate methods developed the best model.

RESULTS: 325 patients (pts) (ET 154, 39+T 171), with 12% HRAs (ET 14%, 39+T 10%) were included. There was no increased risk of HRA for ET vs. 39+T (1.4, 0.8-2.5; OR, 95%CI). The average time to HRA was: ET 62±58d (mean±SD); 39+T 52±48d. Common reasons for HRA were respiratory illness, elective surgery & dehydration. ET HRA was associated with ($p<0.05$) d/c home with medication (7.0, 2.6-18.9), despite visiting nurse services. Breastfed ET pts had less HRAs (0.2, 0.1-0.6). After controlling for GA & BWP, MLR identified the following RF for full term HRA: congenital abnormalities (ABN) (6.3, 3.0-13.4), neurologic ABN (2.3, 1.1-6.7) & any oxygen (O2) therapy (ventilator, CPAP, or nasal cannula) such that for every additional day on O2, the odds of HRA increased by 1.1 (95%CI 1.02-1.2). This model strongly discriminated HRA status (c-statistic=0.75, $p<0.0001$). With an *a priori* HRA rate of 12%, this model classified 78% of events correctly with 68% sensitivity & 79% specificity.

CONCLUSIONS: Breastfed ET pts were protected against HRA. Overall, in full term neonates d/c'd from the NICU, congenital malformations & O2 therapy contribute to HRA, suggesting HRA is related to the complexity of the disease process necessitating intensive care, not maturational issues. At d/c, understanding these variables can define a high-risk group in need of additional anticipatory management to prevent HRA.

Cardiopulmonary Development Platform Session

Sunday, April 1, 2012
9:45am-12:00pm

236

9:45am

Vitamin D Stimulates In Utero Lung Development

Jody L. Zisk, Erin C. Killeen, Janet E. Larson.
Neonatology, Thomas Jefferson University, Philadelphia, PA.

BACKGROUND: Vitamin D plays a critical role in calcium metabolism and homeostasis. Calcium has been shown to be an important component in prenatal lung morphogenesis. In vivo models suggest vitamin D acts as a modulator of epithelial proliferation and growth during lung development.

OBJECTIVE: Our objective was to determine the effect of vitamin D on neonatal lung metabolism and development. We hypothesized that due to the calcium homeostasis properties of vitamin D; it will affect respiratory smooth muscle cell contraction and therefore affect the development of the neonatal lung.

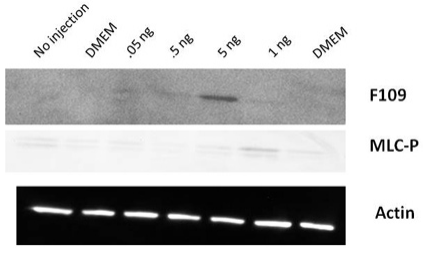
DESIGN/METHODS: Fetal Sprague-Dawley rats were injected with 4 doses of vitamin D (.05ng, .5ng, 1ng, and 5 ng) and control (Dulbecco's modified Eagle's medium; DMEM) directly into the amniotic sac at 16 days gestation. 6 hours following injection, the fetal lungs were harvested.

Protein analysis via western blot was performed using monoclonal antibodies to myosin light chain (MLC-P and F109). Actin was used for loading control.

RESULTS: Phosphorylation of myosin light chain is essential for muscle contraction. MLC-P is a monoclonal antibody specific for the phosphorylated form of myosin light chain. An increase in expression of MLC-P was seen with 1 ng of vitamin D as compared with DMEM.

F109 is a monoclonal antibody specific for both the phosphorylated and unphosphorylated forms of myosin light chain. Similar to MLC-P, an increase in expression of F109 was seen with 5ng of vitamin D as compared with DMEM.

Figure 1



CONCLUSIONS: Few in vivo studies have been done to determine the association of vitamin D and lung development. Evidence suggests calcium induced peristalsis is necessary for lung morphogenesis. We have demonstrated that vitamin D increases the phosphorylation of smooth muscle contraction-related proteins. This suggests vitamin D enhances muscle contraction which in turn may increase or promote embryonic lung development.

237

10:00am

ErbB4 Isoform-Specific Function in Type II Cells

Aikaterini Pringa, Christiane E. Dammann, Heber C. Nielsen.
Pediatrics, Tufts Medical Center, Boston, MA.

BACKGROUND: The ErbB4 receptor promotes lung development by promoting type II cell surfactant production. The ErbB4 receptor exists in four isoforms, based on post-transcriptional processing. These isoforms contain variants at one or both of two sites: the presence (JmA) or absence (JmB) of the TACE-gamma secretase target site near the cell membrane; and the presence (Cyt1) or absence (Cyt2) of the PI3 kinase binding site in the intracellular signaling domain. Studies in cancer biology suggest isoform-specific functions in protection against or increased risk of tumor progression. The expression and role of the different isoforms in type II cells are unknown.

OBJECTIVE: We hypothesize that different ErbB4 isoforms are expressed in type II cells at different ages with isoform-specific effects on cell differentiation and proliferation.

DESIGN/METHODS: The presence of the JmA/JmB variants and the Cyt1/Cyt2 variants was determined in fetal mouse lung type II cells (gestation 16 and 18 days) and in adult mouse lung using RT-PCR. Isoform function was determined by overexpressing each individual isoform in MLE12 cells and studying the effects of neuregulin (NRG, the ligand for ErbB4) treatment on cell differentiation (measured as synthesis of the surfactant phospholipid disaturatedphosphatidylcholine (DSPC)), and cell proliferation (thymidine incorporation into DNA).

RESULTS: Fetal mouse type II cells at each gestation showed all four sequence variants by RT-PCR, indicating expression of at least 2 of the 4 possible isoforms. In contrast, adult mouse lungs showed both Cyt1 and Cyt2 sequences but only the JmA sequence, indicating expression of only two isoforms. Isoform-specific responses to NRG were observed in transfected MLE12 cells. NRG stimulated DSPC synthesis in cells transfected with the JmA/Cyt1 isoform 5-fold greater than untransfected cells and repressed proliferation, while the JmB/Cyt1 and JmB/Cyt2 isoforms showed reduced DSPC synthesis. Cell proliferation was strongly increased by JmB/Cyt2 in the absence of NRG.

CONCLUSIONS: These data indicate developmental differences in ErbB4 isoform expression. Different isoforms appear to control type II cell differentiation and proliferation. We speculate that developmental regulation of ErbB4 isoform expression in type II cells allows ErbB4 to control cellular events appropriate to the specific needs of the lung. Supported by NIH HL037930 and HL085648.

238

10:15am

Do Androgen and Oxygen Combine To Affect Type II Cell Development?

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BACKGROUND: Oxygen has important effects on development of premature lung type II (T2) cells. We and others have shown that O_2 in vitro damages the developing alveolar structures similar to clinical bronchopulmonary dysplasia (BPD). Chronic DHT exposure in vivo and vitro delays fetal lung T2 cell maturation. Preterm male infants are at increased risk of developing BPD. However, the combined effects of O_2 and androgen on lung development are unknown.

OBJECTIVE: We hypothesized that O_2 exposure combines with androgen to alter T2 cell maturation and proliferation.

DESIGN/METHODS: Timed pregnant mice were implanted with DHT pellets (2mg/day) on E11 (term = 19 days). Primary fetal lung T2 cells cultures were prepared from E18 control and DHT- implanted mice and grown with/without DHT (10^{-8}M), and with/without 40% O_2 for 48 hrs. Cells were then serum starved 3 hours, followed by no treatment (control), EGF (10ng/ml), NRG (3.3nM), TGFα (10ng/ml) for 24 hrs. Surfactant production was measured as ^{3}H-choline incorporation into disaturated phosphotidylcholine (DSPC) and by real time PCR measurements of SP-B, SP-C, and fatty acid synthase (FASN) mRNAs. Proliferation was measured by thymidine incorporation.

RESULTS: DSPC synthesis was stimulated ($p<0.01$) by EGF (145% of control), NRG (147%), and TGFα (129%). Stimulation was significantly reduced in 40% O_2 for all three growth factors. Cell proliferation was not significantly increased by any growth factor alone but after DHT each growth factor significantly increased proliferation. However, proliferation was significantly ($p<0.01$) decreased for each factor in 40% O_2 and in O_2 + DHT. SP-B mRNA was increased ($p<0.001$) by EGF (307%), NRG (215%), and TGFα (262%); SP-C mRNA was increased ($p<0.001$) by EGF (327%) and TGFα (341%); and FASN mRNA was increased ($p<0.001$) by EGF(264%) and TGf α(206%). Both DHT and 40% O_2 significantly ($p<0.001$) prevented the DSPC and mRNA changes. The combination of DHT+40% O_2 was not additive in preventing stimulation of DSPC or SP-B, SP-C and FASN mRNA.

CONCLUSIONS: We conclude that treatment with 40% O_2 blocks growth factor effects on T2 cell diferentiataion similar to chronic DHT exposure, while 40% O_2 reverses DHT-promoted proliferative responses. We speculate that the combined effects of O_2 and DHT contribute to dysregulated alveolar development seen in BPD. Supported by NIH HL037930, HL085648.

239
10:30am

Staff Neonatologist

EC-SOD Overexpression Preserving Pulmonary Angiogenesis Inhibited by Oxidative Stress

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BACKGROUND: Angiogenesis is one of the most important processes for normal lung development. Angiogenesis is impaired by oxidative stress resulting in impaired lung development and chronic lung disease. Hyperoxia in neonatal rats leads to a significant suppression of angiogenesis markers like VEGF and PECAM. Nitric oxide scavenging by free oxygen species also impairs lung vascular development.

OBJECTIVE: To investigate the protective effects of EC-SOD overexpression on pulmonary angiogenesis in neonatal rats after exposure to acute hyperoxia.

DESIGN/METHODS: Transgenic [TG, with an extra-copy of human EC-SOD knocked in] and wild-type (WT) neonatal mice (6 mice per group) were exposed from birth for 7 days to either room air (control group) or 95% O^2 and then sacrificed. One lung was placed in RNA buffer solution in -20^0 C and other lung was frozen for immunostaining procedures. Total RNA was extracted and the angiogenesis markers, VEGF, VEGFR1 & VEGFR2 & PECAM were analyzed by RT-qPCR. For quantitative evaluation of angiogenesis, mean vascular density (MVD) was measured using anti CD34 staining.

RESULTS: VEGF expression was significantly reduced in both hyperoxic groups (WT & TG) compared to normoxic groups ($P<0.05$). Among hyperoxic groups, VEGF expression and VEGFR1&2 were significantly reduced in WT group compared to TG groups ($P<0.05$). PECAM expression was significantly and similarly reduced in both hyperoxic groups (WT & TG) compared to normoxic groups ($P<0.05$), though there was no significant difference between WT hyperoxia and TG hyperoxia. There was a significant increase of MVD in TG group after hyperoxia exposure with a mean of 85±12 (mean ±SE) in comparison to WT hyperoxic group with mean of 62±8.4 (mean ± SE), ($P<0.05$).

CONCLUSIONS: EC-SOD plays a key role in preserving angiogenesis by scavenging free radicals in neonatal mouse lungs exposed to hyperoxia.

240
10:45am

Ph.D. Student

miR-221 and miR-130a Control of Neovascularization during Lung Branching Morphogenesis

Sana Mujahid, Heber C. Nielsen, MaryAnn V. Volpe.
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BACKGROUND: miR-221 is anti-angiogenic and miR-130 is pro-angiogenic via opposing effects on endothelial cell proliferation and migration. It is known that the developing lung vasculature impacts airway branching morphogenesis. However, the role of these two miRNAs in lung vascular and airway development has not been studied.

OBJECTIVE: We hypothesized that miR-221 and miR-130a regulate branching morphogenesis, partly through their effects on the developing vasculature.

DESIGN/METHODS: Lung-specific effects of miR-130a and miR-221 were studied in E14 whole fetal mouse lungs cultured for 48hr with anti-miRs to down regulate or mimics to up regulate miR-130a or miR-221. Confocal whole mount E-cadherin staining was used to visualize and quantify changes in airway branching. Immunofluorescence (IF) detection of endothelial cell lectin and VEGFR2 assessed vascular changes. To address fetal lung endothelial cell-specific effects of miR-221 and miR-130a, mouse fetal lung endothelial cells were transfected with mimics to miR-221 or miR-130a and plated on matrigel followed by visualization and quantification of in vitro tubular branching.

RESULTS: Down regulation of miR-130a significantly increased airway branch width while reducing overall airway branch formation (whole mount E-Cadherin). Decreased lectin IF and VEGFR2 staining identified concomitant reduced vessel formation around these airway branches. Conversely, up regulation of mimic 130a led to the development of numerous finely arborized branches with significantly reduced branch width. These airways were surrounded by dense areas of lectin and VEGFR2 IF. In contrast, miR-221 down regulation led to formation of increased distal branch generations surrounded by increased lectin and VEGFR2 staining. miR-221 up regulation reduced airway branching. Airways had dilated tips and mesenchyme expression of lectin and VEGFR2 was decreased. In fetal lung endothelial cells, miR-130a up regulation increased tubular branching by 50%,whereas miR-221 up regulation decreased tubular branching by 25%.

CONCLUSIONS: miR-130a and miR-221 have opposing effects on airway branching and developing lung vasculature supporting an important role for these miRNAs in lung morphogenesis. We speculate that the miR-130a and miR-221 mediate pathway components controlling endothelial cell function and subsequent endothelial to epithelial cell communication. Support: HD04478, HL37930, HL085648, Peabody Foundation.

241
11:00am

Heme Oxygenase-1 Modulates NrF2 Activation in Hyperoxia

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BACKGROUND: Heme oxygenase 1 (HO-1) is thought to be an antioxidant through the generation of its enzymatic byproducts. It is cytoprotective even when devoid of enzymatic activity (Lin et al, JBC, 2007). Futhermore, HO-1 protein, active or inactive, regulates key transcription factors involved in the oxidative stress response including AP-1 (Lin et al, FRBM, 2007). The transcription factor NrF2, contains an AP-1 motif and is key in the regulation of antioxidants and stress response genes through the antioxidant response element (ARE). Although it is well known that NrF2 regulates HO-1 gene expression, HO-1 effects on regulation of NrF2 is unknown.

OBJECTIVE: To evaluate whether HO-1 modulates the activation of NrF2 in hyperoxia-exposed mouse embryonic fibroblasts (MEF) and whether this alters NrF2 downstream gene expression.

DESIGN/METHODS: Wild type (WT) and HO-1 knockout (KO) MEF were transiently infected with a lentiviral luciferase reporter driven by 6 ARE binding sites and exposed to 95%O2/5%CO2 (hyperoxia) or air/5%CO2 (normoxia) for 0-18 h. After incubation with luciferin, cells were visualized for photon emission as a measure of NrF2 transcriptional activity. Downstream targets of NrF2, including thioredoxin reductase 1, gamma-glutamylcysteine synthetase, and glucose-6-phosphate dehydrogenase, were evaluated for mRNA and protein levels at 0, 4, 8 and 18 h. Activation of 48 transcription factor was evaluated at 4h O2 using an array. Transcription initiation was measured at 18h O2 using nuclear run on assays.

RESULTS: After 4 h of hyperoxia, only WT cells showed a visible increase in photon emission compared to normoxia and despite a decrease over time, these levels remained higher than in the air. Levels of NrF2 mRNA increased at 18 h in the WT but also in the KO cells exposed to hyperoxia. In addition, at 18 h, WT mRNA levels of each downstream target increased in both the WT and KO but more so in the KO, suggesting NrF2 downstream gene regulation is dysregulated in the absence of HO-1. We could not document activation of a variety of transcription factors nor increased transcription initiation rate in the KO.

CONCLUSIONS: Disruption of HO-1 inhibits NrF2 promoter activation in hyperoxia but NrF2 downstream genes are paradoxically upregulated without activation of other transcription factors. We suspect that absence of HO-1 prolongs the half-life of NrF2 and antioxidant gene mRNA. It remains to be determined how HO-1 mediates this effect.

242
11:15am

Vascular Endothelial Growth Factor (VEGF) Attenuates Hyperoxia Via Neuropilin-1 (Nrp)-Protein Kinase C (PKC) Dependent Pathway in Endothelial Cells of Explanted Embryonic Lung

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BACKGROUND: VEGF is regulated by oxygen and plays an important role in vascular development and epithelial cell morphogenesis. During hyperoxia, VEGF expression is reduced and can impair airway development. VEGF-165 binds to fetal liver kinase (Flk-1) and Nrp-1. Nrp-1 acts as a coreceptor and can activate the PKC pathway that is required for branching morphogenesis in renal epithelial cells.

OBJECTIVE: To determine whether PKC signaling is activated via Flk-1-Neuropilin-1 by VEGF-165 and to determine in which cells Flk-1 was phosphorylated by VEGF-165.

DESIGN/METHODS: -Wild type and Flk-1-GFP (endothelial cells fluoresce green)embryonic day 12(E12) mouse lung explants were cultured in a)3%oxygen, b)50%oxygen, c)50%oxygen+VEGF-165(100 ng/ml) and d)50% oxygen+anti-Nrp-1 antibody(10 micrograms/ml) for 30 minutes and then VEGF-165 daily at 37ºC in a sealed chamber for 2 days.

-Serum-starved E12 explants were exposed to anti-Nrp-1 antibody for 30 minutes±VEGF-165 for 15 min, and lung lysates were blotted with phospho-PKC antibody.

-E12 mouse lung explants were cultured in a)50%oxygen,b)50% oxygen+VEGF-165,c)50% oxy gen+Vehicle(DMSO)+VEGF-165 and d)50% oxygen+GO6983(PKC pan-inhibitor)+VEGF-165 daily at 37ºC for 3 days.

RESULTS: -Total number of branches and total branch length were significantly reduced after 2 days in 50% oxygen and 50% oxygen+anti-Nrp-1 antibody+VEGF-165 as compared to 50% oxygen+VEGF-165 (16.2±4.7, 14.7±3.2 vs 27.5±9.8 and 2.5±0.8 mm, 2.5±0.8 mm vs 3.6±1.4 mm respectively, $p<0.05$ n=4).

-Densitometry showed that phospho-PKC expression was upregulated in explants stimulated with VEGF-165 as compared to explants exposed to anti-Nrp-1 antibody+VEGF-165($p<0.05$ n=4).

-Total number of lung bud branches and total branch length were reduced in 50% oxygen alone and in 50% oxygen+GO6983+VEGF-165 as compared to 50% oxygen+VEGF-165 (31±9.5, 17.6±5.8 vs 43.8±10 and 3.8±1 mm, 2.7±0.7 mm vs 5.2±1.1 mm $p<0.05$ n=6).

-Phosphorylated Flk-1 receptors were significantly detected with phospho-Flk-1 antibody in endothelial cells of explants in 3% oxygen and 50% oxygen+VEGF-165 as compared to 50% oxygen alone and 50%oxygen+anti-Nrp-1 antibody+VEGF-165 (17.7±4.8%, 15.8±4.6% vs. 5.3±3.9%, 7.5±3.8% $p<0.05$ n=3).

CONCLUSIONS: We demonstrated that attenuation of hyperoxic injury by VEGF-165 requires receptor engagement of Flk-1-Nrp-1 and subsequent activation of the PKC pathway. We speculate that phosphorylation occurs in endothelial cells.

243
11:30am

Medical Student

Novel Method To Quantify Expression of Site Specific Mutants in Transgenic Mice: Application to Troponin I Transgenic Mice

Thomas E. Rappold, Pingbo E. Zhang, Anne Murphy.
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BACKGROUND: Cardiac troponin I (cTnI) is an essential regulatory protein in the cardiac muscle contractile apparatus. Prior work indicated 3% of African American (AA) population had a cTnI sequence variance, Pro82Ser. Hypertensive AA men with this variant have increased cardiac hypertrophy compared to age-matched AA hypertensive controls. Transgenic mice with the Pro82Ser variant have impaired cardiac muscle relaxation and decreased response to isoproterenol. Studies of transgenic lines with point mutations are limited by the lack of an accurate method to determine the expression of the mutant protein.

OBJECTIVE: Our aim was to quantify the amount of cTnI, Pro82Ser in transgenic mouse hearts using a novel method, multiple reaction monitoring (MRM).

DESIGN/METHODS: Cardiac myofilaments were isolated from transgenic wildtype and

Pro82Ser mouse hearts and separated on 1D SDS-PAGE using 4-12% NuPAGE Bis-Tris gels. Gels were stained using Coomassie blue R-250. The cTnI protein was excised from gels and digested using trypsin. Orbitrap LC/MS/MS was used to identify relevant peptides. The standard peptide NITEIADLTQK* was spiked into mouse heart samples at 1 fmol/µl. MRM development, optimization, and validation was by Q-Trap nano-LC/MS/MS analysis. Peak detection and quantification of peak area was determined with Multiquant software version 2.0 (AB SCIEX).
RESULTS: We established a standard calibration curve with the standard peptide to calculate the quantity of wild type protein in each heart sample. Expression of wildtype and mutant (n=8) Pro82Ser cTnI was determined with the MRM assays. Pro82Ser protein was found to be present at 2.2 to 3.5 % of wild type cTnI with mean and standard deviation of 2.94 +/- 0.5 %.
CONCLUSIONS: Prior work on other mutants of troponin has noted significant phenotype at low levels of mutant expression. This work has implications for deleterious impact on cardiac function for a variant present in 3% of the AA population.

244

11:45am

Mechanisms That Control the Function of the Mitochondrial Permeability Transition Pore during Cardiac Myocyte Differentiation

Jennifer R. Hom, George A. Porter.
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BACKGROUND: Mitochondria control energy production as well as signaling pathways that are critical to normal cellular function. We recently showed that changes in mitochondrial structure and function in the embryonic mouse heart are regulated by the activity of the mitochondrial permeability transition pore (mPTP). Furthermore, closure of the mPTP caused a decrease in cellular oxidative stress that facilitated cardiac myocyte differentiation *in vivo* and *in vitro*. These experiments demonstrated that the mPTP-regulatory protein, CyP-D, plays a critical role in the activity of the mPTP in the early heart.
OBJECTIVE: Our goal was to explore the mechanisms that control the activity of the mPTP, and we hypothesized that changes in the expression, function, and post-translational modification of CyP-D regulate mPTP function and myocyte differentiation in the early heart.
DESIGN/METHODS: E9.5 and 11.5 embryonic hearts were harvested from wild-type (WT) and CyP-D null mice for analysis of whole hearts and primary myocyte cultures. Mitochondrial and mPTP function and myocyte differentiation were examined using biochemical assays and fluorescence microscopy. Gene and protein expression and post-translational modification was assessed using RNASeq, immunoblotting (IB), immunofluorescence microscopy (IF) and transfection of myocytes with WT and mutated CyP-D expression vectors.
RESULTS: Between E9.5 and 11.5, gene expression of CyP-D and other components of the mPTP generally increased by 20%. Preliminary IB experiments showed similar changes in protein expression, while IF of sectioned hearts demonstrated increased CyP-D expression in the less differentiated cells of the ventricular walls compared to the more differentiated trabeculae. Deletion or inhibition of CyP-D closed the mPTP and caused maturation of mitochondrial structure and function and increased myocyte differentiation, while re-expression of WT CyP-D in CyP-D null myocytes blocked these effects. In contrast, expression of inactive CyP-D had no effect, suggesting that the PPIase (peptidyl-prolyl isomerase) activity of CyP-D is important for these processes. Further evaluation of the effects of CyP-D acetylation and oxidation is currently underway.
CONCLUSIONS: These studies suggest the activity of CyP-D regulates the mPTP and plays a critical role in cardiac myocyte differentiation in the embryonic heart.

Emergency Medicine Platform Session

Sunday, April 1, 2012
9:45am-12:00pm

245

9:45am

Predictive Value of Initial Glasgow Coma Scale in Pediatric Trauma Patients

Mark X. Cicero, Keith P. Cross.
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BACKGROUND: For injured children, the prognostic value of the Glasgow coma scale (GCS) has not been fully established.
OBJECTIVE: We aimed to determine the predictive value of the GCS and the motor component of the GCS and the Simple Motor Score (SMS). Outcomes of interest were overall mortality, death on arrival (DOA), and major injury (injury severity score [ISS]>15), as well as the relationship between GCS and length of stay (LOS) in both the emergency department (ED) and the hospital.
DESIGN/METHODS: Records from the National Trauma Data Base, a registry of trauma victims developed by the American College of Surgeons, were extracted for the 2007 – 2009 reporting years. Patients aged 0 – 18 years transported from a trauma scene with complete initial scene data were included in the analysis. Statistical analysis, including construction of receiver-operator curves, was performed to determine the correlation between GCS, SMS, and the clinical outcomes of interest. For comparison with SMS, the two other components of the GCS, eye and verbal assessment, were analyzed for prediction of overall mortality.
RESULTS: There were 210,175 pediatric records, of which 104,035 had complete data for analysis, including 3,946 deaths. The mean age of patients was 12.6 years (SD 5.5). GCS was predictive of overall mortality, with area under the receiver-operator curve (AUC) of 0.946 (95% CI: 0.941 – 0.951), death on arrival, with AUC of 0.958 (95% CI: 0.953 – 0.963), and risk of major injury, with AUC of 0.720 (0.715 – 0.724). Lower GCS scores were associated with shorter ED LOS and longer hospital stays ($p < 0.001$, ANOVA) with the exception of GCS 3, associated with shorter hospitalizations. The SMS had predictive value for mortality and injury outcomes similar to the full GCS. For predicting overall mortality, the AUC for SMS was 0.940 (95% CI: 0.935-0.945), and for predicting major injury, the AUC was 0.681 (95% CI: 0.677 – 0.686). For predicting overall mortality, the GCS eye and verbal components had AUC of 0.925 (95% CI: 0.919 - 0.930) and 0.934 (95% CI: 0.929 - 0.938) respectively.
CONCLUSIONS: For pediatric trauma victims, the GCS is predictive of mortality and injury outcomes, as well as ED and hospital LOS, and has excellent prognostic accuracy. The SMS also has predictive value for injury and mortality that is nearly equivalent to the full GCS. Much of predictive ability of GCS may be due to the motor component.

246

10:00am

Creation and Delphi-Method Refinement of Prehospital Pediatric Disaster Triage Simulations

Mark Cicero, Linda Brown, Frank Overly, Jorge Yarzebski, Garth Meckler, Susan Fuchs, Sarita Chung, Andrew Garrett, Daniel Fagbuyi, Kathleen Adelgais, Ran Goldman, James Parker, Marc Auerbach, Antonio Riera, David Cone , Carl Baum.
Yale University, New Haven, CT; Brown University, Providence, RI; University of Massachusetts, Worcester, MA; Oregon Health Sciences University, Portland, OR; Children's Memorial Hospital, Chicago, IL; Children's Hospital, Boston, MA; Department of Health and Human Services, Washington, DC; Children's National Medical Center, Washington, DC; Children's Hospital Colorado, Aurora, CO; BC Children's Hospital, Vancouver, BC; Connecticut Children's Medical Center, Hartford, CT.

BACKGROUND: There is a need for rigorously designed pediatric disaster triage (PDT) training simulations for paramedics and other prehospital providers (PHPs).
OBJECTIVE: We aimed to create validated PDT simulations and evaluation tools, and determine whether subject matter experts (SMEs) in the Pediatric Research in Disaster Education network could reach consensus about expected triage outcomes and evaluation methods.
DESIGN/METHODS: We created high-fidelity disaster simulation scenarios with pediatric victims: a school shooting, a school bus crash, and a multiple-victim house fire. Each simulation had similar injury severity and 10 victims. Examples include children with special healthcare needs, teens with gunshot wounds, and infants with smoke inhalation. Checklist-based evaluation tools and Likert-style global assessments of function were created for each simulation. Physicians and PHPs with differing local PDT strategies were recruited as SMEs for modified Delphi iterative critique (mDelphi) of the simulations and evaluation tools. The mDelphi was managed with an online survey tool. The SMEs provided an expected triage category for each patient. The target for mDelphi consensus was >90%. Using Likert scales and free text, the SMEs rated the face validity of the simulations, clarity of learning objectives, and the correlation of the evaluation tools.
RESULTS: The 10 SMEs who participated in the mDelphi represented nine academic medical centers in the United States and one in British Columbia. Local PDT strategies for the SMEs included JumpSTART (5), Smart (1), partial adoption of the Ontario Protocol (1), and no clear strategy (3). Consensus of expected triage level was 100% for 28 of 30 victims, with the remaining two achieving 90% consensus after three mDelphi iterations. To achieve consensus, we amended 11 instances of bias toward a specific PDT strategy, revised two unclear learning objectives, and corrected 10 instances of non-correlation between evaluations and simulation.
CONCLUSIONS: The Delphi process, used to derive novel PDT simulation and evaluation tools, yielded a high degree of consensus among the SMEs. The simulations and evaluation tools may now be tested for reliability and validity as part of a prehospital PDT curriculum.

247

10:15am

Disparities in Pediatric Injury Outcome by Insurance Status

Sage R. Myers, Charles C. Branas, Benjamin French, Michael L. Nance, Brendan G. Carr.
Division of Emergency Medicine, Children's Hospital, Philadelphia, PA; School of Medicine, University of Pennsylvania, Philadelphia, PA; Department of Surgery, Children's Hospital, Philadelphia, PA; Department of Emergency Medicine, Hospital of the University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Disparities in general health outcomes related to insurance status have been described and attributed to socioeconomic factors and their associated pre-existing conditions. Pediatric injuries occur acutely in a previously healthy population, but recent studies have described outcomes disparities even in this population.
OBJECTIVE: We aimed to compare outcomes among injured children by insurance status in a nationally representative cohort. We hypothesized that, given the acute nature of injury and the healthy patient population, on a national scale, we would see no difference in mortality.
DESIGN/METHODS: We used the Kids Inpatient Database (KID), which is weighted to allow for the production of national estimates, with the addition of general and pediatric trauma center variables through special permission and assistance by AHRQ. We included all pediatric discharges (<16yrs) with primary or secondary ICD-9 code(s) for injury (800-999). ICD-9 codes were also used to calculate injury severity scores (ISS) for each discharge. Weighted logistic regression analyses were employed to evaluate mortality among patients by insurance status, while adjusting for injury severity, trauma level of admitting hospital, mortality risk, age, gender, blunt/penetrating mechanism, hospital rural/urban location, region of country and hospital annual pediatric volume.

RESULTS: See table.

Odds ratios for injury mortality with 95% CI

	Private	Medicaid	Uninsured
All Hospitals			
All patients (n=153,087)	-	1.0 (0.8-1.2)	2.7 (1.9-3.9)
Severely injured (n=13,371)*	-	0.9 (0.7-1.2)	2.5 (1.6-3.9)
Level 1 Trauma Centers			
All patients (n=62,988)	-	0.9 (0.7-1.2)	2.8 (1.7-4.4)
Severely injured (n=8,026)*	-	1.2 (0.9-1.5)	2.0 (1.3-2.8)
Non Trauma Centers			
All patients (n=47,122)	-	1.3 (0.8-2.2)	2.9 (1.4-5.9)
Severely injured (n=1,928)*	-	1.1 (0.5-2.6)	2.4 (1.8-6.9)

*ISS>15

CONCLUSIONS: Increased risk of pediatric injury mortality was found among children with no insurance, as compared to those with private insurance for trauma centers as well as non-trauma centers. No such differences were found with Medicaid patients. This outcome disparity was noted for severely injured children as well. The reason for these findings is not clear but warrants further investigation. These results confirm, on a national stage, prior work in limited cohorts of patients. Given a relative lack of plausible patient-level factors, we must consider the possibility of hospital-level factors as the etiology of these differences.

248

10:30am

Fellow in Training

Accuracy of Point-of-Care Ultrasound for Diagnosis of Elbow Fractures in Children

Joni E. Rabiner, Hnin Khine, Jeffrey R. Avner, James W. Tsung.

Department of Pediatrics, Division of Emergency Medicine, Children's Hospital at Montefiore, Bronx, NY; Department of Emergency Medicine, Division of Pediatric Emergency Medicine, Mount Sinai Medical Center, New York, NY.

BACKGROUND: Ultrasound (US) has been shown to be useful in the diagnosis of pediatric skeletal injuries. It can be performed accurately and reliably by emergency department (ED) physicians with focused US training.

OBJECTIVE: To determine the test performance characteristics for point-of-care (POC) US performed by pediatric emergency medicine (PEM) physicians compared to radiographic diagnosis of elbow fractures.

DESIGN/METHODS: This was a prospective study of children < 21 years presenting to the ED with elbow injuries requiring X-rays. Patients were excluded if they arrived at the ED with elbow X-rays or a diagnosis of fracture. Prior to the start of the study, PEM physicians received a one-hour didactic and hands-on training session on US examination of the elbow. Before obtaining X-rays, the PEM physician performed a brief elbow US using a linear 10-5 MHz transducer probe and recorded images and clips in longitudinal and transverse views. A positive US for fracture at the elbow was defined as the PEM physician's determination of an elevated posterior fat pad (PFP) and/or lipohemarthrosis (LH) of the PFP. All study patients received a standard of care elbow X-ray in the ED and clinical telephone follow-up. The gold standard for fracture in this study was defined as fracture on initial or follow-up X-rays as determined by a radiologist.

RESULTS: 122 patients were enrolled with a mean age of 7.6 (± 5.4) years. 42/122 (34%) had a positive X-ray for fracture. Of the 65/122 (53%) patients with a positive US, 58/65 (89%) had an elevated PFP, 56/65 (86%) had LH, and 49/65 (75%) had both an elevated PFP and LH. A positive elbow ultrasound with an elevated PFP or LH had a sensitivity of 0.98 (95% CI 0.88-1.00), specificity of 0.72 (95% CI 0.61-0.81), positive predictive value of 0.67 (95% CI 0.55-0.77), negative predictive value of 0.98 (95% CI 0.91-1.00), positive likelihood ratio of 3.54 (95% CI 2.45-5.10), and negative likelihood ratio of 0.03 (95% CI 0.01-0.22) for a fracture. The use of POC elbow US would reduce the need for X-rays in 56/122 (46%) patients with elbow injuries but would miss 1 fracture.

CONCLUSIONS: POC US was found to be highly sensitive for elbow fractures when performed by PEM physicians. A negative POC US may reduce the need for X-rays in children with elbow injuries.

249

10:45am

Fellow in Training

Comparison of GlideScope® Videolaryngoscopy to Miller Direct Laryngoscopy for Intubation of a Pediatric Simulator by Novice Physicians

Joni E. Rabiner, Marc Auerbach, Jeffrey R. Avner, Dina Daswani, Hnin Khine.

Department of Pediatrics, Division of Emergency Medicine, Children's Hospital at Montefiore, Bronx, NY; Department of Pediatrics, Division of Emergency Medicine, Yale School of Medicine, New Haven, CT.

BACKGROUND: GlideScope® videolaryngoscopy (GVL) is designed to facilitate tracheal intubation by providing a wider, unobstructed view of the glottis. Previous studies comparing GVL to direct laryngoscopy (DL) by experienced clinicians have found conflicting results in ease of use and time to intubation. While most experienced clinicians favor DL, the technique with which they are familiar, it is not known whether novice clinicians, with limited intubation experience with either technique, would prefer the technology of GVL for intubation.

OBJECTIVE: To compare novice clinicians' performance using GVL to DL in intubating a pediatric simulator.

DESIGN/METHODS: This was a prospective, randomized crossover study on the use of GVL and DL by incoming pediatric interns prior to advanced life support training. At the start of the study, the interns received a didactic session and expert modeling of the use of both devices for intubation. Two scenarios were used: (1) "normal intubation" with a standard airway and (2) "difficult intubation" with tongue edema and pharyngeal swelling. Interns then intubated Laerdal SimBaby™ in each scenario with both GVL and DL for a total of four randomized intubation scenarios. Primary outcomes included time to successful intubation and the rate of successful intubation. The interns also rated their satisfaction of the devices using a visual analog scale (0-10) and chose their preferred device for their next intubation.

RESULTS: 29 interns were included in this study. In the normal airway scenario, there were no differences in the mean time for intubation with GVL or DL (62.9 ± 24.1 vs 61.8 ± 26.2 seconds, p=NS) or the number of interns who performed successful intubation (23 vs 22, p=NS). In the difficult airway scenario, the interns took longer to intubate with GVL than DL (92.3 ± 26.6 vs 59.9 ± 22.7 seconds, p=0.008), but there were no differences in the number of successful intubations (17 vs 19, p=NS). Interns rated their satisfaction higher for GVL than DL (7.3 ± 1.8 vs 6.5 ± 1.5, p=0.05) and GVL was chosen as the preferred device for their next intubation by a majority of the interns (19/29, 66%).

CONCLUSIONS: For novice clinicians, GVL does not improve the time to intubation or intubation success rates in a pediatric manikin model of normal and difficult airway scenarios. Still, these novice clinicians overall preferred GVL for their next intubation.

250

11:00am

Obstacles to Pediatric Disaster Triage Performance: A Qualitative Investigation

Mark X. Cicero, Jeannette Koziel, Garth R. Meckler, Linda Brown.

Pediatrics, Yale School of Medicine, New Haven, CT; Emergency Medicine, Brown University, Providence, RI; Emergency Medicine, Oregon Health Sciences University, Portland, OR.

BACKGROUND: In disasters, paramedics are likely to triage victims, including children. Little is known about obstacles faced by paramedics when they perform pediatric disaster triage (PDT).

OBJECTIVE: To determine obstacles to PDT performance for paramedics enrolled in a simulation-based disaster curriculum.

DESIGN/METHODS: We conducted a qualitative evaluation of subjects' self-reported obstacles to PDT performance. The subjects were paramedics and paramedic students enrolled in a PDT curriculum at three study sites. During the curriculum, subjects individually completed a multiple casualty school bus crash simulation in which they triaged victims. Actors and simulation manikins portrayed the victims. A semi-structured debriefing was created via an iterative process, and administered individually after the simulation. The debriefings were audio recorded and transcribed. We employed maximally diverse cases sampling strategy, with interviews of subjects from several EMS agencies.

Two investigators independently analyzed 97 pages of transcripts. Using a grounded theory strategy, the data were analyzed via: 1) immersion and coding of data, 2) clustering of codes to generate themes, and 3) generation of hypotheses based on the themes. While analyzing the data, we employed peer debriefing to determine emerging codes, groups, and thematic saturation. Systematic data trustworthiness strategies included triangulation of codes and themes with two PDT subject matter experts and two paramedic educators.

RESULTS: 17 subjects were debriefed. Subject experience ranging from 1 to 25 years of prehospital service (median 15 years); six subjects had prior disaster training and seven had delivered care during a disaster. The codes were clustered into themes: 1) differences between multiple patient incidents and single patient emergencies, 2) discomfort with children's physiology and emotions, 3) difficulties with PDT rationale, 4) difficulties with time constraints and efficient triage, 5) children with special health care needs, 6) limitations of simulation fidelity, and 7) subjects' emotional responses to injured and deceased children.

CONCLUSIONS: Paramedics report particular difficulty triaging multiple child disaster victims due to emotional obstacles, discomfort with pediatric physiology, and struggles with triage rationale and efficiency. A hypothesis for further testing is: curricula addressing the obstacles described in this work will improve paramedics' performance of PDT.

251

11:15am

Fellow in Training

A Randomized Trial of Nebulized Hypertonic Saline for Bronchiolitis in the Emergency Department

Todd A. Florin, Marlena Kittick, Kathy N. Shaw, Joseph J. Zorc.

Emergency Medicine, Children's Hospital, Philadelphia, PA.

BACKGROUND: Bronchiolitis is a common cause of hospitalization among infants, yet evidence for an effective therapy is lacking. There are conflicting data on the effectiveness of hypertonic saline (HS) as a treatment for acute bronchiolitis.

OBJECTIVE: To determine whether nebulized 3% HS improves respiratory distress compared to nebulized 0.9% normal saline (NS) in children 2-23 months presenting to the ED with acute bronchiolitis with persistent respiratory distress after initial therapy with a trial of nebulized albuterol.

DESIGN/METHODS: This randomized, double-blind, controlled trial in a single urban pediatric emergency department enrolled children 2-23 months with their first episode of bronchiolitis and a Respiratory Distress Assessment Instrument (RDAI) score of 4-15 after receiving a trial of albuterol and nasal suctioning. Patients were randomized to receive either 3%HS or NS. The primary outcome was the Respiratory Assessment Change Score (RACS), a standard score that includes wheezing, retractions and respiratory rate, at 1 hour after receiving study solution. A score of 0 indicates no change, and a decrease in RACS indicates improvement. Secondary outcomes included RACS at 2 hours, oxygen saturation, vital signs and hospital admission rate. Enrollment was 93% complete at time of abstract submission, and a blinded examination of summary statistics was performed; complete analysis will be available for presentation.

RESULTS: 52 patients were enrolled and evaluable for the primary endpoint. The 2 study groups had similar baseline characteristics, including equal baseline median RDAI scores (7 vs. 7). There was a 3 point difference in median RACS at 1 hour between the two groups (-2 vs. -5). Mean respiratory rate (46.8 ± 11.2 vs. 42.5 ± 10), heart rate (155.6 ± 18.7 vs. 157.2 ± 25.8) and oxygen saturation (96.5 ± 3 vs. 96.5 ± 3.3) appear similar between groups at 1 hour after treatment. There was a 12% difference in hospitalization rate between the two groups (71.4% vs. 59.2%). Hypothesis testing will be conducted at completion of enrollment.

CONCLUSIONS: An initial examination of summary statistics suggests that hypertonic saline may impact respiratory distress at 1 hour after administration. Further analyses will be available at the time of presentation.

Endocrinology & Obesity
Platform Session

Sunday, April 1, 2012
9:45am-12:00pm

252
11:30am

Fellow in Training

Prescription Filling Practices after an Acute Emergency Department Visit for Asthma

Margaret Wolff, Mary Ann Mazer, Joseph Zorc, Esther M. Sampayo.
Division of Emergency Medicine, Children's Hospital, Philadelphia, PA; Department of Emergency Medicine, George Washington University, Washington, DC.

BACKGROUND: Few studies have assessed prescription-filling practices after a pediatric emergency department (ED) visit for asthma. Limitations in the existing literature include a reliance on parental report and a paucity of data on filling of controller medications which are recommended in national asthma guidelines.

OBJECTIVE: To describe prescription filling patterns of asthma medications following discharge from the ED for an acute asthma visit.

DESIGN/METHODS: This was a secondary analysis of a randomized control trial that enrolled children aged 1-18 years who met criteria for persistent asthma but had not been prescribed controller medication prior to an acute asthma visit to an urban children's hospital ED. Intervention subjects were given a prescription for inhaled corticosteroids (ICS). Patient characteristics and data on prescriptions filled by pharmacies were obtained by a combination of parental report, ED medical record, primary care physician medical record, insurance claims and pharmacy record review.

RESULTS: 152 eligible patients were enrolled, and evidence of a filled prescription by pharmacy records or insurance claims were available for 108 patients. 44 subjects had no records of a filled prescription during the 2 month follow-up period. 43% of parents stated they had run out of their albuterol prior to the ED visit. 37% (34/93) of subjects did not fill the prednisone prescription given at ED discharge, and 31% (18/59) filled the prescription ≥ 2 days after the ED visit. 72% (38/53) of intervention subjects filled the ICS prescription given at ED discharge. There was no difference in ICS fill rates between Medicaid patients and privately insured patients. However, Medicaid patients had more albuterol refills within the 2 months after the ED visit (p=.05) and were 7.9 times more likely to have run out of albuterol prior to the ED visit as compared to privately insured patients (p =.018).

Prescription Fill Practices

Days From ED Visit to Prescription Fill				
	Mean	Median	Minimum	Maximum
Albuterol	8.3	1	0	59
Prednisone	1.5	1	0	17
Pulmicort	5.5	1	0	43
Flovent	13.9	3	0	56

CONCLUSIONS: Nonadherence to filling prescribed asthma medications is common among children following an ED visit for asthma. High rates of albuterol rescue use were observed in this population, particularly among Medicaid patients. Future interventions can focus on improving prescription filling rates.

253
11:45am

Fellow in Training

Influenza (IV) Infection and Respiratory Syncytial Viral (RSV) Infection Can Be Distinguished Clinically in the Emergency Room

Brian P. Wood, Howard Faden, Kathy Lillis, Haiping Qiao, Brian Wrotniak.
Emergency Department, WCHOB, Buffalo, NY.

BACKGROUND: IV and RSV are the two most common winter respiratory viruses infecting children. Treatment is recommended for children with IV.

OBJECTIVE: In the absence of laboratory tests, it would be beneficial to have a clinical tool to distinguish IV from RSV. This study was designed to compare clinical characteristics of IV and RSV in an Emergency Department (ED) setting for initiating anti-viral treatment.

DESIGN/METHODS: Children less than 3 years were enrolled into control, IV or RSV groups in the ED from 12/20/10 to 4/19/11. RSV was diagnosed with BinaxNow RSV kit (sensitivity (Sens) 93% and specificity (Spec) 93% and IV by Inverness Medical Influenza A&B Kit (Sens 70-83% for IVA, Spec 90-96%, Sens 69% for IVB, Spec 96-100%). Data collected included age, gender, race, ethnicity, temperature, respiratory rate, tachypnea, oxygen saturation (O_2), and history of fever, malaise/fatigue/lethargy (m/f/l), nasal discharge, cough, respiratory distress, as well as pneumonia by x-ray, and hospital admission. Comparisons of groups were done with Chi square analysis and Fisher's Exact Test.

RESULTS: All groups were similar with respect to age, gender, race and ethnicity.

	Study Group (n=181)			
Parameters	Control (n=59)	Influenza (n=55)	RSV (n=67)	P value (Influenza v. RSV)
Temperature - mean, Celsius	36.75	38.74	37.91	<0.0001
Fever ≥ 39 C (%)	0	47.3	16.46	<0.0001
Respiratory rate (bpm)	29.2	35.5	42.0	0.0035
Tachypne (age related, %)	0	13	27	0.05
O2 saturation mean (%)	99.1	98.2	96.4	0.0007
O2 sat≤ 95% (%)	0	9	29	0.005
History (Hx) of fever (%)	0	87.2	56.7	0.000
Hx m/f/l (%)	0	25.5	6	0.003
Hx nasal discharge (%)	1.69	72.73	92.54	0.0058
Hx cough (%)	1.69	69.09	74.62	0.5462
Hx respiratory distress (%)	0	14.55	41.79	0.0013
Pneumonia (%)	0	1.82	8.96	0.127
Hospital admission (%)	1.69	7.27	28.36	0.0045

A logistic regression model predicted a 95% likelihood of influenza in the presence of fever ≥ 39 C, HX of m/f/l, no Hx of nasal discharge, and O2 saturation > 95%.

CONCLUSIONS: Children with IV had significantly more constitutional symptoms, while children with RSV had significantly more respiratory signs and symptoms. However, cough and pneumonia were not distinguishing characteristics. Differences in clinical characteristics between IV and RSV could be used in an ED for initiating treatment in the absence of lab tests.

254
9:45am

Postdoc Fellow

Ablation of Sim1 Neurons Causes Hyperphagia, Reduced Energy Expenditure and Obesity

Dong Xi, Nilay Gandhi, Meizan Lai, Bassil Kublaoui.
Department of Endocrinology, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Sim1, a transcription factor, is required for the development of the paraventricular nucleus (PVN) of the hypothalamus. The PVN is a critical regulator of appetite and also modulates energy expenditure. Our previous studies showed that *Sim1*$^{+/-}$ mice exhibit hyperphagia, obesity, increased linear growth and susceptibility to diet-induced obesity, but no decrease in energy expenditure. Ablation of the PVN causes obesity due to hyperphagia and reduced energy expenditure. It remains unknown whether Sim1 neurons regulate energy expenditure as well as feeding.

OBJECTIVE: We aim to explore the physiological function of Sim1 neurons by neuron specific ablation in adult mice.

DESIGN/METHODS: Rodents are relatively insensitive to Diphtheria toxin (DT). iDTR (inducible DT receptor) mice have the simian DTR (*Hbegf*) inserted into the ROSA26 locus. Widespread expression of DTR is blocked by an upstream *loxP*-flanked STOP sequence. When bred to Cre recombinase-expressing mice, the STOP sequence is deleted in cre expressing cells, permitting cell specific DTR expression and DT mediated ablation. Sim1cre mice were bred to homozygous iDTR mice generating mice that express DTR in Sim1 cells. Sim1 neuron ablation was performed by ICV injection of DT. Body weight and energy expenditure were measured weekly before and after ablation. Metabolic studies were performed in the pre-obese and obese states. Body temperature and composition were measured. Hypothalamic mRNA expression of Sim1, Oxytocin (OXT), Thyrotropin releasing hormone (TRH), and other neuropeptides was examined by quantitative PCR and OXT peptide expression was examined by immunofluorescence staining.

RESULTS: Compared to control littermates, mice with Sim1 neuron ablation became obese on chow due to increased food intake, reduced energy expenditure and increased feeding efficiency. Sim1 neuron ablation also decreased resting energy expenditure and body temperature, and increased fat mass. Hypothalamic gene expression of Sim1, OXT and TRH was reduced by 50%. Immunofluorescence staining confirmed ablation of OXT neurons in the PVN.

CONCLUSIONS: Our results demonstrate that Sim1 neurons in adult mice regulate both food intake and energy expenditure. Sim1 is expressed in the PVN, supraoptic nucleus, medial amygdala (MeA) and the nucleus of the lateral olfactory tract. Sim1 neurons in the PVN and MeA are likely to regulate feeding while Sim1 neurons in the PVN are likely to regulate energy expenditure.

255
10:00am

House Officer

Addressing Obesity in Pediatric Inpatients: The Role of Electronic Medical Records

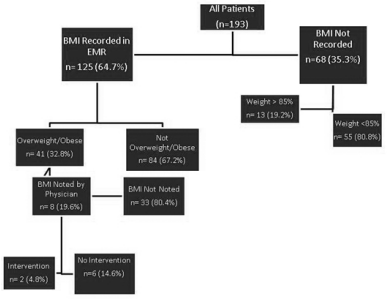
Stephen DeMeo, David I. Rappaport.
Pediatrics, AI duPont Hospital for Children, Wilmington, DE.

BACKGROUND: The 2007 AAP Expert Committee emphasized Body Mass Index (BMI) in identifying overweight/obese children. Although this committee emphasized BMI identification in outpatients, hospitalizations may be valuable "teachable moments". Overweight/obesity may play a role in future hospitalizations. Identification of children's BMI percentile is a component of "meaningful use" for electronic medical records. EMRs may improve identification of overweight/obese children, but this has not been studied in inpatients.

OBJECTIVE: To investigate rates of (1) obtaining BMI, (2)physician recognition of children with BMI ≥85%,(3)interventions for overweight/obese children in a robust EMR.

DESIGN/METHODS: We conducted a retrospective chart review of 193 consecutive general pediatrics patients ≥2 years old admitted in September 2010. We determined whether BMI was obtained. If the BMI were ≥85%, we determined whether the BMI was documented in any physician note or any intervention for overweight/obesity. We noted patients with weight ≥85% for age without a BMI measured because they were likely overweight. We performed chi-squared analysis to determine whether there was a statistically significant association between (1) BMI being obtained and (2) a physician noting the BMI, with patient age, gender, patient care unit, weight, and diagnosis type.

RESULTS: Results are summarized below.



Age, gender, diagnosis and weight were not statistically significantly associated with BMI being obtained, though the association with patient's unit was statistically significant (p= <0.05). The patient's age, sex, diagnosis, unit location and weight were not statistically significantly associated with whether a physician noted the BMI.
CONCLUSIONS: The rate of obtaining BMI in pediatric inpatients is fair. Even with a robust EMR, physician attention to this data is very poor. The patient's unit location may be important in whether BMI is obtained. Staff education will likely improve both identification and treatment of hospitalized overweight/obese children.

256
10:15am

Pediatric PGY-3

Association of OGTT and Thyroid Function in Obese Adolescents

Karen Estrella, Leslie Lam.
Pediatrics, St Barnabas Hospital, Bronx, NY; Pediatric Endocrinology, Children's Hospital at Montefiore, Bronx, NY.

BACKGROUND: Recent data (NHANES) documents a rate of obesity at 16.9% in American children. This percentage continues to increase, with a higher prevalence among Mexican-American boys and non-Hispanic African-American girls. The association of obesity with an increased risk of insulin resistance and subsequent increased oral glucose tolerance test (OGTT) is well known. On the other hand, controversy exists between the association between thyroid function and obesity. Few studies have investigated the relationship between thyroid function tests (TFT) and OGTT. Due to the high incidence and prevalence of obesity in our community, it is important to understand the relationship between obesity and thyroid disease. If there is a correlation between these tests clinicians could (1) provide an improved risk assessment for diabetes mellitus type 2 (DM2) and (2) assess if TFTs are necessary in the routine evaluation of obese patients.
OBJECTIVE: To investigate the association between OGTT and TFT performed in obese adolescents who are referred to the pediatric endocrinology clinic in a large urban community hospital.
DESIGN/METHODS: Chart review of all records with OGTT performed between 2000-2010, as well as all pediatric endocrinology visits between March 2007 and September 2011. Inclusion criteria included age (10-18 years), obese (BMI %>90%), OGTT and TFT performed during the same time period, and no prior history of DM or thyroid disease (TD).
RESULTS: 683 charts were reviewed; 47 (6.9%) met inclusion criteria; gender: 46.8% male and ethnicity: Hispanic 89.4%. 46/47 (97.8%) had normal fasting basal glucose values, with only 1 impaired. 2hrs OGTT: 42/47 (89.3%) were normal and 5 were impaired; 0/47 patients had DM2. Regarding TSH, 1/47 (2.1%) had low, 45/47 had normal and 1/47 had high values. We found no significant association between TSH and either basal or 2hr values of OGTT as well as between TSH and BMI. However, there was a significant association between increasing BMI and 2hr values ($p<0.03$), as well as gender and basal glucose ($p<0.029$). Males had higher levels compared with females. Moreover, 33/47 (70.2%) had HbA1c levels performed as part of their routine evaluation with 3 subjects having levels >6%.
CONCLUSIONS: We found no evidence to support the use of OGTT or TFT as regular laboratory tests in an obese primarily Hispanic study group. Even if patients have impaired OGTT, TFTs are not warranted. By avoiding these tests on 47 study patients, our hospital could have saved $8,428.

257
10:30am

Fellow in Training

Sweet Surprise: The Impact of High Fructose Corn Syrup Ingestion during Childhood on the Development of Adult Obesity

Shazia F. Bhat, Rebecca A. Simmons.
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BACKGROUND: The prevalence of obesity is rising at an alarming rate. High sugar intake is a compelling potential etiology for this increase, given that the rise in obesity parallels a surge in the consumption of sugar, particularly high fructose corn syrup (HFCS).
OBJECTIVE: To determine whether HFCS ingestion in early childhood causes increased obesity and metabolic derangement in adulthood compared to other sugars.
DESIGN/METHODS: At weaning, C57/Bl6 mice were exposed to water containing either sucrose, glucose (20% solution), HFCS (50% solution), or no added sugar. All mice had ad lib access to standard chow. The mice were studied at 100 days of age.
RESULTS: In males, over the study period, total caloric intake did not differ between HFCS and control animals, however a mild increase was seen in sucrose and glucose groups (20% and 13% over controls respectively, $p<0.05$). Caloric intake from sugar did not differ between the sucrose and HFCS groups; there was a slight, but significant increase in caloric intake from sugar in the glucose group ($p<0.05$). At the end of the study period, the HFCS mice weighed significantly more than the other groups ($p<0.05$). Body fat content (measured by NMR) in all 3 sugar groups was more than double that of controls ($p<0.05$). Surprisingly, glucose tolerance was only impaired in HFCS animals compared to controls ($p<0.05$). Non-esterified fatty acids (NEFA), triglycerides (TG), glucose, insulin, and cholesterol levels did not differ between the 4 groups. Leptin levels were significantly higher in the HFCS and glucose groups compared to controls; however, adiponectin levels were significantly higher in the HFCS group only ($p<0.05$). In females, total caloric intake was higher in the sucrose and glucose groups, and caloric intake from sugar was higher in the HFCS group. However, at the end of the study period, there were no differences in weight, glucose tolerance, NEFA, TG, cholesterol, insulin, leptin, or adiponectin levels. Body fat content was higher in the glucose exposed females alone ($p<0.05$).
CONCLUSIONS: Despite lower total caloric intake compared to sucrose and glucose exposed animals, males exposed to HFCS were heavier, had increased adiposity and glucose intolerance, and elevated leptin and adiponectin levels indicative of abnormal fat metabolism. These findings raise a serious concern that HFCS intake during childhood may be contributing to the rise in adult obesity and its associated health problems.

258
10:45am

Fellow in Training

Racial and Insurance Disparities in Metabolic Control and Pump Starts for T1DM Children within Two Years of Diagnosis

Thomas L. Wadzinski, Chris Jasinski, Paul Visintainer, Holley F. Allen, Ksenia N. Tonyushkina.
Baystate Children's Hospital, Springfield, MA; University of Massachusetts, Amherst, MA.

BACKGROUND: Health outcome disparities including timeliness of diagnosis and metabolic control (A1C) in T1DM children are associated with race and insurance type (public vs private). Continuous subcutaneous insulin infusion (CSII) or pump therapy is suggested to improve A1C more than multiple daily injections (MDI) independent of race. Disparities in CSII usage between races have also been reported but information as to how and when these differences develop is lacking.
OBJECTIVE: To assess the effect of race, insurance type (public vs private), and insulin therapy (CSII vs MDI) on A1C in newly diagnosed T1DM children.
DESIGN/METHODS: An IRB approved retrospective chart review of 247 patients (139 males) newly diagnosed with T1DM at 10+/-4.1 (SD) yrs of age and followed at an academic tertiary health care center for 1 to 2 yrs yielded data on race, insurance type, insulin regimen, and A1C at the time of diagnosis and 6, 12 and 24 months after. Chi-squared testing was used to detect relationships between individual variables. Logistic regression (LR) analysis was performed to identify factors associated with CSII therapy or A1C levels at 1 and 2 yrs after diagnosis. Multiple LR analysis evaluated effects on A1C over time.
RESULTS: 17% of children had transitioned to CSII by 1 yr from diagnosis, and 34% by 2 yrs. There was a clear difference in CSII use between ethnic groups and insurance types at 2 yrs ($p<0.001$): 18% of Hispanics (8/45); 41% of Whites (73/179), and no African-Americans (0/16). For insurance type at 2 years: 19% of public (18/93) vs 43% of private (63/147) insurance were on CSII. At 2 yrs LR analysis showed that Whites had lower A1Cs than Hispanics (- 0.9%, $p<0.001$), patients with private vs public insurance (-0.6%, $p=0.004$), and patients on CSII vs MDI therapy (-0.4%, $p=0.049$). CSII was associated with lower A1C level independent of race or insurance. Differences in A1C with race and insurance type were found as early as 6 months after diagnosis, where differences with CSII therapy were not seen until 2 yrs.
CONCLUSIONS: In this newly diagnosed population, ethnic and insurance disparities were strong predictors of metabolic control as well as use of CSII. CSII was associated with better metabolic control at 2 yrs post diagnosis regardless of race. Further studies are needed to elucidate barriers to CSII and metabolic control in Hispanic and African American children with T1DM.

259
11:00am

Fellow in Training

Hypertrophic Cardiomyopathy in Neonates with Congenital Hyperinsulinism

Tingting Huang, Andrea Kelly, Susan Becker, Meryl Cohen, Charles Stanely.
Children's Hospital, Philadelphia, PA.

BACKGROUND: Hypertrophic cardiomyopathy(HCM) is a well-recognized complication in infants of diabetic mothers and is attributed to a compensatory increase in fetal insulin secretion. Infants with congenital hyperinsulinism have excessive pre- and postnatal insulin secretion due to defects in pathways of insulin secretion (most commonly the K_{ATP} channel).
OBJECTIVE: To report cases of HCM occurring in neonates with congenital HI managed at the Children's Hospital of Philadelphia Hyperinsulinism Center and identify potential risk factors for its development.
DESIGN/METHODS: A retrospective chart review of infants less than 3 months of age treated for HI over a 4 year period. Data collected included: gestational age (GA), birth weight (BW), hyperinsulinism form and treatment, and echocardiogram results, cardiac/respiratory complications.
RESULTS: 94 infants were included, gestational age 37.4 ±2.4 weeks, birth weight 3.4±0.9kg, 58 requiring pancreatectomy for diffuse (n=28) or focal (n=30) disease, 10 diazoxide-responsive, and 26 perinatal stress-induced. Thirty had echocardiograms performed, 10 had HCM. All were born large for gestational age and required pancreatectomy for either focal or diffuse HI after failing medical treatment vs. only 60.9% infant with no HCM required pancreactectomy. HCM infants had younger GA (36±2 weeks) than their surgical counterparts (38±2 weeks), p=0.02. The difference in BW (4.2±0.4 vs 3.9±0.7kg) approached significance (p=0.063), adjusting for GA. Insulin levels at hypoglycemia were significant higher in HCM group (median 30 vs. 14 IU/dL). Following treatment of HI and prior to discharge, HCM had improved/resolved in all ten infants. Supraventricular tachycardia (SVT) was diagnosed in five infants, three of whom also had HCM. Four of the five infants received Diazoxide prior to the occurrence of SVT . SVT resolved within the first year of life in three children in whom long-term cardiac information was available.
CONCLUSIONS: Hypertrophic cardiomyopathy occurs in neonates with congenital hyperinsulinism and further supports the role of insulin in the development of HCM. Infants with more severe hyperinsulinism and younger GA appear to be at greatest risk. Arrhythmias were also identified, but the etiology is not clear. Physicians caring for neonates with hyperinsulinism should be aware of potential cardiac complications and consider routine surveillance.

260
11:15am

Partial Nicotinic Acetylcholine Receptor Agonists Alter Epinephrine Responsiveness to Recurrent Insulin-Induced Hypoglycemic Stress: A Possible Translational Therapy for Diabetics

Necla Kirtok, Bistra Nankova, Edmund F. La Gamma.
Pediatrics / Division of Newborn Medicine, New York Medical College Maria Fareri Children's Hospital, Valhalla, NY.

BACKGROUND: During hypoglycemia, sympathetic nerve impulses cause release of acetylcholine (ACh) at the adrenal chromaffin cell synapse which initiates both release and biosynthesis of Epinephrine (Epi) via nicotinic acetylcholine receptors (nAChRs). Recurrent hypoglycemia blunts Epi release (e.g. suboptimal insulin treatment). The progressive loss in Epi response is known as hypoglycemia associated autonomic failure (HAAF). Cytisine is a partial agonist at selected subtypes of central and peripheral nAChRs. Its effects on adrenal nAChRs and autonomic neurotransmission has not been addressed.

OBJECTIVE: To determine whether nAChR partial agonists can attenuate excessive cholinergic stimulation during recurrent hypoglycemia and preserve epinephrine responsiveness.

DESIGN/METHODS: 7 days after vascular catheterization (carotid artery and jugular vein), Sprague-Dawley rats received either cytisine and/or insulin (2 U/kg Humulin) intraperitoneally (i.p) once or twice daily. Control animals received 0.9% saline i.p. On day 4 blood was collected at 0, 30, 60, 90, 120 min after the treatment for plasma Epi levels.

RESULTS: We observed a modest dose-dependent effect of cytisine (0.3, 1 or 3 mg/kg) on plasma Epi levels (avg 5 , 14, 46 pg/ml, respectively). Twice daily cytisine caused a 4-fold increase in Epi response compared to single daily treatment (avg 46.2 $\pm$ 14 pg/ml vs 11.5 $\pm$ 4 pg/ml). However even the maximal response to cytisine remained below 5% of acute hypoglycemia-induced Epi response (3020 $\pm$ 162 pg/ml), consistent with it's partial agonist properties. In addition, when animals were pretreated with cytisine, their Epi responses to a single acute hypoglycemic stress were attenuated. When cytisine was given before each episode of recurrent insulin-induced hypoglycemia for 3 days, the Epi response was better preserved (1616 $\pm$ 230 pg/ml) compared to animals exposed to twice daily insulin without partial agonist (1060 $\pm$ 95 pg/ml).

CONCLUSIONS: 1) The nAChR partial agonist cytisine has a dose-response relationship to plasma Epi levels (much lower than the endogenous agonist Ach 2) Pre-treatment with cytisine enables more Epi release during recurrent hypoglycemia. These experiments provide a proof of concept, that modulation of nAChR can preserve Epi release *in vivo* and thus offer promise as a translational adjunctive therapy for insulin dependent diabetes.

261
11:30am

Fellow in Training

Age Modulates Parathyroid Hormone Levels in Obese Adolescents Regardless of 25OHD and BMI

Emily Frydman, Chrystal Wittcopp, Holley F. Allen,
Paul Visintainer, Nancy S. Dunbar.
Pediatric Endocrinology, Baystate Children's Hospital, Springfield, MA.

BACKGROUND: Hypovitaminosis D is a common problem among obese children and adolescents. PTH is often used as a surrogate marker of 25OHD status in terms of bone health; however, the level of 25OHD that is needed to suppress PTH varies in studies and populations. Studies in adults found that fat mass and age modulate the relationship between 25OHD and PTH. We elected to retrospectively study the relationship between age, 25OHD levels, PTH and BMI in our population.

OBJECTIVE: To assess the relationship between age, 25OHD, PTH and BMI in a cohort of obese children and adolescents.

DESIGN/METHODS: This retrospective study included 70 patients aged 4 through 21 years with BMI >95%ile seen between April 2008 and April 2010 in our Pediatric Endocrinology Weight Management Clinic. Patients with a known malabsorptive disorder or parathyroid disease were excluded. Laboratory measurements included 25OHD and PTH. The primary analysis was the impact of age and BMI on the relationship between 25OHD and PTH.

RESULTS: Mean age of our cohort was 12.9 $\pm$ 3.5 yrs with 48% female and 47% Caucasian. The mean 25-OHD level was 21.0 $\pm$ 9.3 ng/ml. The mean BMI z-score was 2.4 $\pm$ 0.5. The prevalence of patients with 25OHD <20 ng/ml was 51%, 20 – 30 ng/ml was 28%, and > 30 ng/ml was 20%. The mean PTH was 37.5 $\pm$12.4 pg/ml. The relationship between PTH and 25OHD was significant. For each 1ng/ml increase in 25OHD, PTH decreased 0.35 pg/ml (P=0.037) (controlling for season and BMI-z-score), and t-Test showed a significant difference of 5.92 pg/ml (p=0.033) between the means of PTH values above and below 25OHD levels of 20ng/ml. However, once age is controlled for in the model, the relationship between PTH and 25OHD is attenuated and for each 1ng/ml increase in 25OHD, PTH only decreased 0.26 pg/ml (p=0.10). Age was significantly associated with PTH (p=0.001). For each 1 year increase in age, PTH increased 1.5pg/ml (controlling for season, 25OHD and BMI z-score).

CONCLUSIONS: Hypovitaminosis D was common in our population of obese children; however, we did not find a relationship between BMI, 25OHD and PTH. In addition, age confounded the expected relationship between 25OHD and PTH. Age, however, did have a significant relationship with PTH. This may have implications for the current common practice of utilizing adult normative PTH data in the pediatrics as it may provide false reassurance of vitamin D status.

262
11:45am

Fellow in Training

Arginine and Levo-Dopa Stimulation in Children: Timing of Peak Growth Hormone Response and Correlation with Body Mass Index in Children

Elizabeth M. Chacko, Evan Graber, Elizabeth Wallach, Molly Regelmann,
Rachel Annunziato, Michelle Klein, Dennis Chia, Robert Rapaport.
Pediatric Endocrinology, Mount Sinai Hospital, New York, NY.

BACKGROUND: Growth hormone (GH) stimulation testing (ST) is part of the evaluation of growth failure in children. Recent studies to establish optimal times for measuring peak GH levels are lacking for the arginine and levo-dopa (ALD) ST. BMI has been reported to be negatively correlated with peak GH in patients who had ST with various agents (only 15 of whom received arginine and carbidopa/levo-dopa).

OBJECTIVE: To determine the time of peak GH level during ALD ST and to assess a correlation between BMI and peak GH to ALD.

DESIGN/METHODS: We performed a retrospective chart review of patients with growth failure who underwent GH ST with ALD using a uniform and standard protocol. Samples for GH were obtained at baseline and 30, 60, 90, 120 and 180 minutes (min) after administration of ALD. Data collection included age, sex, height, weight, and BMI. GH was measured by the same laboratory (Esoterix Inc., Calabasas Hills,CA). Pearson correlations were performed for BMI Z- score and peak GH.

RESULTS: A total of 132 consecutive children with an average age of 10.5±2.9 yr and BMI Z- score -0.176±1.02 were reviewed. Peak GH level occurred at 120 minutes or earlier in all patients: at 30 min (56%), 60 min (16.7%), 90 min (10.6%) and 120 min (16.7%). BMI Z-score negatively correlated with peak GH in all patients and in subgroups Female (F), prepubertal (PP), and prepubertal female (PPF) children (see table).

Correlation of Growth Hormone Peak with BMI-Z Score

	r-coefficient	p-value
All (n=132)	-0.231	0.008
M (n=89)	-0.185	0.082
F (n=43)	-0.342	0.025
P (n=59)	-0.077	0.561
PM (n=41)	-0.100	0.532
PF (n=18)	0.014	0.957
PP (n=73)	-0.366	0.001
PPM (n=48)	-0.258	0.077
PPF (n=25)	-0.652	<0.001

M= Male P=Pubertal PM=Pubertal Male PF=Pubertal Female PPM=Prepubertal Male

CONCLUSIONS: All peak GH levels occurred at ≤ 120 min suggesting that the standard 180 min sample can be omitted from ALD ST without compromising its diagnostic value. A negative correlation was found between BMI -Z score and peak GH response to ST in all patients, however further analysis revealed the strongest negative correlation in PPF, a finding not previously reported. The effect of BMI on peak GH response to ALD should be taken into consideration when diagnosing GH deficiency in PPF. Still other constituents of BMI, such as body composition and its effect in this group, need to be studied.

General Pediatrics II
Platform Session

Sunday, April 1, 2012
9:45am-12:00pm

263
9:45am

Can a Home-Based Asthma Intervention Improve Parental Metered-Dose Inhaler Technique?

Marina Reznik, Ellen J. Silver, Judith Wylie-Rosett.
Pediatrics, Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY; Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Many parents of children with asthma incorrectly demonstrate Metered-Dose Inhaler-Spacer (MDI-S) technique even after receiving physician instructions. Community Health Workers (CHWs), lay people from the community who work to decrease barriers to health care, may be an innovative approach to improving technique.

OBJECTIVE: To evaluate the impact of a CHW-delivered home-based asthma intervention on parental MDI-S technique.

DESIGN/METHODS: Children (ages 2-9 yrs) with persistent asthma and at least one asthma exacerbation in the past 12 months requiring hospitalization, ED visit or unscheduled clinic visit and their parents were randomized to receive either the CHW-delivered home-based asthma intervention (AI) or usual care (UC). Parental MDI-S technique was assessed at baseline and 3 months post-intervention. Parents were asked to demonstrate how they would administer two puffs of Albuterol MDI using a two-way valve AeroChamber Plus with mask (Monaghan Medical, Plattsburgh, NY), the most commonly used spacer device in pediatric asthma management. We coded parental performance as correct or incorrect for each of 10 steps of MDI-S use with manufacturers' instructions serving as the criterion standard. Chi-square analyses compared the two groups on the percentages correctly completing each step in the pre- and post-tests.

RESULTS: From 12/16/2009 - 9/9/11, 94 children and their parents were randomized and 80 (85%) completed 3 months follow-up to date (39, AI group; 41, UC group). 80% of parents were Hispanic, mean age 32.3 yrs (SD 7.7). At baseline, there was only one difference between the groups, wherein UC parents were more likely to correctly assemble the MDI-S device (97.5% vs

83.8% AI group, p=.04). At 3 months follow-up, AI parents were more likely to correctly perform the following steps: shake MDI for at least 5 sec (100% AI vs 78.9% UC, p=.005), press MDI only once (100% vs 76.3%, p=.002), take correct number of breaths (93.9% vs 47.4%, p<.0001), and wait correct interval for next puff (69.7% vs 10.5%, p<.0001).
CONCLUSIONS: Our preliminary results revealed that one-on-one, culturally competent asthma education provided to parents in the home by CHWs improved several important steps in MDI-S technique. Interventions such as this that go beyond the traditional medical model may be useful in improving asthma care and outcomes for children.

264
10:00am

Medical Student

Clinical Severity Scores for Bronchiolitis Lack Validity, Reliability and Responsiveness: A Systematic Review

Nana A. Asabere, Todd A. Florin, Joseph J. Zorc.
Perelman School of Medicine at the University of Pennsylania, Philadelphia, PA; Emergency Medicine, Children's Hospital, Philadelphia, PA.
BACKGROUND: Accurate assessment of infants with bronchiolitis requires a clinical score that is reliable, valid and responsive. A variety of scores are used in research and clinical care, and a systematic comparison of the literature could guide use of existing scores or new instrument development.
OBJECTIVE: To evaluate the measurement properties of clinical severity scores used in research studies of children with bronchiolitis.
DESIGN/METHODS: A PubMed search using the term "bronchiolitis" was conducted, and limited to "clinical trial" or "randomized controlled trial," age <18 years and English language. Studies that used a clinical score were examined for measures of score reliability, validity and responsiveness. If a citation was used as a reference for score properties, this reference was examined for these measures.
RESULTS: 274 bronchiolitis clinical trials were identified, of which 59 used a clinical score as a marker for respiratory distress. In these 59 studies, 15 clinical scores were used. The Respiratory Distress Assessment Index (RDAI) was the most frequently used score (37% of studies), followed by the Wang score (18%). 3 out of 15 scores (RDAI, Clinical Asthma Score and Bronchiolitis Caregiver Diary/Composite Symptom Score) had a measure from each of the 3 checklist categories (validity, reliability, and responsiveness) reported. A source of validity was cited in 41% of studies, while 75% cited a source reporting reliability. Of the 14 articles cited as references for score properties, 4 (28.6%) measured validity and 10 (71.4%) measured reliability. Reliability was most commonly measured with the kappa statistic or % agreement (range = 0.39-0.95). Correlation coefficients for validity ranged from 0.44-0.68. 29% of clinical trials did not report any of the score properties included in the evaluation framework. The most common markers of respiratory distress were retractions (n=10 scores), respiratory rate (n=8), and wheezing (n=7).
CONCLUSIONS: Most clinical respiratory severity scores designed for use in children with bronchiolitis were created in an informal manner, based on clinical experience and convention. Rigorous evaluation of reliability, validity, and responsiveness was uncommonly reported. Future research should compare existing scores to determine optimal methods of assessment.

265
10:15am

Premature Infants and Respiratory Syncytial Virus: A Failure To Protect

Robert W. Grundmeier, Annique K. Hogan, Dean J. Karavite, Lihai Song, Mark J. Ramos, James J. Massey, Russell Localio, Alexander G. Fiks.
Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA.
BACKGROUND: Adequate protection against respiratory syncytial virus (RSV) depends upon timely and repeated vaccination with up to 5 doses of Palivizumab through the RSV season. Little research has addressed rates of complete vaccination among eligible premature children or why this process fails.
OBJECTIVE: 1. Measure the completion rate of the Palivizumab series during a single season in a large healthcare network; 2. Identify reasons for failure to complete the Palivizumab series.
DESIGN/METHODS: Review of electronic health records for premature children eligible to receive 5 doses of Palivizumab at 21 primary care practices in a pediatric practice-based research network. The primary outcome was receipt of at least 4 doses. We compared rates of vaccination in urban vs. suburban practices (χ2-test). Manual chart review identified reasons for incomplete vaccination among children receiving 3 or fewer doses.
RESULTS: Out of 54,613 children (2,485 premature) under age 2 years who established outpatient primary care before the 2010-2011 RSV season and continued to receive care during the season, 129 were premature children eligible to receive 5 doses of Palivizumab (90 premature, 30 chronic lung disease, 4 cardiac disease, 5 both lung and cardiac disease). Overall 72 (57%) of the eligible children received at least 4 doses (95% CI: 48% to 65%). The 4 urban practices had the lowest rates of vaccination with 16 out of 57 (28%) eligible children receiving 4 doses compared to 56 out of 72 (78%) eligible chidren in the suburban practices (p<.001). Among the 57 children with ≤3 doses, chart review revealed doses were most commonly missed due to: failure to recognize the child as eligible by clinicians (N=27), "no shows" for scheduled appointments (N=20), failure of office staff to follow-up with scheduling (N=13), missed opportunities when the child was in the office (N=10), insurance denial (N=2), and family refusal (N=2). Several of these children had two or more reasons why doses were missed (N=16).
CONCLUSIONS: Offices, especially in the urban setting, need better systems to ensure adequate vaccination with Palivizumab for eligible children. Specific efforts to better identify eligible children, follow-up more aggressively with scheduling appointments, and re-scheduling after "no show" visits may improve vaccination rates. Electronic health records may help support these efforts.

266
10:30am

House Officer

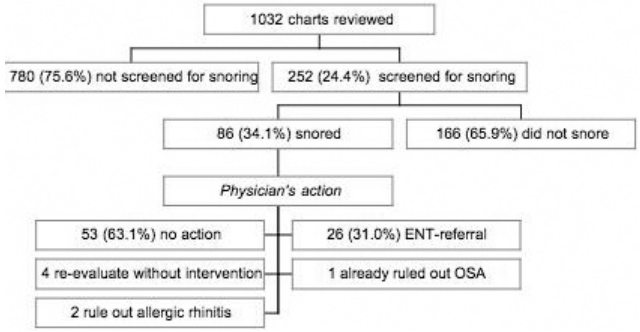
Housestaff as a Vector: Bronchiolitis Management Guidelines Impact across Services and Disciplines

Tamar Lubell, Ilyssa Goodman, Benard Dreyer, Elizabeth Fiorino, Gabrielle Gold-Von Simson, Sol Zimmerman, Bret A. Rudy, Shira A. Gertz, Rebecca E. Rosenberg.
Department of Pediatrics, New York University School of Medicine/NYU Langone Medical Center, New York, NY; Department of Pediatrics, Hackensack University Medical Center, Hackensack, NJ.
BACKGROUND: Evidence-based guidelines for inpatient management of bronchiolitis have improved patient outcomes when implemented throughout an organization.
OBJECTIVE: To examine the effects of implementation of evidence-based guidelines through an educational intervention targeted toward pediatric housestaff (PH) on length of stay (LOS) and management outcomes of infants hospitalized with acute bronchiolitis.
DESIGN/METHODS: Pediatric inpatient faculty (intensivists, pulmonologists and hospitalists) at an academic tertiary care hospital adapted evidence-based inpatient management guidelines for non-intubated bronchiolitis. Guidelines were distributed to PH in August 2010 and reinforced in lecture format and during bedside rounds for patients on the pediatric hospitalist service. No formal education was conducted with community pediatricians or nursing. Retrospective data, including readmission rate and admitting service, were collected from charts of guideline-eligible infants with a discharge diagnosis of bronchiolitis admitted August 2009-April 2010 and August 2010-April 2011. Primary outcome was LOS. Secondary process outcomes were chest physiotherapy, antibiotics, steroids, bronchodilators, and use of continuous pulse oximetry at discharge. We used Mann-Whitney *U* to compare median LOS and Fisher's exact test to compare secondary outcomes.
RESULTS: Among patients admitted to all services pre-intervention (n=35), median LOS = 3d (IQR 1-3); post-guideline (n=27), median LOS = 2d, IQR (2-3) (p<.05). Chest physiotherapy decreased from 74% to 29% (p<.001). Median LOS decreased in pediatric hospitalist and community pediatric services when analyzed separately, but without statistical significance due to inadequate power. Rates of readmission (3% pre, 3% post), steroid use (0% pre, 3% post), and bronchodilator use (24% pre, 18% post) were low in both time periods and not statistically different. Antibiotic use, initiated before admission, was high and did not change (43% pre, 48% post). Anecdotal evidence suggested decrease in continuous pulse oximetry near discharge but documentation was unreliable and not analyzed.
CONCLUSIONS: Education among PH at a tertiary care hospital may promote evidence-based practice of bronchiolitis management and outcomes across multiple services and disciplines.

267
10:45am

Primary Care Screening for Sleep-Disordered Breathing in Children 4-17 Years

Cecilia Godoy, Fanny Granse, Daniel Erichsen, John Axelsson.
Karolinska Institutet, Stockholm, Sweden; Albert Einstein College of Medicine, St. Barnabas Hospital, Bronx, NY.
BACKGROUND: The prevalence of obstructive sleep apnea (OSA) and habitual snoring (HS) in children is 1-4% and 5-12% respectively. Both are associated with significant health consequences including neurocognitive impairment and poor academic performance that may be reversible with treatment. The American Board of Pediatrics (ABP) recommends that screening for snoring should be part of all yearly visits.
OBJECTIVE: To investigate adherence to ABP guidelines in an obese and overweight inner-city population.
DESIGN/METHODS: We reviewed a random selection of electronic charts from the yearly well child visits of children aged 4-17 years seen between January 1-December 31, 2010. Abstracted data included demographic variables and documentation of sleep related problems.



RESULTS: The study group age was 8.5±3.9 years (mean±SD). 79.7% were Hispanic 5/1,032 (0.5%) subjects had documented OSA. 252 (24.4%) of subjects included screening for snoring of which 86 (34.1%) snored. 53 subjects (61.6%) with snoring had no further evaluation. Snoring was never categorized as intermittent or habitual. Of 22 patients with enlarged tonsils 18 (81.8%) snored. This was significantly higher compared with those without enlarged tonsils (p<0.01). Children with large tonsils were significantly younger than children without enlarged tonsils (5.8±2.3 v 8.6±3.9 years, p<0.01). Children who snored were significantly younger than non-snorers (7.0±3.1 v 7.9±3.4 years, p < 0.05). 461/1,032 (47.6%) subjects were overweight or obese. There was no significant relationship between BMI %iles and snoring.
CONCLUSIONS: The OSA prevalence of 0.5% was significantly lower than expected based on previous population studies. This may be explained by the fact that few pediatricians followed ABP-guidelines. Furthermore, snoring was rarely followed by an appropriate evaluation. Further education of providers and caregivers may improve care for children with sleep-disordered breathing.

268

11:00am

Effectiveness of Forward Facing Child Restraint Systems

Mark R. Zonfrillo, Kristy B. Arbogast, Michael J. Kallan, Dennis R. Durbin.
Center for Injury Research and Prevention and Division of Emergency Medicine, Children's Hospital, Philadelphia, PA; Center for Clinical Epidemiology and Biostatistics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Given the increased use of forward facing child restraint systems (FFCRS), as well as a broader range of seats available, there is a need for continued assessments of their real-world effectiveness.

OBJECTIVE: To provide an estimate of the effectiveness of FFCRS in preventing injury as compared to children in seat belts alone.

DESIGN/METHODS: This was a cross-sectional study of US children aged 12-47 months old, or those 48-71 months and less than 40 pounds (18.2 kg), who were seated in the rear vehicle row(s) in a FFCRS with an internal harness or seat belt alone in MVCs, with data collected via insurance claim records and a telephone survey from 12/1/98-11/30/07. Parent-reported injuries were defined as those with an Abbreviated Injury Scale (AIS) score of ≥2. Multivariable logistic regression was used to determine the odds of injury for children in FFCRS versus those in seat belts alone.

RESULTS: The study sample included 3,043 children (weighted to represent 35,025 children), of whom 93.3% were restrained in a FFCRS, and 0.52% sustained clinically significant injuries. After adjustment for point of first impact, child age, driver age, driver sex, intrusion, vehicle type, and vehicle model year, the odds ratio for injury was 0.39, 95% CI (0.22-0.68) for children in FFCRS versus those in seat belts.

CONCLUSIONS: This analysis updates previous evidence that FFCRS reduce the risk of clinically significant crash-related injury as compared to seat belts alone. Although the current effectiveness is slightly lower than previous reports, it still provides consistent evidence about the effectiveness of FFCRS. Parents should continue to properly restrain their children per published guidelines, and pediatric-specific crash surveillance systems should continue to be a priority in traffic safety.

269

11:15am

Comparing the Effectiveness of Automated Decision Support for Families, Clinicians, or Both on Human Papillomavirus (HPV) Vaccination Rates for Girls

Alexander Fiks, Robert Grundmeier, Kristen Feemster, Dean Karavite, Stephanie Mayne, Lihai Song, Cayce Hughes, Jim Massey, Ron Keren, Louis Bell, Richard Wasserman, Russell Localio.
Children's Hospital, Philadelphia, PA; Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; University of Vermont College of Medicine, Burlington, VT.

BACKGROUND: The HPV vaccine is safe, effective and recommended, yet vaccination rates remain low.

OBJECTIVE: To compare the effectiveness of automated clinician-focused, family-focused decision support, or both in improving HPV vaccination rates.

DESIGN/METHODS: Design: 12 month cluster randomized 2x2 factorial design.

Intervention: 22 primary care practices were first randomized to receive the 3-pronged intervention (educational sessions + electronic health record-based vaccine alerts + feedback on HPV vaccination rates) or not. Within each practice, families of girls were randomized to receive family-focused decision support with automated, educational phone calls when a dose of HPV vaccine was due or not.

Subjects: Adolescent girls 11-17 years due for HPV dose 1, 2 or 3 at any time during the study period.

Outcomes: Time to receipt of HPV dose 1, 2, and 3 and vaccination rates at the end of the study.

Analysis: For each HPV vaccine dose, we separately generated standardized survival curves to compare vaccination rates and time from randomization (or subsequent eligibility) to vaccination achieved for those receiving the clinician-focused, family-focused, both, or no intervention.

RESULTS: Baseline characteristics of girls in each arm were similar (32% black, 20% urban, 69% age 11-13). Highest vaccination rates and shortest time to vaccine receipt occurred in the group with both interventions (p<0.001) (Table). The clinician-focused group performed significantly better than the family-focused group for HPV dose 1, but the reverse occurred for doses 2 and 3 (p<0.001).

Intervention Arm	HPV dose 1 (N=17,658)		HPV dose 2* (N=5,165)		HPV dose 3* (N=4,829)	
	Days to 15% complete	Final Rate	Days to 50% complete	Final Rate	Days to 50% complete	Final Rate
Both	175	23%	106	75%	118	77%
Clinician Only	186	22%	196	65%	185	68%
Family Only	297	17%	147	70%	149	72%
Neither	361	15%	214	63%	232	62%

*Among girls who received the prior dose.

CONCLUSIONS: The combination of clinician and family-focused interventions was most effective in improving HPV vaccination timeliness and rates. Clinician-focused intervention appears most effective for initiating the vaccination series, while family-focused intervention promotes completion. These approaches should be studied in other settings.

270

11:30am

Fellow in Training

Empiric Antibiotics and Outcomes of Children Hospitalized with Eczema Herpeticum

Paul L. Aronson, Albert C. Yan, Manoj K. Mittal, Zeinab Mohamad, Samir S. Shah.
The Children's Hospital of Philadelphia, Philadelphia, PA; Cincinnati Children's Hospital Medical Center, Cincinnati, OH.

BACKGROUND: Children with eczema herpeticum typically require hospitalization and treatment with acyclovir. Bacterial colonization is well described in these patients and bacterial septicemia has been reported as a cause of mortality. Therefore patients with eczema herpeticum may be treated with empiric antibiotics on admission to the hospital for presumed bacterial superinfection. However the impact of empiric antibiotic therapy on outcomes is unknown.

OBJECTIVE: To explore the association of empiric antibiotics with outcomes in children hospitalized with eczema herpeticum.

DESIGN/METHODS: A multicenter retrospective cohort study of 1,150 children age 2 months to 17 years admitted with a diagnosis of eczema herpeticum between January 1, 2001 and March 31, 2010 to 41 tertiary care children's hospitals in the Pediatric Health Information System database. Multivariable linear regression models determined the association between empiric antibiotic therapy and the main outcome measure, hospital length of stay (LOS).

RESULTS: There were no deaths during the study period. 889 patients (77.3%) received antibiotics on day 1 of hospitalization. Receipt of empiric antibiotics was not associated with change in LOS on unadjusted or multivariable analysis (Table). Type of empiric antibiotic was not associated with LOS except for receipt of vancomycin, which was associated with increased LOS (21% adjusted increase in LOS, 95% confidence interval (CI): 8% to 35%; p=0.001). When restricted to patients with a bloodstream infection, receipt of empiric antibiotics was associated with a 51% adjusted decrease in LOS (95% CI: -24% to -68%; p=0.002).

Table. Multivariable analysis of empiric antibiotics and LOS in children with eczema herpeticum.

	Receipt of Empiric Antibiotics	
Variable	**No**	**Yes**
Adjusted beta coefficient (95% CI)[a]	Reference	-0.005 (-0.10 to 0.09)
Adjusted percent decrease in LOS (95% CI)[a]	…	0% (-10% to 10%)
P-value	…	0.92

[a]Model also adjusted for acyclovir day of initiation, receipt of topical antibiotics, receipt of systemic corticosteroids, bloodstream infection, *Staphylococcus aureus* infection, testing with blood culture, all patient refined-diagnosis related groups severity classification, and race/ethnicity.

Abbreviations: CI, confidence interval; LOS, length of stay

CONCLUSIONS: Among children hospitalized with eczema herpeticum, empiric antibiotic therapy was not associated with a shorter LOS overall but was associated with a shorter LOS in patients with a bloodstream infection. These findings highlight the importance of early recognition of systemic bacterial illness in children with eczema herpeticum. Empiric antibiotic therapy did not affect the mortality rate, which is very low in children admitted with eczema herpeticum.

271

11:45am

Fellow in Training

HIV Testing Behavior in High-Risk Adolescents: Are Characteristics of the Sex Partner Relationship More Important Than Characteristics of the Individual?

Hina J. Talib, Ellen J. Silver, Laurie J. Bauman, Susan M. Coupey.
Pediatrics, Children's Hospital at Montefiore/Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Nearly half of adolescents living with HIV are unaware of their status. Early identification of HIV by increasing testing is a priority. Improved understanding of HIV testing behavior will inform preventive interventions.

OBJECTIVE: To examine associations of partner-related and individual variables with self-reported HIV testing in a convenience sample of teens living in a county where new cases of HIV are diagnosed at 3.5 times the national rate.

DESIGN/METHODS: Participants were 980 sexually experienced 14-17-year-olds, mean age 15.9 (SD=0.94) yrs; 56% female; 55% Latino; 25% black; 19% white, recruited from the Bronx community as part of a larger study. In the last 6 months, 32% reported having unprotected sex; 21% ever had a partner with high HIV risk behavior; 15% ever had a pregnancy. Participants completed a 60-90 minute computer-assisted survey with questions about demographics and HIV testing. Survey questions about partner commitment; worry about getting HIV/AIDS; sexual risk behaviors; as well as validated scales measuring HIV-related partner communication and HIV/AIDS knowledge were dichotomized as high score vs. low score.

RESULTS: 428 (44%) of participants reported HIV testing; 51% of girls vs. 35% of boys (p<0.001), with no ethnic or age differences. Rates of HIV testing were higher in participants with high vs. low HIV-related partner communication, 60% vs. 27% p<0.001; high vs. low partner commitment, 54% vs. 37% p<0.001; and low vs. high worry about getting HIV/AIDS, 68% vs. 32% p <0.001. There was no association of HIV testing with sexual risk behaviors or HIV/AIDS knowledge. In multivariable logistic regression adjusted for gender, high scores on HIV-related partner communication (OR=3.60, CI 2.72-4.77) and partner commitment (OR=1.35, CI 1.00-1.83) remained associated with HIV testing. Participants with a high score on worry about getting HIV/AIDS were nearly half as likely to report HIV testing (OR=0.56, CI 0.48-0.74).

CONCLUSIONS: We found that characteristics of the sex partner-relationship, especially

communication, were more likely to be associated with HIV testing than individual characteristics such as sexual risk behaviors or HIV knowledge, and that fear may be a barrier to testing in this sample of high school-aged adolescents.

General Pediatrics - Medical Education & Quality Improvement Platform Session

Sunday, April 1, 2012
9:45am-12:00pm

272

9:45am

Geographic Variation in Pediatric Hospital Costs

Annemarie Stroustrup, Leonardo Trasande.
Departments of Pediatrics and Preventive Medicine, Mount Sinai School of Medicine, New York, NY; Departments of Pediatrics, Environmental Medicine and Health Policy, New York University, New York, NY.

BACKGROUND: Multiple investigations have assessed geographic differences in Medicare spending as a proxy for geographic differences in health care costs and utilization. These investigations are confounded by geographic variation in chronic disease in the elderly population. Young children have much lower rates of socio-culturally mediated chronic disease, and therefore are a more uniform patient population in which to evaluate this question.

OBJECTIVE: To determine whether geographic variation exists in hospitalization charges and costs for the most common pediatric diseases in hospitalized children under six years old.

DESIGN/METHODS: We analyzed a multiyear dataset concatenated from the 2002-2008 Nationwide Inpatient Sample, the largest statistically representative sample of hospital care in the United States. The most common disease diagnoses for hospitalized children were identified. Total charges and total cost of the hospitalization for children with each of these diagnoses were evaluated. Univariate and multivariate logistic regression models were built to assess the relationship between geography, patient demographics, and hospital characteristics.

RESULTS: The most common disease diagnoses for hospitalized children age < 2 were bronchiolitis, pneumonia (PNA), and urinary tract infection (UTI). The most common disease diagnoses for hospitalized children age 2-6 were PNA, asthma, and dehydration. Charges and cost of hospitalization were 5.9-28.0% higher in the Northeast (NE) and West than in the South and Midwest for all disease categories examined (p=0.0183 to <0.0001).

	Bronchiolitis (birth to <2yrs)		Pneumonia (birth to <2yrs)		UTI (birth to < 2yrs)		Pneumonia (2yrs to < 6yrs)		Asthma (2yrs to < 6yrs)		Dehydration (2yrs to < 6yrs)	
	Total Charges (% change)	p value	Total Charges (% change)	p value	Total Charges (% change)	p value	Total Charges (% change)	p value	Total Charges (% change)	p value	Total Charges (% change)	p value
Northeast	-3.87	0.2070	-8.68*	0.0079	-5.89*	0.0471	-6.88*	0.0406	-0.79	0.8113	-4.08	0.1630
Midwest	-22.13*	<0.0001	-27.97*	<0.0001	-25.69*	<0.0001	-23.99*	<0.0001	-17.07*	<0.0001	-22.15*	<0.0001
South	-15.29*	<0.0001	-20.59*	<0.0001	-19.35*	<0.0001	-14.60*	<0.0001	-9.93*	0.0002	-16.88*	<0.0001
West (Referent)	1		1		1		1		1		1	

* indicates significant percentage difference from total charges for hospitalization for the disease of interest in the Western United States

	Bronchiolitis (birth to <2yrs)		Pneumonia (birth to <2yrs)		UTI (birth to < 2yrs)		Pneumonia (2yrs to < 6yrs)		Asthma (2yrs to < 6yrs)		Dehydration (2yrs to < 6yrs)	
	Total Costs (% change)	p value	Total Costs (% change)	p value	Total Costs (% change)	p value	Total Costs (% change)	p value	Total Costs (% change)	p value	Total Costs (% change)	p value
Northeast	1.35	0.6427	-4.62	0.0962	3.58	0.3201	-4.08	0.1500	4.09	0.1636	2.52	0.4088
Midwest	-7.33*	0.0039	-13.42*	<0.0001	-12.75*	<0.0001	-10.07*	0.0002	-3.76*	0.0770	-6.03*	0.0183
South	-13.48*	<0.0001	-16.77*	<0.0001	-15.89*	<0.0001	-12.59*	<0.0001	-7.27*	0.0002	-12.81*	<0.0001
West (Referent)	1		1		1		1		1		1	

* indicates significant percentage difference from total cost for hospitalization for the disease of interest in the Western United States

CONCLUSIONS: Geographic variation in health care inefficiency seen in other studies may not be entirely due to chronic disease burden on the coasts. Further study of pediatric cohorts may clarify this national health care debate.

273

10:00am

Resource Utilization for Observation-Status Stays at Children's Hospitals

E. Fieldston, S. Shah, M. Hall, P. Hain, E. Alpern, M. Del Beccaro, J. Harding, M. Macy.
Children's Hospital, Philadelphia, PA; Child Health Corporation of America, Kansas City, KS; Cincinnati Children's Hospital, Cincinnati, OH; Univ of Michigan, Ann Arbor, MI; Seattle Children's Hospital, Seattle, WA; Vanderbilt University, Nashville, TN; All Children's Hospital, St. Petersburg, FL.

BACKGROUND: Observation-status (OBS), in contrast to inpatient-status (IPS), is a billing designation for Medicare hospital payment but is applied to non-Medicare patients, including children. OBS stays are presumed to be shorter and less resource-intensive, and with lower reimbursement, but effort is necessary to assign & monitor OBS. Resource utilization of pediatric OBS vs IPS stays has not been compared.

OBJECTIVE: Describe resource utilization characteristics for patients in OBS vs IPS in a national cohort of hospitalized children.

DESIGN/METHODS: Retrospective cohort from 2010 from 43 freestanding children's hospitals in the Pediatric Health Information System. OBS and IPS stays ≤2 days admitted from the emergency department were categorized by APR-DRG. Hospital length of stay (LOS), total charges, and charge categories were analyzed. Comparison between charges adjusting for age, severity, LOS were conducted using random-effect mixed models to account for clustering of patients within hospitals.

RESULTS: OBS was assigned to 120,978 discharges. OBS use was variable: 9 hospitals applied OBS to >30% of discharges (range 2-45%), while 10 did not use it at all. OBS pts had total charges ($) including room from 944-248342 (median 6735, IQR 4247, 11459) and without room charges from 11-34497 (median 2320, IQR 1386, 4033). Asthma, gastroenteritis, bronchiolitis, seizure, appendectomy were most common diagnoses for OBS. With the exception of appendectomy, OBS had lower non-room charges compared with IPS. There was substantial overlap in charges for OBS & IPS patients. While statistically significant, average per patient differences between OBS and IPS were often small (Table 1).

Table 1: Adjusted^ Charge Differences IPS vs. OBS

	Total ($) (Exclude Room)*	Clinical ($)*	Imaging ($)**	Lab ($)**	Pharmacy ($)*	Supplies ($)
Seizure	1212	261	375	327	179	71
Bronchiolitis	425	140	36	179	77	-7
Asthma	486	163	31	126	144	22
Appendectomy	-2320	-559	-109	-8	275	-1919
Gastroenteritis	541	-45	181	262	133	11

Positive values indicate IPS > OBS charges, while negative values indicate OBS > IPS charges.
^Adjusted for age, severity level using APR-DRG severity of illness, LOS
*P<0.05; **P>0.05 except for appendectomy; ***P<0.05 except for bronchiolitis, gastroenteritis

CONCLUSIONS: OBS is variably applied for billing across children's hospitals. For large numbers of patients, within and between hospitals, it is difficult to differentiate OBS vs IPS based on charges. The large overlap and variability in use calls into question the utility of segmenting patients by billing status.

274

10:15am

House Officer

Attitudes, Practices, and Knowledge Regarding Pain Management in Patients with Intellectual Disabilities among Pediatric Residents and Pediatricians

Carolina Cuba-Bustinza, Fernanda Kupferman, Elizabeth Cruz, Susana Rapaport, Louis Primavera, Jose Serruya.
Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Graduate School of Psychology and Health Sciences, Touro College, New York, NY.

BACKGROUND: The American Academy of Pediatrics and the American Pain Society jointly issued a statement to underscore the responsibility of pediatricians to take a leadership and advocacy role to ensure humane and competent treatment of pain in children. Pain in children with intellectual disabilities (ID) remains unexplored.

OBJECTIVE: To assess attitudes, clinical practice and knowledge among health care professionals regarding pain management in patients with ID.

DESIGN/METHODS: This was a descriptive, analytical study utilizing a 28-question online survey using Zoomerang sent to pediatricians and pediatric residents across US. The survey asked demographic data,questions to assess attitudes, clinical practice, pharmacokinetics of analgesics, recognition of symptoms, and awareness of pain scales such as Faces; Numeric; Face, Legs, Activity, Cry, Consolability Scale (FLACC); and Non Communicating Children's Pain Checklist-Revised (NCCP-R). Physicians responded, anonymously, with implied consent. Data were reported as frequencies and statistically analyzed by Pearson's chi-square.

RESULTS: Of 3200 invitees, 433 responded; 53 were excluded for failure to complete the survey. Of the 380 complete responders, 250 were residents and 130 were pediatricians. Health providers were more knowledgeable about diagnosis of pain using scales for awake and developmentally appropriate patients (Faces and Numeric) than those for ID or post surgical patients (FLACC and NCCP-R). Most were aware of Faces (83.3%) and Numeric (87.1%) but few were aware of FLACC (36.1%) or NCCP-R (13.7%) scales. Only 62.1% knew the maximum dose of acetaminophen and 52.5% knew the pharmacokinetics of morphine. No significant variations in knowledge were noted between years of training (p=0.95). The recognition of pain indicators in patients with ID were (67.8%). There were significant discrepancy between perception of appropriate pain management and correct use of pain medications (p<0.03).

CONCLUSIONS: There was an overall lack of knowledge about pain in patients without verbal cues. Perceived knowledge among physicians about pain management was not a good indicator of real knowledge regarding this topic and duration of training did not improve this knowledge.It is imperative to develop strategies to improve pediatricians' knowledge and management of pain in patients with ID.

275

10:30am

Research Assistant

Using the EMR To Examine the Impact of Possible Co-Morbid Conditions on Diagnosis of ADHD

Lauren M. Daley, Steven K. Reader, Jennifer S. Pendley, Lloyd Werk.
Nemours Foundation, Wilmington, DE; Nemours Foundation, Orlando, FL.

BACKGROUND: Attention Deficit Hyperactivity Disorder (ADHD) is one of the most commonly diagnosed mental health disorders in children and is frequently associated with co-morbid conditions such as oppositional defiant disorder (ODD), conduct disorder (CD), and anxiety/depression (A/D). The Vanderbilt Rating Scales (Vanderbilt) is a DSM-IV based assessment tool used to diagnose ADHD that can be electronically administered. Diagnosis of ADHD requires the presence of symptoms and impairment in two settings, from two informants. However, ADHD diagnoses are sometimes made when children are subthreshold on criteria. Exploring outcomes has become possible with the advent of online portals that can collect clinical assessments and their integration with electronic medical records (EMR).

OBJECTIVE: We hypothesized that children may be diagnosed with ADHD despite not meeting Vanderbilt criteria and the presence of co-morbid conditions increases the likelihood of ADHD diagnosis.

DESIGN/METHODS: A retrospective study of children evaluated for ADHD between 1/1/06 and 12/31/10. Subjects were patients seen in primary and subspecialty clinic and were selected based on a completed initial parent and/or teacher online Vanderbilt. Analyses included descriptive statistics, chi-square test and logistic regression modeling.

RESULTS: The cohort of 886 children had a mean age of 9.3 years, were 73% male, and 56.3% Caucasian. Within 3 months of the Vanderbilt evaluation, 58.8% of the cohort was diagnosed in the EMR with ADHD.

Only 319 (36%) children had electronic assessments from parent *and* teacher. Of the 319, 45.1% met Vanderbilt criteria for ADHD and 51.1% had a diagnosis of ADHD in the EMR. 19.4% screened positive for ADHD on the Vanderbilt but did not have a diagnosis in the EMR. 25.4% did not screen positively for ADHD on the Vanderbilt, but had an ADHD diagnosis. Of children not meeting criteria for ADHD on the Vanderbilt, but with ADHD diagnosis, 37.1% screened positive for a disruptive disorder and 19.8% were positive for A/D on the parent or teacher Vanderbilt. Using the total cohort, a logistic regression found that children who screen positive for a disruptive disorder on the Vanderbilt were approximately twice as likely to be diagnosed with ADHD.
CONCLUSIONS: Factors other than a Vanderbilt assessment meeting DSM-IV criteria appear to influence the diagnosis of ADHD. The presence of co-morbid a disruptive disorder appears to increase the likelihood of a diagnosis.

276

10:45am

Fellow in Training

"Helping Babies Breathe" Training Increases Neonatal Resuscitation Knowledge among Master Trainer Candidates in Ethiopia

Rebecca Hoban, Ida Neuman, Minghua Chen, Sherri Bucher, Jonathan Spector.
Newborn Medicine, Tufts Medical Center, Boston, MA; UNICEF, Addis Ababa, Ethiopia; Neonatology, Massachusetts General Hospital, Boston, MA; Neonatal-Perinatal Medicine, Indiana University School of Medicine, Indianapolis, IN.

BACKGROUND: Helping Babies Breathe (HBB) is an evidence-based neonatal resuscitation education curriculum designed for low resource settings. Insufficient data currently exist describing the impact of HBB on transfer of knowledge and skills in high priority areas.
OBJECTIVE: We hypothesized that a national-level training program in Ethiopia would improve knowledge of key concepts and practices. We also wanted to identify other factors associated with successful training in this setting.
DESIGN/METHODS: Data were collected from 4 training sites across Ethiopia in September 2010. National HBB master trainer candidates completed a 10-question multiple choice questionnaire (MCQ) before and after a 2 day HBB course. After training, learners were assessed on bag-mask ventilation (BMV) skills using a validated checklist and completed a questionnaire describing their professional background. Mean pre and post-test scores were determined for each site and compared with t tests and Wilcoxon signed rank sum testing. ANOVA was used to determine if results varied by profession or by trainer:trainee ratio.
RESULTS: Data were available for 69 participants. Significant improvement in newborn resuscitation knowledge was found, with an increase in mean pre- vs. post-training MCQ scores from 8.7/10 (SD 1.4) to 9.4/10 (SD 1.1; p=0.003). There were significant differences between physicians, nurses, and health officers in pre-test scoring (p=0.003), with physicians scoring highest. Knowledge differences disappeared post-training (p=0.21). Post-testing MCQ scores indicated differences between sites with scores increasing as trainer:trainee ratio decreased (p=0.004). The mean post-HBB BMV score for trainees was 5.7/7 (SD 1.6). Trainer:trainee ratio did not significantly impact BMV score. Over 1/3 of participants missed 2 BMV skills related to "improving ventilation if poor chest rise" - clearing secretions and squeezing the bag harder. Nearly all participants (90%) adequately demonstrated a facial seal with the mask, ventilation at an appropriate rate, and checking for chest rise.
CONCLUSIONS: A two-day HBB national training session led to improved knowledge of neonatal resuscitation among Ethiopian master trainer candidates. Lower trainer:trainee ratio was associated with increased post-course MCQ scores. HBB appears to eliminate baseline differences in neonatal resuscitation knowledge in different health care worker cadres.

277

11:00am

Impact of a Community Violence Module on the Knowledge, Attitudes, and Behaviors of Pediatric Interns

Mario Cruz, Daniel R. Taylor.
Section of General Pediatrics, St. Christopher's Hospital for Children, Philadelphia, PA.

BACKGROUND: Community violence (CV) is a public health issue that disproportionately affects minority families in poor, urban communities. While many parents would welcome the opportunity to discuss CV, pediatricians report inadequate time, a lack of knowledge of resources, and a lack of skills as barriers to CV counseling.
OBJECTIVE: To assess the impact of a brief CV module on the knowledge, attitudes, and self-reported behaviors of pediatric interns in the continuity clinic setting.
DESIGN/METHODS: A needs assessment and theoretical framework guided the design and implementation a 90-minute, case-based, CV module for interns who began residency training in 2010. Interns who started their training in 2009 did not participate and served as the control group. The objectives were to recognize CV as a public health issue, identify CV risk and resiliency factors, list CV resources, and adopt attitudes and behaviors supportive of CV discussion. Interns participated in the interactive small group module (two interns, one faculty member) during their advocacy rotation. Web-based pre and post intervention questionnaires were completed at the beginning and end of the intern year to assess changes in knowledge, attitudes, and CV counseling behaviors in the continuity clinic.
RESULTS: Compared to the control group, the intervention group was more likely to correctly list "homicide" as the major cause of death for African American adolescents (94% vs 65%). The intervention group was also more aware of resources for CV victims (76% vs 38%). No statistical differences were found in regards to CV-related attitudes and self-reported behaviors.

Table 1: Impact of a community violence module on knowledge, attitudes, and self-reported behaviors of pediatric interns in the continuity clinic setting: selected questionnaire results*

	Pre-intervention Questionnaire (October of intern year)	Post-intervention Questionnaire (June of intern year)
Have you ever treated a patient for injuries related to community violence? (yes)		
2009 Interns (Control)	50 (n=24)	84 (n=22)
2010 Interns (Intervention)	50 (n=22)	82 (n=21)
Interns that correctly identified homicide as the major cause of death for African American adolescent males		
2009 Interns (Control)	28 (n=13)	69 (n=30)
2010 Interns (Intervention)	30 (n=13)	94 (n=39)**
I don't have time to ask about community violence (agree/strongly agree)		
2009 Interns (Control)	41(n=19)	16 (n=7)
2010 Interns (Intervention)	28 (n=12)**	23 (n=10)
I have access to community resources related to community violence (agree/strongly agree)		
2009 Interns (Control)	35 (n=16)	39 (n=17)
2010 Interns (Intervention)	28 (n=12)	77 (n=32)**
How often do you ask adolescents if they carry weapons? (sometimes/most of the time/always)		
2009 Interns (Control)	12 (n=6)	5 (n=2)
2010 Interns (Intervention)	6 (n=3)	14 (n=6)
How often do you ask adolescents about fighting? (sometimes/most of the time/always)		
2009 Interns (Control)	53 (n=25)	92 (n=40)
2010 Interns (Intervention)	67 (n=30)	94 (n=39)

*Response rate for the control group was 60% (n=47) and 55% (n=43) for the pre and post intervention, respectively. Response rate for the intervention group was 57% (n=44) and 54% (n=42) for the pre and post intervention questionnaire, respectively.

**Significantly different from the control group ($p < 0.05$), Chi squared analysis.

CONCLUSIONS: A brief, case-based module on CV prevention can improve resident knowledge of CV and CV-related resources. However, case-based discussions alone may not be sufficient to overcome the many barriers to discussing CV in the continuity clinic setting. These findings will be used as a needs assessmentto drive the development of a broader, longitudinal, multimodal CV curriculum for pediatric residents.

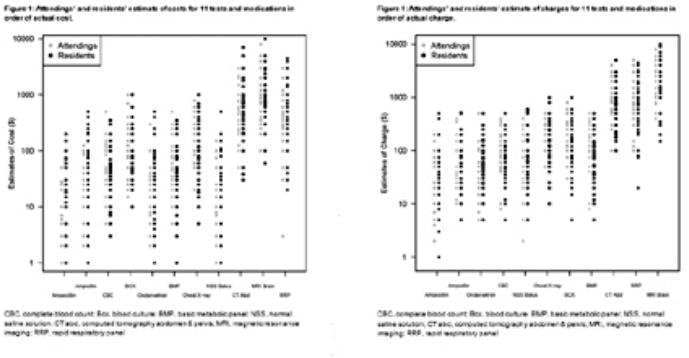
278

11:15am

Pediatric Attending & Resident Knowledge of Hospital Finances for Inpatient Care

T. Rock, R. Xiao, E. Fieldston.
The Chartis Group, New York, NY; Department of Biostatistics sand Epidemiology, University of Pennsylvania, Philadelphia, PA; Division of General Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Physicians have limited knowledge of healthcare finances and a limited awareness of hospital costs & charges.
OBJECTIVE: To analyze general pediatric attendings' and residents' knowledge of costs, charges, and reimbursements for inpatient care.
DESIGN/METHODS: Online survey of inpatient general pediatric attendings and the pediatric residency program at Children's Hospital of Philadelphia in spring 2011. Participants' estimates of costs, charges, reimbursements for several common tests, medications, and services were measured. Accuracy range was defined as +/-25% around true values of cost, charge, reimbursement; estimates outside this range were considered inaccurate. Percent error (|estimate – true value|/true value) quantified estimation error. Average percent error of all estimates (cost, charge, reimbursement) for each participant across all services is primary outcome variable. Grouped percent errors were compared using analysis of variance (ANOVA) by years of experience, self-reported knowledge, and for attendings, number of weeks on service and percent of work effort that is clinical.
RESULTS: 38 attendings & 100 residents participated (84% & 76% response rates). Most attendings (71%) & residents (75%) characterized their understanding as minimal or completely unaware. The ranges of estimates were large (Fig 1). All respondents overestimated cost and underestimated charge & reimbursement: 66% of attendings & 72% of residents overestimated true cost; 82% & 72% underestimated charges; 95% & 82% underestimated reimbursement. Only 15% of attendings' & 11% of residents' estimates were within +/-25% of true values. Estimation errors ranged from 0% to >5000%; they were larger and more varied for costs than charges & reimbursement. Percent error did not vary by experience or self-reported knowledge.



CONCLUSIONS: Attendings & residents showed limited knowledge of costs, charges, and reimbursements. To meet expectations on competency in systems-based practice and to be stewards of resources, it appears that physicians need further financial education.

279
11:30am

House Officer

Bronchiolitis Management in the Inpatient Setting: Are Pediatric Hospitalists Following the AAP Guideline?

Marie-Astrid Lefebvre, JoAnna Leyenaar, Elisabeth Schainker.
Pediatrics, Floating Hospital for Children at Tufts Medical Center, Boston, MA.

BACKGROUND: Bronchiolitis is a leading cause of hospitalization in infants. In 2006, the American Academy of Pediatrics (AAP) published a clinical practice guideline (CPG) for bronchiolitis management to support evidence based care.

OBJECTIVE: To assess whether the AAP CPG has changed inpatient care of bronchiolitis and to examine associations with practice setting.

DESIGN/METHODS: A survey assessing pediatricians' application of the CPG was sent electronically to the AAP Section on Hospital Medicine listserv. Descriptive statistics of the study population were calculated using frequencies and percents for categorical variables and medians (IQR) for continuous variables. Unadjusted associations between hospital setting and CPG-associated variables were assessed using chi-squared tests. Logistic regression was used to control for age, gender, years in hospital medicine practice and geographic region.

RESULTS: Of the 205 responses received, 63.5%(129) were female, median age was 38 years (IQR 33-44) and median number of years attending on an inpatient unit was 5 (IQR 3-10). 61.8%(126) reported working primarily at a tertiary care children's hospital(CH) and 30.9%(63) at a community hospital(ComH). A majority of pediatricians in both settings stated that the CPG had changed their management of bronchiolitis. Most respondents agreed with the CPG recommendations regarding laboratory and radiologic investigations and use of steroids, bronchodilators, oxygen and chest physiotherapy, but 12%(15) of CH respondents reported perceived inconsistency in their institution regarding use of inhaled bronchodilators and oxygen compared to 24.6%(15) of ComH respondents ($p = 0.03$). ComH were significantly less likely than CH to have a site based CPG for bronchiolitis ($p < 0.01$) or to use an objective clinical scoring tool ($p = 0.02$). Pediatricians practicing in ComH with their own CPG were much less likely to report variability in bronchiolitis management than those practicing in hospitals without their own CPG ($p < 0.01$); this difference was not seen among CH respondents.

CONCLUSIONS: The AAP CPG appears to have impacted inpatient bronchiolitis management but there remains variability in care in both CH and ComH. Hospital-specific CPGs seem to reduce practice variation in the community hospital setting. These results may be used to guide practice improvement initiatives and continuing medical education programs.

280
11:45am

Perceptions of Educational Experience and Inpatient Workload among Pediatric Residents

D. Haferbecker, S. Medina, O. Fakeye, E. Fieldston.
Mary Bridge Children's Hospital, Tacoma, WA; The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Resident education in academic medical centers occurs as part of clinical care, but little is known about the relationship between clinical workload and educational experiences.

OBJECTIVE: Assess residents' perceptions of learning on inpatient services at a children's hospital over time in relation to patient census.

DESIGN/METHODS: Cross-sectional longitudinal study of interns at The Children's Hospital of Philadelphia. Surveys on educational experience were administered weekly to interns on 8 pediatric units from October 2010 to June 2011. Actual daily patient census data were collected. Correlations were performed.

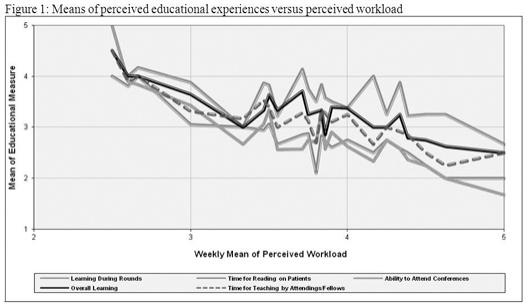
RESULTS: Mean weekly response rate was 28%. Perceived workload was correlated with weekly peak patient census (ρ=0.67; p=0.00). Many aspects of perceived learning were negatively correlated with perceived workload (Table 1; Figure 1). Activities beyond direct patient care (attending conferences, independent reading) showed higher negative correlation than educational experience during rounds. Quality of teaching and time for patient care discussion during rounds were not significantly correlated with perceived workload.

Table 1: Weekly means across pediatric units of interns' assessments of educational experiences and correlation with perceived workload

Measures*	n	Mean of Weekly Averages	SD	Correlation with Perceived Workload
Perceived workload	209	3.72	0.70	-
DURING ROUNDS:				
Time for patient care discussion	211	3.80	0.42	-0.45
Time for education beyond patient care	211	3.50	0.48	-0.69**
Learning opportunities	210	3.63	0.52	-0.64**
OUTSIDE ROUNDS:				
Quality of teaching by attendings	211	3.64	0.51	-0.54
Time for teaching by attendings	211	3.17	0.55	-0.79**
Quality of teaching by seniors	211	3.55	0.34	-0.60*
Time for teaching by seniors	211	3.32	0.51	-0.71**
OVERALL:				
Time for reading on patients and conditions	211	2.83	0.58	-0.84**
Time for attending conferences	211	2.91	0.78	-0.82**
Overall learning	211	3.33	0.54	-0.76**

*Respondents assessed measures on a 5-point Likert scale, with 1=poor very low and 5=excellent very high. Coefficients of correlation are presented with Bonferroni-adjusted significance at the 5%(*) and 1%(**) levels.

Figure 1: Means of perceived educational experiences versus perceived workload



CONCLUSIONS: While patient care is essential for resident education, higher census may adversely affect some measures of perceived educational opportunities by medical trainees. More research is needed to identify how these perceptions relate to actual learning and if specific thresholds of patient census and/or clinical workload cause declines in perceived or real education.

Neonatology - Clinical Studies II
Platform Session

Sunday, April 1, 2012
9:45am-12:00pm

281
9:45am

Pre-Oxygenation with 100% Oxygen Does Not Impact Time to Asystole in Newborn Piglets

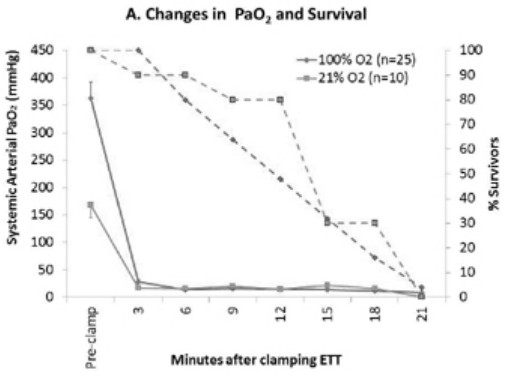
Bobby Mathew, Daniel D. Swartz, Jayasree Nair, Sylvia F. Gugino, Melissa F. Carmen, Lori Nielsen, Satyan Lakshminrusimha.
Pediatrics, The Women & Children's Hospital of Buffalo, NY.

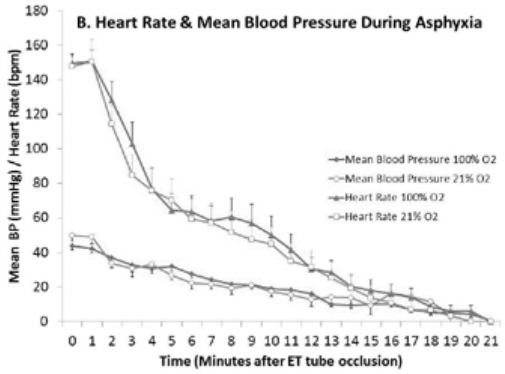
BACKGROUND: It is common practice to provide 100% O_2 prior to intubation and other emergent anesthetic procedures. Preoxygenation is considered to provide a buffer for episodes of desaturations during anesthesia and surgery and delay desaturation and bradycardia. The effect of preoxygenation on time to cardiac arrest following interuption in ventilation (such as accidental extubation) is not known.

OBJECTIVE: To compare the effects of preoxygenation with 100% O_2 vs ventilation with 21% O_2 on time to asystole, hemodynamic parameters and arterial blood gases following interuption of ventilation / asphyxiation.

DESIGN/METHODS: Newborn piglets (1-3 days old) were anesthetised with isoflurane. Venous and arterial lines were placed in the internal jugular vein and carotid artery. Piglets were preoxygenated with 100% O_2 or 21% O_2 for 10 minutes prior to asphyxiation by occlusion of endotracheal tube. Heart rate, oxygen saturations and blood pressure (BP) were recorded at baseline (ETT clamping) and every minute till asystole, confirmed by auscultation and absence of arterial pulsations on invasive blood pressure monitor recording (arterial line tracing). Arterial blood gases were obtained every 3 minutes till asystole.

RESULTS: 35 newborn piglets were included in the study (n =24 in 100% and 11 in 21% O_2 group). There were no significant differences in the weight or age between the 100% vs 21% O_2 groups. Preoxygenation with 100% O_2 did not increase the time to asystole 704 ±386 seconds as compared to room air 750 ± 342s. There were no significant differences in the heart rate, mean, systolic or diastolic BP, pH, PaO_2 or $PaCO_2$ over the period of asphyxiation by repeated measures ANOVA.





CONCLUSIONS: Pre oxygenation with 100% oxygen does not delay the decrease in heart rate and oxygenation induced by airway compromise and exposes patients to the effects of oxidative stress and clinicians to a false sense of security.

This study was funded by the NRP / AAP (BM).

282

10:00am

Do Valid Film Decision-Aids Inform Parents on Potential Outcomes of Extreme Prematurity without Creating Stress?

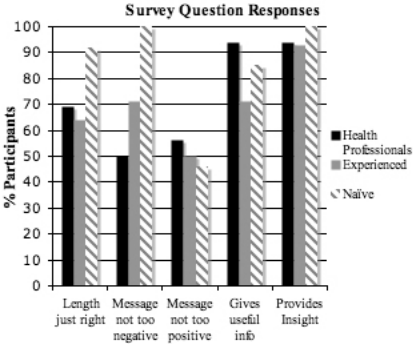
Ursula Guillen, Sanghee Suh, Eileen Wang, Veronica Stickleman, Haresh Kirpalani.
Children's Hospital, Philadelphia, PA; University of Pennsylvania, Philadelphia, PA; Philadelphia Women in Film and Television, Philadelphia, PA.

BACKGROUND: Valid decision-aids for parents making decisions when facing extreme premature delivery at limits of viability are scarce (Guillen U. J Pediatrics 2011)

OBJECTIVE: To iteratively develop a valid short film decision-aid on the range of possible outcomes of extreme premature infants, from death to survival with or without impairments.

DESIGN/METHODS: Semi-structured interviews were conducted of neonatologists, obstetricians, nurses ('professionals' n=31) and parents of premature infants <26wks GA (n=30). These defined key content items and recommended a film. We formatted items into a short film. A first film was pre-tested and modified. To validate the final film, we tested three groups: 'professionals', 'experienced' parents (previous premature delivery) and healthy 'naïve' women (no prior knowledge about prematurity). They estimated the usefulness of the film (8-question survey) and completed the State-Trait Anxiety Inventory.

RESULTS: A 10-minute film showed clips of 6 children/parent dyads at toddler age. All were former 23-25 weekers with a wide range of outcomes (from normal, to mild, to severe cerebral palsy and/or cognitive and language delay). Two parents of multiples with only one survivor discussed bereavement. The first film was perceived as 'negative' and resulted in high anxiety (50.8 anxiety state). The final film was evaluated by 16 'professionals', 14 'experienced' parents, and 13 'naïve' women. This iteration was well accepted by all 3 groups, who perceived it as 'balanced' with a 'neutral' message. In this population, anxiety was not induced (anxiety state score 'experienced' 36.1 vs 'naïve' 30.2).



CONCLUSIONS: We designed a valid short-film to show the range of outcomes of prematurity, which may be a useful and non-stress inducing aid to parents facing extreme prematurity. Future research should evaluate the effectiveness of the film in controlled trials over decision cards.

283

10:15am

Potential Alcohol Exposure from Inhalation in Low Birth Weight Infants

Shiv Kapoor, Cynthia Bearer, Bruce Lippy, Leonard Burrelli.
Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD; Environmental Profiles Inc, Columbia, MD.

BACKGROUND: Preterm neonates spend up to 12 weeks in isolettes to maintain their temperature and promote their growth. With advances in neonatal care, many of these weeks are off ventilators breathing ambient air. To reduce convective heat loss, ventilation within the isolette is minimal, raising the question of air quality within it. One potential neurotoxic chemical to which they may be exposed is ethanol, the volatile active ingredient of hand sanitizers. Ethanol is a known developmental neurotoxicant and may have long-term consequences on the development of preterm babies. We hypothesize that ethanol vapor within the isolette may reach harmful concentrations. We tested this hypothesis using a mock-up of an isolette.

OBJECTIVE: To estimate the concentration of ethanol in the air within isolettes after use of alcohol based hand hygiene product.

DESIGN/METHODS: A glove box was made which approximated the size of a neonatal giraffe isolette. A generic hand sanitizer containing 62% ethanol was used as a test chemical. Measurements of air within the previously purged glove box were made after the application of alcohol sanitizer to hands, rubbing the hands together continuously for 20 seconds and inserting both hands into the glove box. Air was collected 1 and 3 minutes after insertion of hands in the box, and 1.5 min after the hands were removed. Measurements were done with photoionization devices (PIDs) and calibrated before and after testing. PIDs are sensitive instruments for measuring volatile organic compounds down to parts per billion (ppb) concentrations.

RESULTS: The concentration of ethanol in the air of the glove box 1 minute after introduction of hands cleaned with sanitizer was 404 parts per million (ppm) and increased at 3 minutes to 563 ppm. Hands were removed at 3 minutes and a measurement at 4.5 minutes (1.5 min elapsed since removal of hands) showed 330 ppm.

CONCLUSIONS: The results suggest significant alcohol concentrations are present in the glove box environment after a single introduction of hands cleaned with alcohol. The alcohol persists even after removal of the hands. The permissible short term exposure limit for alcohol is 1000 ppm as set by the Occupational Safety and Health Administration (OSHA) for healthy adults. The acceptable exposure limit to developing preterm babies is unknown. The repeated exposure of preterm babies to ethyl alcohol may have long-term consequences for growth and brain development.

284

10:30am

Early Treated Hypotension and the Risk of Hearing Loss among Extremely Low Birth Weight Infants

Semsa Gogcu, Lisa Washburn, Michael O'Shea.
Pediatrics, Neonatal-Perinatal Medicine, Maria Fareri Children's Hospital, New York Medical College, Valhalla, NY; Pediatrics, Neonatal-Perinatal Medicine, Wake Forest University School of Medicine, Winston-Salem, NC.

BACKGROUND: Treatment of hypotension in extremely low birth weight (ELBW) infants varies across the centers, suggesting a lack of clarity about the benefit of treating hypotension.

In the only study to date of treated hypotension and developmental outcome, infants treated for hypotension had a higher rate of hearing loss. However, this conclusion was based on the study of only 5 patients with hearing impairment. The present study was undertaken in an effort to replicate this finding with a considerably larger sample of infants with hearing impairment.

OBJECTIVE: To study the association between treated hypotension in the first 24 hours of life and subsequent hearing loss in ELBW infants.

DESIGN/METHODS: This study was a case-control analysis. 735 consecutive ELBW infants who were born between 11/01/1997 and 5/31/2006, admitted to our neonatology service and survived to 18 months adjusted age were evaluated between 18 and 22 months adjusted age. 25 of the infants were diagnosed with sensorineural hearing loss. To serve as controls, 75 ELBW infants were selected among the 710 ELBW infants who had normal hearing.

Treated hypotension was defined as receipt of at least 10ml/kg of normal saline infusion in the first 24 hours of life.

RESULTS: 60% of infants with hearing impairment and 25% of infants without hearing impairment were treated for hypotension in the first 24 hours of life (OR: 4.4; 95% CI 1.7-11.5). 85% of infants treated for hypotension received volume plus a dopamine infusion. When compared to controls, infants with hearing impairment had lower gestational age at birth and were less likely to have been exposed to antenatal steroids. In addition, they were more likely to have had a 5 min APGAR less than 6, an umbilical catheter, treatment with high frequency ventilation, and a major cranial ultrasound abnormality. Stepwise backwards elimination to select variables associated with hearing impairment resulted in a multivariate model, containing gestational age, antenatal steroids, and treated hypotension. The multivariate OR for hypotension was 3.6, 95% CI: 1.3-9.7.

CONCLUSIONS: Treated hypotension in ELBW infants in the first 24 hours of life is associated with an increased risk of sensorineural hearing impairment. Randomized trials of treatment for hypotension are needed to evaluate whether this association is causal and if related to hypotension or treatments for hypotension.

285

10:45am

Fellow in Training

EC-SOD Overexpression Protects Against Retinopathy of Prematurity (ROP) in Neonatal Mice

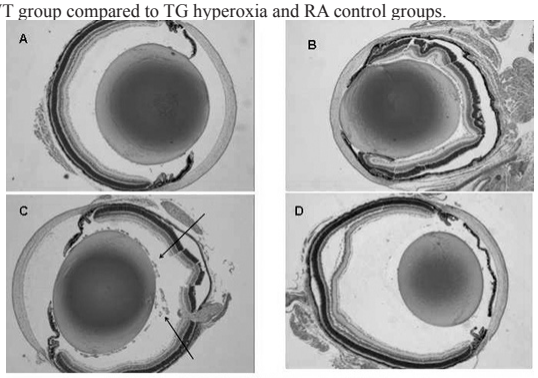
Nahla Zaghloul, John Catanzaro, Hardick Patel, Arslan Arif, Champa Codipilly, Nasim Mansoor, Mohamed Ahmed.
Pediatrics/Neonatology, Cohen Children's Medical Center of New York, Manhasset, NY; Pediatrics/Neonatology, Feinstein Institute for Medical Research, Manhasset, NY; Pathology, Long Island Jewish Medical Center, New Hyde Park, NY.

BACKGROUND: Retinopathy of Prematurity (ROP), is characterized by an early phase of vascular injury with obliteration of immature vessels and a second phase of vascular repair. Oxidative retinal damage caused by free oxygen radicals is one of the important factors in its pathogenesis. Oxygen radicals directly cause angiogenesis, or indirectly lead to release of angiogenic growth factors (e.g. VEGF).

OBJECTIVE: To study the relationship between diminishing oxygen radical production by EC-SOD over expression and the severity of ROP in neonatal mice.

DESIGN/METHODS: Transgenic neonatal mice (TG, with an extra-copy of hEC-SOD knocked in) and wild type (WT) were exposed to hyperoxia (95% O_2) from DOL2 to 8, then room air (RA) until DOL 11. Two additional groups (TG & WT) were raised in RA for 10 days. After exposures, mice were sacrificed, eyes were collected for histopathological studies and immuno-staining for hEC-SOD protein. Protein was extracted for laminin assays (a measure of angiogenesis). RNA was extracted for VEGF RT-qPCR as an early index of angiogenesis.

RESULTS: Immunostaining of eye sections showed no hEC-SOD expression in both WT and TG groups. Histopathological studies showed marked vascularization and proliferation in the hyperoxic WT group compared to TG hyperoxia and RA control groups.



(A: WT RA B: TG RA C: WT hyperoxia D: TG Hyperoxia)

The mean vascular tuft was significantly greater in WT hyperoxia (46.83±5.82) compared to TG hyperoxia (34.43±4.58)(P<0.05). Laminin was significantly higher in WT hyperoxia compared

to other groups (P<0.05). RT-PCR for both VEGF was also significantly higher in hyperoxic WT compared to other three groups (P<0.05).
CONCLUSIONS: Despite low to negligible EC-SOD in the eye, overexpression of EC-SOD has a role in the prevention of ROP induced by oxidative stress in neonatal mouse model.

286

11:00am

Evaluation of the New Generation Dual-Lumen Catheter for ECMO

Mariam M. Said, Oswaldo Rivera, Mikesell T. Gerald, Khodayar Rais-Bahrami.
Neonatology, Children's National Medical Center, Washington, DC; The George Washington University School of Medicine, Washington, DC.

BACKGROUND: The original prototype dual-lumen catheter for VV-ECMO was designed, made and tested at CNMC in our animal laboratory facilities leading to production of commercially available dual-lumen catheter for use in neonatal VV-ECMO (OriGen Biomedical, Austin TX). Recently OriGen has made changes to the catheter to improve mechanical characteristics particularly in the area of kink resistance and preventing collapse by wire re-enforcing the catheter. This has resulted in elimination of some of the reinfusion side holes. The original dual lumen catheter has multiple small side holes for blood return from the ECMO circuit to patient. The new design has incorporated one elliptical shaped reinfusion port.
OBJECTIVE: The purpose of this study was to compare the newly designed catheter with the current dual-lumen catheter to ensure it is as safe and effective prior to its use in human neonates.
DESIGN/METHODS: Newborn lambs 1-5 days of age, 4.2 ± 0.5 kg (N=5) were anesthetized, intubated and ventilated. Femoral arterial, venous and cephalic jugular vein catheters were placed. After systemic heparinization, the 13 Fr. New OriGen catheter (Code: VR13) was placed in the RJV and advanced to right atrium with the reinfusion hole in line with the tricuspid valve. After stabilization on ECMO, ventilator settings were set to PIP 15, PEEP 5, IMV 15-20, and FiO2 0.30. ECMO flows were increased in 100 ml increments from 200-600 ml/min with measurements taken 15-20 minutes after each change. After completion of data collection, animals were recannulated with the 12 Fr. Current OriGen catheter (Code:VV12) and the same measurements were repeated. Post mortem necropsy was performed to verify catheter positioning.
RESULTS: Recirculation values were equal for both catheters ranging from 5% at 200 ml/min to a maximum of 35% at 500 ml/ min. The pressure drop at the reinfusion port was 75 mmHg for both catheters at 200 ml/min and exponentially increased to 275 mmHg at 500 ml/min for the VR13 vs. 240 mmHg for the existing VV12 catheter.
CONCLUSIONS: The New OriGen catheter resulted in equal levels of recirculation when compared to the currently available catheter. However, in order to achieve these levels of recirculation it required meticulous manipulation as compared to the current product. Pressure drop was slightly higher for the new designed catheter. Based on resistance measurements we do not recommend the use of this New catheter beyond 400 ml/ min, provided minor design changes are made.

287

11:15am

Outcomes of Peripherally Inserted Central Catheters Related to Tip Location in Newborn Infants

Jeanne Rorke, Laura Folk, Pam Kilcullen, Jayashree Ramasethu.
Neonatal Intensive Care Unit, Department of Nursing, Georgetown University Hospital, Washington, DC; Division of Neonatal Perinatal Medicine, Georgetown University Hospital, Washington, DC.

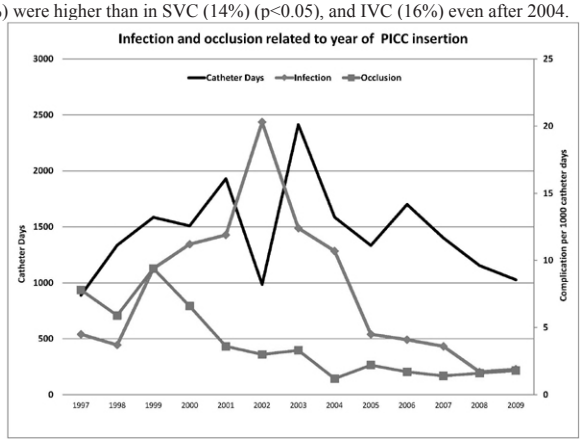
BACKGROUND: The tips of peripherally inserted central catheters (PICCs) should be located in the superior vena cava (SVC) or inferior vena cava (IVC). Occasionally, the tip is in the innominate/subclavian vein, ie., midclavicular (MC) region. Few studies have compared outcomes related to PICC tip location specifically in neonates.
OBJECTIVE: To compare outcomes of PICCs with tips in the SVC, IVC or MC region in newborn infants.
DESIGN/METHODS: Retrospective analysis of PICCs in NICU patients at Georgetown University Hospital from 1997 to 2009. PICC tip location was documented by Xray after insertion. Statistical tests: Fisher's exact test and Logistic regression (SAS 9.1.3; SAS Inst Inc).
RESULTS: Analysis of 1148 PICCs in 1050 infants is presented (81 infants had 2 PICCs, 17 had ≥ 3 PICCs). Mean gestational age (GA) at birth was 29.9 ± 4.9 weeks, weight at insertion time 1.6 ± 1.04 kg. Success (completion of therapy) and complication rates are shown.

PICC Tip Location: Success and Complication* Rates

	SVC (n=768)	IVC (n=207)	MC (n=173)	p value
Dwell time* (days) mean±sd	16.8 ±11.5	17.3± 13.6	13.6±10.6	SVC or IVC vs MC p<0.005
Successful n(%)	572 (74)	154 (74)	112 (65)	SVC or IVC vs MC p<0.05
No Complications n(%)	528 (69)	148 (72)	107 (62)	IVC vs MC p<0.05
Infection n(%)	126 (16)	20 (10)	19 (11)	SVC vs IVC or MC p<0.05
Occlusion n(%)	52 (7)	17 (8)	15 (9)	ns
Phlebitis n(%)	4 (0.5)	9 (4.3)	3 (1.7)	SVC vs IVC p< 0.001
Infiltration n(%)	3 (0.4)	0	9 (5)	SVC or IVC vs MC p<0.001
Pericardial effusion n(%)	2 (0.3)	0	0	ns
Pleural effusion n(%)	1 (0.1)	0	2 (1)	ns
Migration n(%)	16 (2)	1 (0.5)	5 (3)	ns

* excludes leaks, tears or dislodgement

Complication rates decreased over the years (p<0.0001)(fig. 1). Complication rates of PICCs in MC (25%) were higher than in SVC (14%) (p<0.05), and IVC (16%) even after 2004.



CONCLUSIONS: PICCS with tips in the SVC and IVC had the best success rates. MC PICCs had shorter dwell times and increased complications, but were still successfully used in 65% of cases. Infection and occlusion rates have decreased significantly.

288

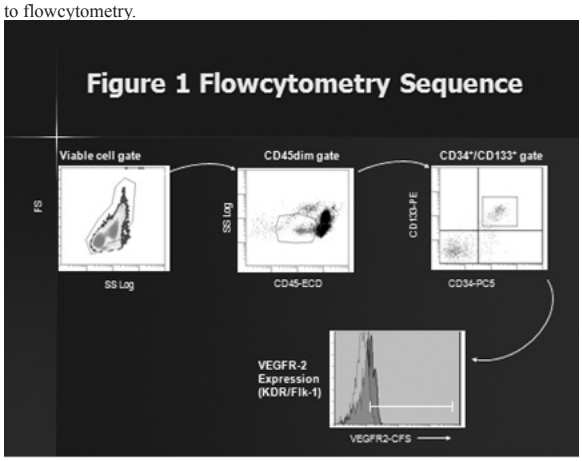
11:30am

Fellow in Training

Quantitative Analysis of Endothelial Progenitor Cells (EPCs) in Very Low Birth Weight Newborns (VLBW) at Risk of Retinopathy of Prematurity (ROP)

Kanayo Ezeanolue, Ranjan Monga, Felix K. Quist, Steven Buck, NItin S. Chouthai.
Pediatrics (Division of Neonatal-Perinatal Medicine), Wayne State Unviersity, Detroit, MI; Pediatrics(Division of Neonatal-Perinatal Medicine), Hurley Medical Center, Flint, MI.

BACKGROUND: Circulating EPCs contribute towards post natal vasculogenesis. VLBW newborns are at very high risk of ROP. Aberrant vasculogenesis in response to cycles of hypoxia and hyperoxia is deemed to be the pathophysiology of ROP. The data about changes in levels of circulating EPCs in newborn at risk of ROP is deficient.
OBJECTIVE: To determine the proportion of circulating EPCs in VLBW newborns at risk of ROP.
DESIGN/METHODS: Blood samples were collected from 5 VLBW newborns with severe ROP needing photocoagulation and 10 VLBW newborns with no ROP at 36 weeks of post menstrual age. Mononuclear cells were separated by gradient centrifugation and were subjected to flowcytometry.



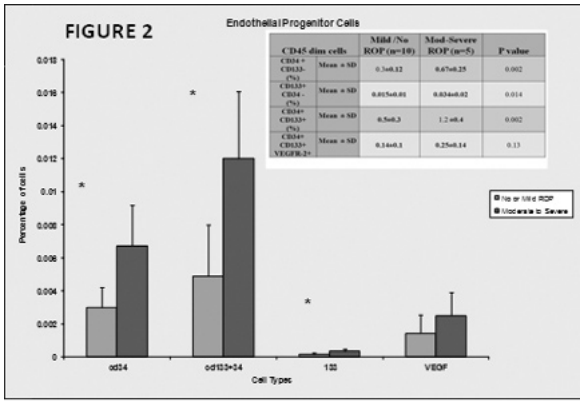
Clinical data was obtained using prospective chart analysis.
RESULTS: Demographic data of VLBW newborns is described.

Clinical characteristics of the study group

Characteristic (n=15)	Mild /No ROP (n=10)	Mod-Severe ROP (n=5)	P value
Birth wt(g)	874±198	629±186	0.039
Current wt(g	2179±395	1831±225	0.09
Gestation(wks)	26.3±1.4	25.2±1.3	0.17
PMA(wks)	36.4±1.35	36.8±0.8	0.56
Vent days(wks)	6.3±4.7	10.2±1.6	0.10
02 days	8.8±3.4	11.4±2.6	0.15
no of transfusions	3.2±3.4	6.2±6.6	0.26

Results expressed in mean±SD

EPC subtypes were significantly incresed in VLBW newborns with severe ROP as compared to those without ROP except those with CD34+CD133+VEGFR-2+ phenotype.



CONCLUSIONS: EPCs may play important roles as biomarkers for severe ROP. Further studies are needed to establish gestational age related changes in EPC percentages.

289

11:45am

Fellow in Training

A View in the Vascular Endothelial Growth Factor (VEGF) in Preterm Neonates and Their Complications

Victoria Lima, Maria de la Luz Sanchez-Tirado, Miguel Ramirez-Elias, Luzmila Martinez-Gonzalez, Angel Alpuche-Solis, Carolina Villegas-Alvarez, Francisco Javier Gonzalez.

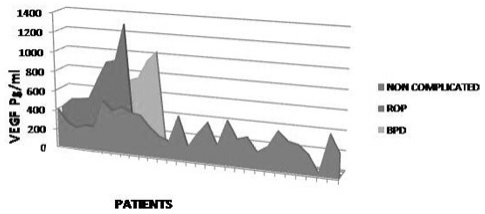
Neonatology, Hospital Central Dr Ignacio Morones Prieto, San Luis Potosi, Mexico; Neonatology, Universidad Autonoma de San Luis Potosi, San Luis Potosi, Mexico; Molecular Biology, Instituto Potosino de Investigacion Cientifica y Tecnologica AC, San Luis Potosi, Mexico.

BACKGROUND: Preterm delivery is a health care problem, affecting 10% of all births, and they have a high risk for acute and long-term organ injury, multiple factors influence the development of these, such as hyperoxia and hypoxia, via regulation of the VEGF. The implication of this factor is increasingly important.

OBJECTIVE: To determinate the role of the VEGF in the mayor complications of the preterm infants (PI).

DESIGN/METHODS: The study was approved by the Ethics Committee and informed consent was obtained from parents. We enrolled 65 PI at Hospital Central in San Luis Potosi, Mexico. These were classified into those who developed Retinopathy of Prematurity (ROP), and Those with Bronchopulmonary Dysplasia (BPD), Serum samples for determination of VEGF by ELISA were taken at birth and at the moment of the complications. For statistical analysis we used chi square for categorical variables, t students for continuous and multivariable logistic regression. p values less than 0.05 were considered statistically significant. All calcultations were done in SPSS 19.

RESULTS: The mean weight were 1348±429g, for gestational age were 31.6±4.6 weeks, the mean serum values for VEGF in the non complicated group were 307.99±117.5pg/ml, range (31.3-519.5) and in the complicated group who developed BPD (13) 20%, 811.21±507.53 pg/ml, with a range (324.6-1303.6), p<0.0008, and for the ROP group (8) 12.3%, mean 717.5±309.01 pg/ml, range (402.5-13O2), p<0.006.



CONCLUSIONS: Although animal studies have shown that in early lung development, VEGF is decreased, as in preterm infants at risk of Respiratory Distress Syndrome, this study demonstrate that the VEGF is increased in long-term complications such as BPD and ROP, this could be explained by the repeated fluctuations between hyperoxia and hypoxia that regulates the expression of this factor.

Abstract Author Index

Index numerals refer to the Abstract number, not the page number.
Only Presenting Abstract Authors are included in the Index.

Faculty Disclosures

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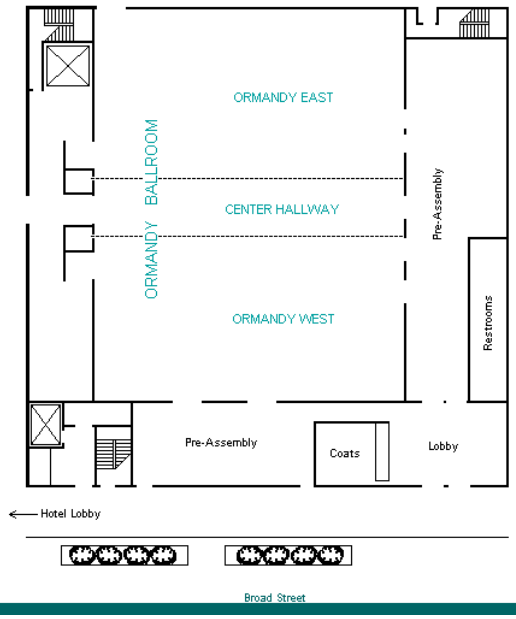

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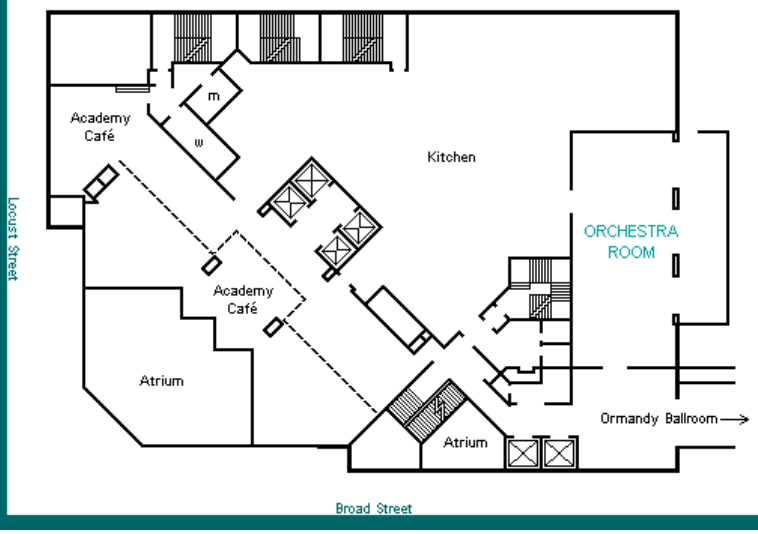

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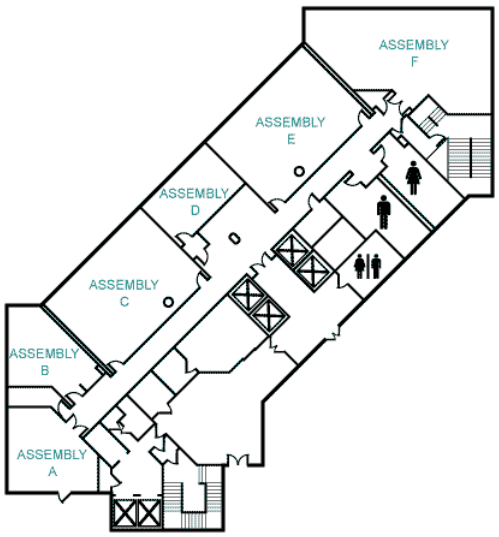

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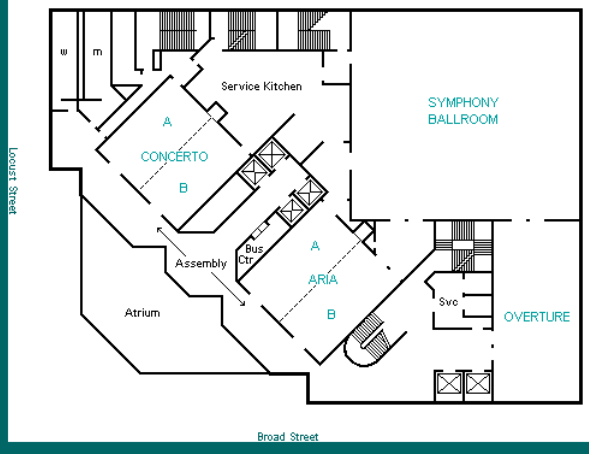

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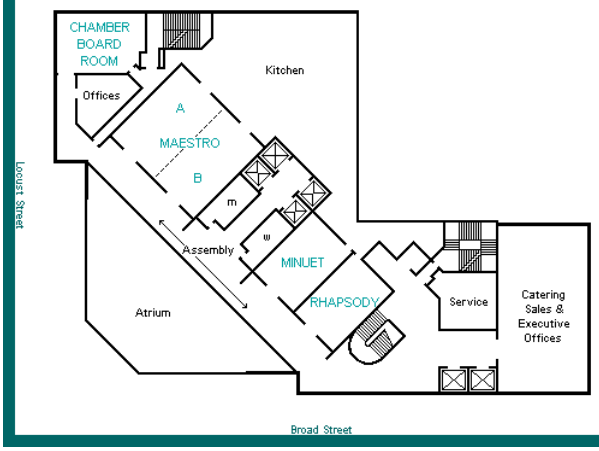

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