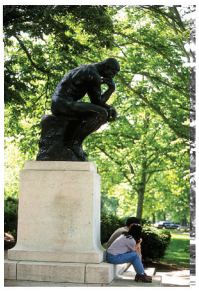
Program Guide

March 13-15, 2009 • Crowne Plaza Philadelphia • Philadelphia, PA





THE EASTERN SOCIETY FOR PEDIATRIC RESEARCH

21st Annual Meeting

In cooperation with:
The Center for Continuing Education,
Tulane University Health Sciences Center

Eastern SPR
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Dear Colleagues,

Welcome to the 21st Annual Meeting of the Eastern Society for Pediatric Research (Eastern SPR) and to our host city of Philadelphia, the Cradle of Liberty!

The Eastern SPR 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. 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 2009 sponsor for CME program. 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!

Lawrence Nogee, MD
President

Edmund F. La Gamma, MD, FAAP
Secretary

Vineet Bhandari, MD
Chair, Planning Committee

Meeting Services & CME Accreditation

Registration and CME Desk Hours

Registration will be held in the Liberty Ballroom Foyer. Registration hours are as follows:

Friday, March 13	4:00pm – 7:00pm
Saturday, March 14	7:30am – 7:30pm
Sunday, March 15	7:30am – 1:00pm

Abstract Publication

All abstracts being presented at the 2009 Eastern SPR Annual Meeting are printed in this Program Guide, beginning on page 14.

Audio/Visual Information

All oral presentations must be made using PowerPoint. Computers and LCD projectors will be provided. Slide projectors will not be provided. Presenters should have submitted their presentations in advance, but still are required to check in at Speaker Ready.

Speaker Ready (Board Room-2nd 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 Crowne Plaza Philadelphia Center is located on the 2nd floor, adjacent to the Constitution Room.

Statement of Need

There are few programs entirely dedicated to presentation of medical research by junior physician scientists across a broad array of medical disciplines. In keeping with the purpose stated by the society in its bylaws, missions and goals, the Eastern Society for Pediatric Research Annual Meeting is organized to foster teaching and investigation, to encourage young investigators and provide a platform for the presentation of original research.

Learning Objectives

1. Discuss with colleagues new developments in pathophysiology of human disease that will improve patient care and medical education.
2. Identify new areas of investigation, which will inform research and improve patient care and safety.
3. Explore current innovative tools for teaching and practicing medicine.
4. Critically evaluate new techniques for biomedical research in common disease states.
5. Discuss recent medical advances with students and colleagues.
6. Develop optimal strategies for clinical investigation and transmission of clinical research results.

Target Audience

Multi-specialty clinical & basic researchers; Ph.D. basic/clinical scientists; Medical students who have performed a research project

CME Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) 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 to provide continuing medical education for physicians.

Designation Statement

Tulane University Health Sciences Center designates this educational activity for a maximum of **11.75** *AMA PRA Category 1 Credits™*. Physicians should only claim 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 utilize 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.

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 2004 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 relevant 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.

Procedures for CME Credit

To receive the appropriate number of CME credits, it is important to do the following:

- Locate your verification form included with your registration packet or pick one up at the Registration Desk.
- Complete your verification form as you attend each activity.
- On your departure date, turn in your completed verification form at the Registration desk.

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Eastern SPR Schedule-at-a Glance

Crowne Plaza Philadelphia
March 13-15, 2009

Friday, March 13

6:00pm–7:30pm

Poster Session I & Reception
— Independence Ballroom (Reception in Liberty Foyer) —

Saturday, March 14

7:30am–8:30am

Continental Breakfast
— Liberty Foyer —

8:15am–10:30am

Neonatology I: Neonatal Pulmonology
— Liberty Ballroom C—

General Pediatrics I
— Liberty Ballroom A —

Hematology/Oncology
— Liberty Ballroom B —

Cardiovascular
— Constitution Room —

Infectious Diseases
—Freedom Room —

Emergency Medicine
— Declaration Room —

10:30am–10:45am

Coffee Break
— Liberty Foyer —

10:45am–11:45am

Plenary Session I

MENTOR OF THE YEAR PRESENTATION
Ivan D. Frantz, III, MD, Floating Hospital for Children
— Liberty Ballroom C —

12:00pm–1:00pm

Meet the Professor Lunch
Edward E. Lawson, MD, Johns Hopkins Medical Institute
Ins and Outs of Writing and Publishing a Scientific Manuscript
— Liberty Ballroom B —

Eastern SPR Business Meeting
— Congress —

1:10pm–4:00pm

Plenary Session II

PLENARY LECTURE
Norman Rosenblum, MD, Hospital for Sick Children
Moving Beyond Malformation Phenotypes to Molecular Mechanisms: The Kidney as a Model
— Liberty Ballroom C —

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

4:00pm–4:15pm

Coffee Break
— Liberty Foyer —

4:15pm–5:45pm

Neonatology II - Epidemiology and Follow-Up
— Liberty Ballroom C —

Neonatology III - GI/Nutrition
— Declaration Room —

General Pediatrics II
— Liberty Ballroom A —

Adolescent Medicine
—Freedom Room —

Pulmonary and Asthma
— Constitution Room —

Developmental Biology I
— Liberty Ballroom B —

6:00pm-7:30pm

Poster Session II
— Independence Ballroom —

Reception
— Liberty Foyer —

Sunday, March 15

7:45am–8:45am

Continental Breakfast
— Liberty Foyer —

8:30am–9:30am

Plenary Session III

PRESENTATION OF THE YOUNG INVESTIGATOR AWARDS

PLENARY LECTURE
Nina Schor, MD, PhD, Golisano Children's Hospital
Targeted Therapy for Neuroblastoma: Slaying Dragons, Chasing Windmills
— Liberty Ballroom C—

9:30am–9:45am

Coffee Break
— Liberty Foyer —

9:45am–12:00pm

Neurobiology
— Liberty Ballroom B —

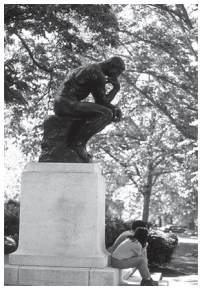
Pulmonary Development & Injury
— Constitution Room —

Developmental Biology II
— Freedom Room —

Neonatology IV: Clinical Studies
— Liberty Ballroom C —

General Pediatrics III
— Liberty Ballroom A —

Endocrinology/Metabolism
— Declaration Room —



Friday, March 13, 2009

Poster Session I

6:00 PM-7:30 PM **Independence Ballroom**

1 **Economic Disparities in the Use of Environmental Control Practices among Children with Asthma**
Angkana Roy, Juan Wisnivesky. – Abstract 1

2 **Parental Observations with Levalbuterol Use in Children**
Chee Chun Tan, Archana Singh, Melodi Pirzada. – Abstract 2

3 **Physician Views on Incentives-for-Adherence in Childhood Asthma**
Evan Fieldston, Andrea Puig, Judy Shea, Susmita Pati, Joshua Metlay. – Abstract 3

4 **Innovative Way To Improve Asthma Severity Documentation in the ED**
John M. Corsi, Marvin C. Culbertson III, Sharon R. Smith. – Abstract 4

5 **Complementary/Alternative Medicine Use among Children Hospitalized with Asthma**
Bernice M. Vicil, Sandra F. Braganza, Iman Sharif. – Abstract 5

6 **Knowledge, Attitudes and Practices of Caretakers Concerning Respiratory Infections in Their Children**
Ana Valdes Roque, Fernanda Kupferman, Apostolis Tsoumpariotis, Humberto Martinez Canalejo. – Abstract 6

7 **How Parents' Experiences at Immunization Visits Affects Child Immunization Status**
Melissa S. Stockwell, Sally Findley, Raquel A. Martinez, Matilde Irigoyen. – Abstract 7

8 **Effectiveness of Influenza Vaccine Given to Pregnant Women in Preventing Hospitalization in Their Infants**
Issac Benowitz, Kristina DePeau, Daina Esposito, Eugene D. Shapiro, Jeffrey S. Kahn, Marietta Vazquez. – Abstract 8

9 **Administration of Tetanus, Diptheria and Acellular Pertussis Vaccine (Tdap) to Parents of NICU Patients Secondarily Increases Health Care Worker Vaccination Rates**
Shetal Shah, Farihah Anwar. – Abstract 9

10 **Effectiveness of Rotavirus Vaccine in Preventing Hospitalization of Young Children**
Sachin N. Desai, Eugene D. Shapiro, Penelope H. Dennehy, Marietta Vazquez. – Abstract 10

11 **Ethnic Disparities in Influenza Vaccination Coverage for Latino Children Aged 7-36 Months**
Omolara A. Thomas, Sally E. Findley, Matilde Irigoyen, Raquel Andres-Martinez, Melissa S. Stockwell. – Abstract 11

12 **Is HPV Vaccine Being Given on Time? An Inner-City Center's Experience**
Alexis S. Lieberman, Allan M. Arbeter, Rachel Kauffman, Katherine Desmond, Matilde Irigoyen. – Abstract 12

13 **An Assessment of the Current State of Palliative Care Education in Pediatric Hematology/Oncology Fellowship Training**
Roth Michael, Kim Mimi, Moody Karen. – Abstract 13

14 **Midnight Census Is a Misleading Metric for Hospital Capacity-Planning**
Evan Fieldston, Bhuvaneswari Jayaraman, Mahesh Narayan, Kelly Allebach, Susmita Pati. – Abstract 14

15 **Successful Strategies for Enhancing Inpatient Subspecialty Exposure in a Small Pediatric Residency Program**
Anna M. Carr, Matilde Irigoyen, Robert S. Wimmer, Robert S. McGregor. – Abstract 15

16 **Family-Centered Rounds: The Residents' Perspective**
David I. Rappaport, Maureen G. Leffler, Michael F. Cellucci, Kate L. Fronheiser. – Abstract 16

17 **Challenges Implementing PEDS Screening in a Resident Continuity Clinic**
Cynthia W. DeLago, Wendy Ross. – Abstract 17

18 **Medical Students' Response to Teaching and Counseling about an Awkward Topic**
Judith A. Turow, Amy C. Rothkopf, Eleanor Park, Quang Ngo, J. Lindsey Lane. – Abstract 18

19 **Improving the Screening and Documentation of the Use of Over-the-Counter Medications and Home Remedies at an Academic Community-Based Health Center**
Brenda Ritson, Luz Adriana Matiz, Steve Caddle. – Abstract 19

20 **Associations between Causes of Prematurity, NICU Course and Beyond**
Raja R. Senguttuvan, Maria Pici, Jordan S. Kase. – Abstract 20

21 **US Fetal Mortality Rates Are Insensitive with Rising Late Preterm Induction Rates**
Karna Murthy, William A. Grobman, Todd A. Lee, Jane L. Holl. – Abstract 21

22 **The Impact of Maternal Medical Comorbidities on the Preterm Birth Rate of Women in a Methadone Treatment Program**
Chris Almario, Nicole Salva, Neil Seligman, Kevin Dysart, Ted Hayes, Jason Baxter. – Abstract 22

23 **Delivery Room Triage of Infants of Medication Dependent Diabetic Mothers (IMDDM): Validation of a Risk Score for Hypoglycemia**
Andrea M. Scheurer-Monaghan, Tim Stevens, Zahi Haidar-Ahmad, Georgia Lowmaster, Ronnie Guillet. – Abstract 23

24 **Knowledge, Attitudes and Understanding of Mothers Concerning Breastfeeding Their Infant**
Manju Chopra, Fernanda Kupferman, Louis Primavera, Susana Rapaport. – Abstract 24

25 **Late Preterm Twins: Increased Neonatal Morbidity**
Shahida Chowdhury, Judith Palafoutas, Jayashree Ramasethu. – Abstract 25

26 ***In Vitro* Comparison of the Caleo® and Giraffe® Warming Devices**
T.L. Hubert, R. Lindemann, J. Wu, C. Agnew, T.H. Shaffer, M.R. Wolfson.– Abstract 26

27 **Early Neonatal Hypotension (ENH) in Neonates with Gestational Age (GA) ≤ 32 Weeks Born to Mothers with Pregnancy-Induced Hypertension (PIH)**
Surabhi Jain, Gigliola Dolmaian, Susana Rapaport, Fernanda Kupferman, Louis Primavera. – Abstract 27

28 **Thrombopoietin in Infants Born to Mothers with Preeclampsia Compared to Those with IUGR**
Tiffany LaBella, Amy Mackley, Kelly Zook, Pierrette Andre, Steven McKenzie, David A. Paul. – Abstract 28

29 **Use of Hydrocortisone To Prevent Cardiovascular and Respiratory Instability after PDA Ligation in Preterm Infants**
Monique D. Satpute, Pamela Donohue, Susan Aucott. – Abstract 29

30 **Transfusion Related Acute Gut Injury (TRAGI): Necrotizing Enterocolitis (NEC) in VLBW Neonates Following PRBC Transfusion**
Jonathan Blau, Johanna Calo, Donna Dozor, Edmund La Gamma. – Abstract 30

31 **A Single Center Retrospective Study of Risk Factors for Spontaneous Intestinal Perforation (SIP) in Neonates**
Bobby Mathew, Rita M. Ryan, Vasanth H. Kumar. – Abstract 31

32 **Follow-Up of Urban ICN Graduates (ICN-G): Assessing Barriers to Care**
Seema Anandalwar, Nancy L. Brodsky, Noah Cook, Alisa Burnham, Danielle Foy, Hallam Hurt. – Abstract 32

33 **Validity of Apnea, Bradycardia, and Desaturation Monitoring during NICU Hospitalization for Prediction of Subsequent Apparent Life-Threatening Events**
Denise C. Hassinger, Anson Koshy, Simona Nativ, Sallie Ann Ganpot, Ben H. Lee. – Abstract 33

34 **Factors That Predict Successful Transition of Infants from Car Beds to Car Seats**
Michele DeGrazia, Ashley Wilkinson, Lawrence Rhein. – Abstract 34

35 **Evaluation of Our "Back To Sleep " Program**
Rachel Porat, Claudia G. Lares, Shilpa Hundalani, Mariya L. Koval, Lina Huerta-Saenz. – Abstract 35

Saturday, March 14, 2009

Neonatology I - Neonatal Pulmonology Platform Session

8:15 AM-10:30 AM **Liberty C**

Moderator: Rose Viscardi, MD

8:15 AM **Disruption of Heme Oxygenase-1 Alters Postnatal Lung Development**
Tiangang Zhuang, Phyllis A. Dennery, Sara Q. Lin. – Abstract 36

8:30 AM **Nuclear Localization of HO-1 Enhances DNA Repair after Oxidative Stress**
Amal P. Fernando, Ping La, Guang Yang, Maurice D. Hinson, Phyllis A. Dennery. – Abstract 37

8:45 AM **C/EBPα Is Induced in Hyperoxia and Modulates Type II Cell Proliferation during Postnatal Lung Development**
Guang Yang, Jessica Bordner, Tiangang Zhuang, Clyde Wright, Phyllis A. Dennery. – Abstract 38

9:00 AM **Effect of Catalytic Antioxidant MnTBAP on Pulmonary Angiogenic and Oxidative Gene Expression to Hyperoxia in Newborn Mice**
Vasanth H. Kumar, Babu Paturi, Lori Nielson, Huamei Wang, Rita M. Ryan.– Abstract 39

9:15 AM **The Role of TGFβ in Hyperoxia/Hypoxia-Induced Delay in Alveolarization and Endothelial Dysfunction**
Huayan Zhang, Bo Han, Scott G. Worthen, Horace M. DeLisser. – Abstract 40

9:30 AM **Feeding Enhances Translation Initiation Complex Formation in the Lungs of Hyperoxia-Exposed Newborn Rats**
Bethany Edwards, Wesley Konsavage, Whitney Zurat, Jeffrey S. Shenberger.– Abstract 41

9:45 AM **Prone Positioning Decreases Pepsin in Tracheal Aspirates from Premature Ventilated Infants**
Sabeena Farhath, Judy Saslow, Sam Sounder, Zhaoping He, Barbara Amendolia, Riva Eydelman, Keely Pierzchalski, Kee Pyon, Patricia Pearlman, Gary Stahl, Dev Mehta, Zubair Aghai. – Abstract 42

10:00 AM **High Mobility Group Box-1 Protein in Tracheal Aspirates from Premature Infants: Relationship with Bronchopulmonary Dysplasia and Steroid Therapy**
Zubair Aghai, Judy Saslow, Chinazo Meniru, Catherine Porter, Riva Eydelman, Vishwanath Bhat, Gary Stahl, Sulaiman Sannoh, Kee Pyon, Charles Hewitt, Vineet Bhandari. – Abstract 43

10:15 AM **Effects of High Flow Nasal Cannula in the Smaller Preterm Infant**
Kee H. Pyon, Zubair H. Aghai, Gary E. Stahl, Judy G. Saslow. – Abstract 44

General Pediatrics I Platform Session

8:15 AM-10:30 AM **Liberty A**

Moderator: Maida P. Galvez, MD

8:15 AM **Bright Present? The Relationship of Developmentally Focused Anticipatory Guidance and Parenting Practices**
Prina Amin, Richard E. Adams, Lawrence Kleinman, Danielle Laraque. – Abstract 45

8:30 AM **Language Acquisition in Internationally Adopted Children**
Melina Harmelin, Patrick Mason. – Abstract 46

8:45 AM **Growth and Development of the Infants Exposed to the High Lead Level In Utero**
Tatyana Gabinsky, Claudia Cosmineanu, Dean Stefanov, Melvin Gertner. – Abstract 47

9:00 AM **Needs Assessment: Creating a Mental Health Home for Latino Children**
Anagha Loharikar, Sandra Braganza, Iman Sharif. – Abstract 48

9:15 AM **Racial Disparities for Ambulatory Care Sensitive Hospital Stays Persist from 1997 to 2006**
Suzette O. Oyeku, Ryan Conrad, Andrew D. Racine. – Abstract 49

9:30 AM **Racial Disparities in the National Rates of Labor Induction at Term Gestation in the United States**
Karna Murthy, William A. Grobman, Todd A. Lee, Jane L. Holl. – Abstract 50

9:45 AM **Subjective Social Status over a Lifetime and Associations with Prematurity**
Erika F. Dennis, Scott Lorch, Leny Mathew, Jennifer Culhane. – Abstract 51

10:00 AM **Nursing Staff Adherance to Hand Hygiene Protocol in a Regional Perinatal Center**
X. Wu, E. Swanson, B. Clones, B. Parvez. – Abstract 52

10:15 AM **Transition Practices at Cystic Fibrosis Treatment Programs Vary Nationwide**
Lisa K. Tuchman, Ioanna D. Kalogiros, Kimberly M. Ganster, Ronald C. Rubenstein. – Abstract 53

Hematology-Oncology Platform Session

8:15 AM-10:30 AM **Liberty B**

Moderator: Richard Gorlick, MD

8:15 AM **Immunotherapy Targeting the WT1 Leukemia Antigen**
Chioma Ihunnah, Robert Jenq, Marcel R.M. van den Brink. – Abstract 54

8:30 AM **Maternal Exposure to Medical Radiation and Wilms Tumor in the Offspring: A Report from the Childrens' Oncology Group**
Ruchika Goel, Andrew F. Olshan, Julie A. Ross, Norman E. Breslow, Brad H. Pollock. – Abstract 55

8:45 AM **Results of a Randomized Trial To Improve Bone Health Knowledge and Behaviors among Adolescent Survivors of Childhood Cancer: The Survivor Health and Resilience Education (SHARE) Program**
Allison Heinly, Lara D. Wilson, Sowmya Prahlad, Revonda B. Mosher, Aziza T. Shad, Kenneth P. Tercyak. – Abstract 56

9:00 AM **Thrombocytopenia and Neutropenia in Infants Born to Preeclamptic Mothers: Effects of Antenatal Steroids, Gestational Age and Birth Weight**
Miriam Salvador, Vishwanath Bhat, Nosrat Razi, Judy Saslow, Sulaiman Sannoh, Kee Pyon, Nicole Kemble, Gary Stahl, Zubair Aghai. – Abstract 57

9:15 AM **Utility of an Hour Specific Bilirubin Nomogram in the Management of ABO Incompatible Coombs Positive Infants**
David L. Schutzman, Romal Sekhon, Shilpa Hundalani. – Abstract 58

9:30 AM **Knowledge, Attitudes and Behaviors and the Management of Hyperbilirubinemia in Newborns**
Susan Mabrouk, Jean Lee, Karen Carpenter. – Abstract 59

9:45 AM **Changes in Regional Cerebral Oxygenation (rCO2) in Preterm Neonates during Neonatal Blood Transfusion (NBT) and Its Correlation to Hemoglobin Levels**
Sean M. Bailey, Karen Hendricks-Munoz, John T. Wells, Pradeep Mally. – Abstract 60

10:00 AM **Oxygen Saturation Monitoring in the Neonatal Intensive Care Unit (NICU): Evaluation of a New Alarm Management**
Heather M. Brostowicz, Khodayar Rais-Bahrami. – Abstract 61

10:15 AM **Parental Perception of Child's Comfort during Routine Venipuncture in Hospitalized Children**
Katherine M. O'Connor, Sheila K. Liewehr, Meghan Kelly, Catherine Skae.– Abstract 62

Cardiovascular Platform Session

8:15 AM-10:30 AM **Constitution**

Moderator: Anne Murphy, MD

8:15 AM **Glutamine Restores Myocardial Cytochrome Oxidase Activity and Improves Cardiac Function during Sepsis**
Portia Groening, Zhishan Huang, Edmund F. La Gamma, Richard J. Levy.
– Abstract 63

8:30 AM **A High Throughput Screen Reveals the DiGeorge Syndrome Gene Tbx1 Interacts with the c-Jun Oncogene**
Eldhose B. Thekkethottiyil, Li Huang, Jason Z. Stoller. – Abstract 64

8:45 AM **Optimal PaO_2 Levels in Peristent Pulmonary Hypertension of the Newborn (PPHN)**
Satyan Lakshminrusimha, James A. Russell, Sylvia F. Gugino, Daniel D. Swartz, Karen A. Wynn, Robin H. Steinhorn. – Abstract 65

9:00 AM **Risk of Cardiovascular (CV) or Respiratory Decompensation Following Patent Ductus Arteriosus (PDA) Ligation Surgery**
Robert L. Dood, Michael Posencheg, David Munson, Scott A. Lorch.
– Abstract 66

9:15 AM **Pre-Operative LV End Diastolic Dimension (LVEDD) Is Smaller in Very Low Birth Weight (VLBW) Infants Requiring Inotorpes (IT) Post Surgical Ligation (SL) of a Patent Ductus Arteriosus (PDA)**
Elizabeth C. Mitchell, Francesca M. Anderson, Patrick Flynn, Jeffrey M. Perlman. – Abstract 67

9:30 AM **Preliminary Experience with Targeted Biologic Inhibition in Children with Multivessel Intraluminal Pulmonary Vein Stenosis**
Maliha Rehman, Jean A. Connor, Mark W. Kieran, Amy Juraszek, Kathy J. Jenkins. – Abstract 68

9:45 AM **Racial Differences in Left Ventricular Hypertrophy among Children with Primary Hypertension (PHTN)**
Cozumel S. Pruette, Barbara Fivush, Joseph Flynn, Tammy M. Brady.
– Abstract 69

10:00 AM **High Prevalence of Structural Heart Disease in Children with Methylmalonic Aciduria and Homocystinuria (cblC)**
Laurie E. Profitlich, Brian Kirmse, Wasserstein P. Melissa, Diaz A. George, Gelb Bruce, Srivastava Shubhika. – Abstract 70

10:15 AM **Near-Infrared Spectroscopy Cerebral and Somatic (Renal) Oxygen Saturation Correlation to Continuous Venous Oxygen Saturation Via Intravenous Oximetry Catheter**
Gilma A. Marimon, W. Keith Dockery, Michael J. Sheridan, Swati Agarwal.– Abstract 71

Infectious Disease Platform Session

8:15 AM-10:30 AM **Freedom**

Moderator: Howard Faden, MD

8:15 AM **The Final Surge: What More Can Be Done To Decrease Central Line-Associated Bloodstream Infections in Level III Nurseries?**
Nneka I. Nzegwu, Lori Richardson, Rebecca Beck, Jenny Lamb, Barbara Wallen, Jill Duncan, Michael Sheridan, John North. – Abstract 72

8:30 AM **Long Term Morbidity and Healthcare Utilization among Uninfected Children with Perinatal HIV Exposure**
Tequa A. Salehi-Rad, Stephen C. Eppes. – Abstract 73

8:45 AM **Evidence of Disproportionate Increase in the Use of Tympanostomy Tubes in US Children: 1996 to 2006**
Lawrence C. Kleinman, Leonardo Trasande, Salomeh Keyhani.
– Abstract 74

9:00 AM **Comparison of the Inverness Medical Acceava® Strep A Test to the Genzyme® OSOM® and Quidel® QuickVue® Strep A Tests**
Tanya Rogo, Richard Schwartz. – Abstract 75

9:15 AM **Impact of a Tdap School-Entry Mandate on Tdap and MCV4 Coverage**
Elyse Olshen Kharbanda, Melissa Stockwell, James Colgrove, Vaughn Rickert. – Abstract 76

9:30 AM **Pediatric Community-Acquired Pneumonia and Associated Complications in the United States, 1993-2006**
Timothy O'Meara, Joshua P. Metlay, Matthew P. Kronman, Yuan-Shung Huang, Samir S. Shah. – Abstract 77

9:45 AM **Antifungal Effects of Methylxanthines**
Kalliope Tsirilakis, Alfin G. Vicencio, David L. Goldman. – Abstract 78

10:00 AM **Immunogenicity of Trivalent Influenza Vaccine (TIV) in Extremely Premature Infants**
Kristin M. Scheible, Carl T. D'Angio, Premature Infant Vaccine Collaborative. – Abstract 79

10:15 AM **Implementation of the 2-Dose Varicella Vaccination Regimen among Children Aged 4-6 Years in Philadelphia: A Good Start but a Long Way To Go**
Irini Daskalaki, Dana Perella, Claire Newbern, Barbara Watson.
– Abstract 80

Emergency Medicine Platform Session

8:15 AM-10:30 AM **Declaration**

Moderator: Raemma P. Luck, MD

8:15 AM **Normal Cerebrospinal Fluid Protein Concentration in Neonates and Young Infants**
Jessica L. Ebberson, Lori A. Kestenbaum, Joseph J. Zorc, Caitlin La Russa, Richard L. Hodinka, Samir S. Shah. – Abstract 81

8:30 AM **Defining Normal Cerebrospinal Fluid White Blood Cell Counts in Neonates and Young Infants**
Lori A. Kestenbaum, Jessica Ebberson, Joseph J. Zorc, Caitlin LaRussa, Richard L. Hodinka, Samir S. Shah. – Abstract 82

8:45 AM **Characterization of Chest Depth in Neonates Using Chest Computed Tomography To Assess Recommendations for Chest Compression Depth in Neonatal Resuscitation**
Andrew Meyer, Anne Ades, Vinay Nadkarni, Avrum Pollock, Matthew Braga, Helge Mylebust, Jon Nysaether, Charlie Babbs. – Abstract 83

9:00 AM **Educational Opportunities in a Pediatric Emergency Department Parental Attitude and Perceptions of CPR**
Adam D. Barouh, Christopher Haines, Sri S. Chinta, Colette C. Mull, Sabina Singh. – Abstract 84

9:15 AM **Resident Use of Medical Literature**
Kathryn Scharbach, Marina Reznik, Philip O. Ozuah. – Abstract 85

9:30 AM **Screening for Violence in the Pediatric ED**
Courtney Thomas, Kyle Finnegan, Nicholas Allen, James F. Parker, Hassan N. Salaheen, Kevin Borrup, Sharon R. Smith. – Abstract 86

9:45 AM **Ultrasound Evaluation of the Saphenous Vein in Children**
Antonio Riera, Lei Chen, Melissa Langhan, Karen Santucci.
– Abstract 87

10:00 AM **Reasons for Early Emergency Department Return Visits: A Prospective Assessment**
Alliyia B. Ali, Rick Place, John Howell, Sienna Malubay, Christina Issaev.
– Abstract 88

10:15 AM **The High Rate of Adverse Drug Events (ADE) in Children Receiving Prolonged Outpatient Parenteral Antibiotic Therapy (OPAT) for Osteomyelitis**
Howard Faden. – Abstract 89

Plenary Session I

10:45 PM-11:45 PM **Liberty C**

10:45 AM **Mentor of the Year Presentation**
Ivan D. Frantz, III, MD, Floating Hospital for Children

Meet the Professor Lunch

12:00 PM-1:00PM **Liberty B**

Ins and Outs of Writing and Publishing a Scientific Manuscript
Edward E. Lawson, MD, Johns Hopkins Medical Institute, Baltimore, MD

Eastern ESPR Business Meeting

12:00 PM-1:00PM **Congress**

Plenary Session II & Young Investigator Presentations

1:10 PM-4:00 PM **Liberty C**

2:00 PM **A Susceptibility Gene for Type 2 Diabetes Is a Genetic Modifier of Diabetes Complicating Cystic Fibrosis**
Scott M. Blackman, Stephanie Hsu, Sarah E. Ritter, Kathleen M. Naughton, Mitchell L. Drumm, Michael R. Knowles, Garry R. Cutting. – Abstract 90

2:15 PM **Modulation of Proinflammatory Signaling by the Cationic Antimicrobial Peptide WLBU-2**
Shruti M. Paranjape, Thomas W. Lauer, Neeraj Vij. – Abstract 91

2:30 PM **Inter-Hospital Standardized Reintubation Ratios: An Index of Quality of Care?**
Angela T. Wratney, Stephen C. Kurachek, Christopher J. Newth, Albert Hoang, Murray M. Pollack. – Abstract 92

2:45 PM **Break**

3:00 PM **Pathogenesis of Cardiac Hypertrophy from Noonan Syndrome-Associated Mutant RAF1**
Perundurai S. Dhandapany, Ioannis Karakikes, Rahul S. Tonk, Lifan Liang, Kimihiko Oishi, Roger Hajjar, Djamel Lebeche, Bruce D. Gelb. – Abstract 93

3:15 PM **Development of YAP and γ-Secretase in ErbB4-Receptor Signaling Pathways during Fetal Lung Type 2 Cell Maturation**
Kristina Hoeing, Sandy Murray, Lucia Pham, Christiane E.L. Dammann, Heber C. Nielsen. – Abstract 94

3:30 PM **Pneumococcal Resistance Patterns Do Not Influence Choice of Empiric Antibiotic Therapy for Community-Acquired Pneumonia in Children**
Timothy E. O'Meara, Joshua P. Metlay, Seth Sheffler-Collins, Karin L. McGowan, Samir S. Shah. – Abstract 95

3:45 PM **What Happens to Inner-City Youth between Ages 8-19: Perceptions and Intentions vs. Reality**
Jennifer M. Handzel, Nancy L. Brodsky, Laura M. Betancourt, Hallam Hurt.– Abstract 96

Neonatology II - Epidemiology and Follow Up Platform Session

4:15 PM-5:45 PM **Liberty C**

Moderator: Jay S. Greenspan, MD

4:15 PM **Potential Biases in Reports of Outcomes of ELBW Infants**
Ursula Guillen, Li Ma, Eileen Wang, Amiram Gafni, John Zupancic, Barbara Schmidt, Haresh Kirpalani. – Abstract 97

4:30 PM **Parental Reading Behavior and Language Development in Premature Infants**
Malgorzata D. Bulanowski, Sanjiv B. Amin, Carl T. D'Angio. – Abstract 98

4:45 PM **Neurodevelopmental Outcome of Preterm Infants Born to Mothers with Severe Preeclampsia**
Roschanak Mossabeb, Emidio Sivieri, Kathleen Finnegan, Soraya Abbasi. – Abstract 99

5:00 PM **Late Preterm Infants Have Worse Neurodevelopmental Outcomes Than Full Term Infants**
Melissa A. Woythaler, Marie C. McCormick, Vincent C. Smith. – Abstract 100

5:15 PM **Limitations of Neonatal Hearing Screening Program Based on Transient Evoked Otoacoustic Emission in Evaluations of the Newborns with Fetal Lead Exposure**
Tatyana Gabinsky, Claudia Cosmineanu, Dean Stefanov, Melvin Gertner. – Abstract 101

5:30 PM **Term Neonates with Hypoxic-Ischemic Encephalopathy (HIE) Treated with Selective Head Cooling (SHC) Have a Favorable Short Term Outcome Even with a Marked Delay in Onset of Sleep-Wake Cycles (SWC)**
Toshiki Takenouchi, Elayna O. Rubens, Vivien L. Yap, Murray Engel, Jeffrey M. Perlman. – Abstract 102

Neonatology III - GI/Nutrition Platform Session

4:15 PM-5:45 PM **Declaration**

Moderator: Soraya Abbasi, MD

4:15 PM **Effect of Non-Nutritive Sucking on Gastric Motility of Late Preterm Neonates**
Soraya Abbasi, Emido Sivieri, Jeffrey S. Gerdes. – Abstract 103

4:30 PM **Intestinal Barrier Development of Newborn Rats**
Eunsung Cho, Jing Lin, Cecilia Berin, Ian R. Holzman. – Abstract 104

4:45 PM ***Ureaplasma* Species Respiratory Tract Colonization: Risk Factor for NEC in VLBW Infants**
Adora C. Okogbule-Wonodi, Elise Janofsky, George W. Gross, Rose M. Viscardi. – Abstract 105

5:00 PM **Enteral Feeding Strategies in Low Birth Weight Infants: A Retrospective Analysis**
Sara B. DeMauro, Soraya Abbasi, Scott A. Lorch. – Abstract 106

5:15 PM **Feeding Progression in Preterm Infants from 40 Weeks PCA to 3 Months Corrected Age**
Barbara Medoff-Cooper, Kathleen Philbin, Toni Mancini, Soraya Abbasi. – Abstract 107

5:30 PM **Protein Safety in Extremely Low Birth Weight Infants**
Maya Balakrishnan, Richard Tucker, Bonnie E. Stephens, Joseph M. Bliss. – Abstract 108

General Pediatrics II Platform Session

4:15 PM-5:45 PM **Liberty A**

Moderator: Richard H. Schwartz, MD

4:15 PM **Impact of Clinician Computer Skill on Pediatric Primary Care Acute Visits Conducted with Electronic Health Records (EHRs)**
Alexander Fiks, Andreas Gerber, Saira Khan, Jennifer Lofland, Christopher Forrest, Evaline Alessandrini. – Abstract 109

4:30 PM **Assessment of Current Practices for Weaning Infants from Car Beds to Car Seats**
Michele DeGrazia, Ashley Wilkinson, Lawrence Rhein. – Abstract 110

4:45 PM **Predictors of Caregiver Outreach after a Disclosure of Child Sexual Abuse**
Ingrid Walker-Descartes, Danielle Laraque, Yvette Sealy, Mary Rojas. – Abstract 111

5:00 PM **Do Children's Hospitals Respond to Predictable Fluctuations in Patient Volume?**
Evan Fieldston, Matthew Hall, Marion Sills, Anthony Slonim, Angela Myers, Courtney Cannon, Susmita Pati, Samir Shah. – Abstract 112

5:15 PM **Management of Congenital Preauricular Sinus: A Survey of Members of the American Society of Pediatric Otolaryngology**
Vahe Badalyan, Richard H. Schwartz, Jonathan Weil, Robert S. Bahadori, Michael J. Sheridan. – Abstract 113

5:30 PM **Who Will Pay When I Get Out? Insurance Status of Youth in Secure Detention Centers**
Krishna White, Jennifer Maehr, Lawrence D'Angelo. – Abstract 114

Adolescent Medicine Platform Session

4:15 PM-5:45 PM **Freedom**

Moderator: Susan M. Coupey, MD

4:15 PM **Adolescent Interpersonal Violence Outcomes for Childhood Witnesses of Adult Violence in the Home**
Christine M. Forke, Rachel K. Myers, Marina Catallozzi, Abdul Salam, Abbas Jawad, Donald F. Schwarz. – Abstract 115

4:30 PM **Prevalence of *Trichomonas vaginalis* Genital Infection in a Clinical Sample of Sexually-Active Adolescent Females Using the APTIMA Trichomonas Assay (ATV)**
Dominic Hollman, Susan Coupey, Amy Fox, Betsy Herold. – Abstract 116

4:45 PM **Transgender Adolescents: Understanding Their Psychosocial Challenges and Barriers to Health Care**
Christine A. Lee, Iman Sharif, Natalie Langston-Davis. – Abstract 117

5:00 PM **Administration of Tdap Vaccine by Obstetrical Providers to Post-Partum Adolescent Mothers Aged 11-18 Years**
Corina Niculescu, David Perlstein, Michelle Ratau, David H. Rubin. – Abstract 118

5:15 PM **Follow-Up on Effects of Prenatal Cocaine Exposure on the Young Adult Brain**
Brian B. Avants, Hengyi Rao, John Pluta, Joan Giannetta, Hallam Hurt, Marc Korczykowski, James C. Gee. – Abstract 119

5:30 PM **Youth Attitudes towards Guns and Violence**
Kailash Pawar, Raluca Dobre, Fernanda Kupferman, Kanchana Roychoudhury, Rafael Javier. – Abstract 120

Pulmonary and Asthma Platform Session

4:15 PM-5:45 PM **Constitution**

Moderator: Craig M. Schramm, MD

4:15 PM **EMR Reminders Increase Influenza Immunization Rates among Asthmatic Children**
Gary A. Emmett, Gabrielle Ramirez-Garnica, Amy C. Rothkopf, Brittany Massare. – Abstract 121

4:30 PM **Gastroesophageal Reflux in Obese Children with Asthma**
Aswini Rajaram, Haeyoung Hwang, David H. Rubin. – Abstract 122

4:45 PM **Demonstration of Metered-Dose Inhaler and Spacer Administration Technique by Health Care Providers on Videotape**
Diana C. Go, Natalie Zhitelzeyf, Rusly Harsono, Patricia Visbal Edmondson. – Abstract 123

5:00 PM **Comorbidity Count and Adverse Asthma Outcomes in Children**
Alan S. Weller. – Abstract 124

5:15 PM **An Effective Care Coordination Model To Address Health Disparities for Children with Asthma in the Inner-City**
Luz Adriana Matiz, Patricia J. Peretz, Mary McCord, Sally Findley. – Abstract 125

5:30 PM **Comprehensive Use of Environmental Control Practices among Children with Asthma**
Angkana Roy, Juan Wisnivesky. – Abstract 126

Developmental Biology I Platform Session

4:15 PM-5:45 PM **Liberty B**

Moderator: Juan Sanchez-Esteban, MD

4:15 PM **Differential ErbB Pathway Activation in Murine Fetal Lung Cell Populations**
Sandy Murray, Kristina Hoeing, Lucia D. Pham, Christiane E.L. Dammann, Heber C. Nielsen. – Abstract 127

4:30 PM **Does TACE Activation Promote Type II Cell Maturation in Fetal ErbB4$^{-/-}_{heart}$ Mouse Lungs?**
Lucia D. Pham, Sandy Murray, Washa Liu, Christiane E.L. Dammann, Heber C. Nielsen. – Abstract 128

4:45 PM **Expression of Carcinoembryonic Cell Adhesion Molecule 6 (CEACAM6) in Fetal and Transformed Human Lung Cells**
Olivier Danhaive, Cheryl Chapin, Linda W. Gonzales, Jeff N. Vanderbilt, Philip L. Ballard. – Abstract 129

5:00 PM **NFkB1 (p50) Modulates Key Circadian Genes in the Mouse Lung**
Maurice D. Hinson, Guang Yang, Phyllis A. Dennery. – Abstract 130

5:15 PM **Moderate Oxygen Exposure Differentially Affects Human Fetal Lung Fibroblast Expression of Key Hox Transcription Factor Proteins**
Dina Villanueva, Marcia L. Brandao, Heber C. Nielsen, MaryAnn V. Volpe.– Abstract 131

5:30 PM **Caffeine and Vascular Development: Implications for Retinopathy of Prematurity**
Bina G. Patel, Karen Hendricks-Munoz, Curatola Anna Maria, Jie Xu. – Abstract 132

Poster Session II

6:00 PM-7:30 PM **Independence Ballroom**

1 **Pulmonary Changes in Sprague Dawley Rats Exposed to Antenatal Magnesium Sulphate**
Swati Aleti-Jacobs, Joseph Hudak, Erin Kileen, Janet Larson, Craig J Cohen, Shanthy Sridhar. – Abstract 133

2 **Simulated Medical Transport Increases Interleukin 6 and 8 Expression and Down Regulates Toll-Like Receptors 2 and 4 in the Lungs of Sprague-Dawley Rats**
Farihah Anwar, Erin Killeen, Craig Cohen, Shetal I. Shah. – Abstract 134

3 **Methemoglobin Levels and Response to Inhaled Nitric Oxide (NO) in Persistent Pulmonary Hypertension of the Newborn (PPHN)**
Sujir Pritha Nayak, Maria Janina U. Pabalan, Rita M. Ryan, Satyan Lakshminrusimha. – Abstract 135

4 **Plasticizer, Di(2-Ethylhexyl) Phthalate (DEHP) Exposure in Neonatal ECMO vs. Near-Miss ECMO Patients**
Matthew Eig, Khodayar Rais-Bahrami, Naomi Luban, Stephen Soldin, Billie L. Short. – Abstract 136

5 **Survival in Congenital Diaphragmatic Hernia: Use of Predictive Equations in the ECMO Population**
Suma Bhat, An Nguyen-Massaro, Cynthia Gingalewski, Billie Lou Short. – Abstract 137

6 **Exhaled Nitric Oxide Levels in Infants with RSV Versus Non-RSV Viral Lower Respiratory Illness**
Claudia Fernandez, Khalid Ahmad, Melodi Pirzada, Leonard Krilov, MariaLyn Quintos-Alagheband. – Abstract 138

7 **Combined Pediatric and Adult Cystic Fibrosis Treatment Programs Offer Smooth Transition Process**
Lisa K. Tuchman, Ioanna D. Kalogiros, Kimberly M. Ganster, Ronald C. Rubenstein. – Abstract 139

8 **Is a Small Platelet Mass Associated with Intraventricular Hemorrhage in Very Low Birth Weight Neonates?**
Jody L. Kohut, Amy Mackley, Robert Christensen, David A. Paul. – Abstract 140

9 **The Determination of Neonatal Brain Oxygenation Status by Near Infrared Technology**
M. Roger Kim, Harry Graber, Randall Barbour, Nidhi Rawal, Pradeep Siwach, Devaraj Sambalingam. – Abstract 141

10 **Visual Light Spectrography (VLS) for Detecting Alterations in Tissue Oxygenation with PRBC Transfusion in Very Low Birth Weight (VLBW) Neonates**
V. Bronshtein, J. Garcia Hoffman, J.M. Curry, E.F. LaGamma, B. Parvez. – Abstract 142

11 **Antenatal Smoking Does Not Increase the Risk of Postnatal Infections in Premature Infants**
Heidi Taylor, Afsheen Siddique, Judy Saslow, Vishwanath Bhat, Nosrat Razi, Barbara Amendolia, Gary Stahl, Kee Pyon, Sulaiman Sannoh, Nicole Kemble, Zubair Aghai. – Abstract 143

12 **Umbilical Artery Access: Historical Perspectives**
John Ladino. – Abstract 144

13 **Quality Initiative To Reduce Central Line Device Utilization Rates in a Level IV Neonatal Intensive Care Unit**
Martha C. Caprio, Michelle L. DeSomma, Steven A. Bock, Karen D. Hendricks-Munoz. – Abstract 145

14 **Adherence to Infection Control Protocols Can Be Improved by Re-Education Sessions and Input from Staff**
Venkata S. Majjiga, Xiaoping Wu, Sulaiman Sannoh, Barbara Clones, Boriana Parvez. – Abstract 146

15 **Rapid Detection of Early and Late Neonatal Sepsis Utilizing an Automated Blood Culture System**
Karen D. Lidoshore-Fuld, Karen Hendricks-Munoz, Yang Kim. – Abstract 147

16 **Extended-Interval Gentamicin Administration in Preterm Neonates ≤ 34 Weeks Gestational Age**
Lalithambal Venugopalan, Tingnong Supaswud, Gladys Elchaar, Susana Castro-Alcaraz. – Abstract 148

17 **Changing Incidence of Fungal Infections in a Level III NICU in US: 1990-2008**
Srinivasarao Badugu, Kingshuk Dasgupta, Dipankar Gupta, Neha Kumbhat, Roger Kim, Dominique Jean Baptiste, Myron Sokal. – Abstract 149

18 **The Effectiveness of Twice Weekly Dosing of Fluconazole on Prevention of Invasive Candidiasis in Extremely Low Birth Weight Infants**
Milliecor Fojas, Judy Saslow, Vishwanath Bhat, Sulaiman Sannoh, Barbara Amendolia, Gary Stahl, Kee Pyon, Nicole Kemble, Zubair Aghai.– Abstract 150

19 **Neurologic Manifestations Associated with Parvovirous B19 Infection**
Miltiadis Douvoyiannis, Nathan Litman, David L. Goldman. – Abstract 151

20 **The Immunomodulatory Effects of Opioids and Clonidine on Neonatal Immune Cells**
Raul Chavez-Valdez, Lara Kovell, Rajni Ahlawat, Marsha Wills-Karp, Estelle B. Gauda. – Abstract 152

21 **Effect of Massage on Methadone Exposed Infants**
Yun J. Lee, Barry Lester, Mary B. Roberts, Pauline Wright, Joseph McNamara. – Abstract 153

22 **Can Infant and Childhood Excessive Weight Gain and Obesity Be Prevented by Infant Control of Feeding?**
Herbert I. Goldman. – Abstract 154

23 **Perceptions about Exercise among Inner-City Adolescent Girls**
Sharyn H. Miskovitz, Eleanor Bathory, Sandra Braganza, Iman Sharif. – Abstract 155

24 **Depression in Adolescents – Feasibility of Effective Screening**
Sujatha Buddhe, Myron Sokal, Sherry Sakowitz. – Abstract 156

25 **The Effectiveness of Screening for Depression in Urban Adolescents**
John Rausch, William Rausch, Rachel Zuckerbrot, Karen Soren. – Abstract 157

26 **Respiratory Depression in Intoxicated Adolescents and Young Adults**
Melissa L. Langhan. – Abstract 158

27 **Birth Hyperoxia Alters Pro-Inflammatory Cytokine Expression and Downregulates Toll-Like Receptors (TLR) 2 and 4 in the Lungs of Sprague-Dawley Rats**
Erin K. Stenson, Erin Killeen, J. Craig Cohen, Shetal I. Shah. – Abstract 159

28 **Long Term Respiratory Function after Birth Hyperoxia in Sprague-Dawley Rats with Equivalent Cumulative Oxygen Exposure**
Erin K. Stenson, J. Craig Cohen, Shetal I. Shah. – Abstract 160

29 **Effect of Nitric Oxide and Hyperoxia on the Differentiation of Type II Pneumocytes**
Lindsay C. Johnston, Linda Gonzales, Harry Ischiropoulos. – Abstract 161

30 **CD8+ T-Lymphocytes in Infants with Bronchopulmonary Dysplasia (BPD)**
Rita M. Ryan, Qadeer Ahmed, Christopher A. D'Angelis, Vasanth H. Kumar, Satyan Lakshminrusimha, Leon A. Metlay, Huamei Wang, Gloria S. Pryhuber. – Abstract 162

31 **Altered Oxidative Stress: A Susceptibility Factor in Bronchopulmonary Dysplasia (BPD)**
N. Chinnakaruppan, B. Spur, T.P. Stein, B. Kunjumon, J. Savla, E. Brandsma, C. Amato-Bowden, S.-E. Lu, G. Lambert. – Abstract 163

32 **Change in Incidence of Diagnosis and Associated Hospitalization Characteristics for Neonatal Intensive Care among Patients with Bronchopulmonary Dysplasia: A National Evaluation, 1998-2005**
Annemarie Stroustrup, Leonardo Trasande. – Abstract 164

33 **Single Nucleotide Polymorphisms of Fas, Fas Ligand, and the Caspases and Bronchopulmonary Dysplasia in ELBW Infants**
Hima B. Maramreddy, Annie Yao, Chauchau Pham, Nora Ali, Mitashi Singh, Joie Fisher, Sonya Strassberg, Lance A. Parton. – Abstract 165

34 **Variability in Reported Practice Patterns for Weaning Oxygen Therapy in Former Premature Infants**
Tregony Simoneau, Kara May, Gregory Sawicki, Lawrence Rhein. – Abstract 166

35 **Tapering Outpatient Diuretic Therapy (ODT) in Patients with Stable BPD: How Long Is Too Long?**
A. Bhandari, U. Chow, J.I. Hagadorn. – Abstract 167

Sunday, March 15, 2009

Plenary Session III & Presentation of The Young Invesigator Awards

8:30 AM-9:30 AM **Liberty C**

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

8:40 AM **Plenary Lecture - Targeted Therapy for Neuroblastoma: Slaying Dragons, Chasing Windmills**
Nina Schor, MD, PhD Golisano Children's Hospital

Neurobiology Platform Session

9:45 AM-12:00 PM **Liberty B**

Moderator: Alan Zubrow, MD

9:45 AM **Kinetics of CaM Kinase IV during Hyperoxia in Neuronal Nuclei of the Cerebral Cortex of Newborn Piglets**
Nadege Brutus, Eddie Chang, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 168

10:00 AM **Effect of Src Kinase Inhibition on Phosphorylation of Cyclic AMP Response Element Binding (CREB) Protein Following Hypoxia in the Neuronal Nuclei of Newborn Piglets**
Nicholas Obiri, Qazi M. Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 169

10:15 AM **Long-Term Consequences of Germinal Matrix Hemorrhage in a Rabbit Pup Model**
Caroline O. Chua, Halima Chahboune, Krishna Dummula, Furong Hu, Charles Edrick Chua, Fahmeed Hyder, Praveen Ballabh. – Abstract 170

10:30 AM **Early Postnatal Exposure to Hyperoxia Prolongs Time to Last Gasp in Response to a Lethal Anoxic Stimulus in Newborn Rat Pups**
Raul Chavez-Valdez, Rajni Ahlawat, Clarke Tankersley, Gabrielle McLemore, Estelle Gauda. – Abstract 171

10:45 AM **Maturational Changes in Integrins in the Vasculature of Germinal Matrix, Cortex and White Matter**
Krishna Dummula, Hongmin Xu, Caroline Chua, Govindaiah Vinukonda, Muhammad T. Zia, Praveen Ballabh. – Abstract 172

11:00 AM **White Matter Magnetic Resonance Spectroscopy (MRS) of Extremely Low Birth Weight (ELBW) Infants Is Similar to Term Infants**
Erlita P. Gadin, David A. Paul, Amy Mackley, James C. Galloway, Kert F. Anzilotti, Karl Steiner. – Abstract 173

11:15 AM **Effect of Hyperoxia on DNA Fragmentation in Neuronal Nuclei of the Cerebral Cortex of Newborn Piglets**
Manjula Mudduluru, Alan Zubrow, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 174

11:30 AM **Astrocyte Phenotypic Changes Induced by Hyperoxia**
Christie J. Bruno, Todd Greco, Harry Ischiropoulos. – Abstract 175

11:45 AM **Amplitude Electroencephalogram (aEEG) Findings in Infants with Broncho-Pulmonary Dysplasia (BPD)**
Ross Sommers, Abbot Laptook. – Abstract 176

Pulmonary Development and Injury Platform Session

9:45 AM-12:00 PM **Constitution**

Moderator: Gloria Pryhuber, MD

9:45 AM **Impact of Gonadal Hormones on Surviving Klebsiella pneumoniae Infection after Ozone Exposure in Mice**
Faryal Durrani, David S. Phelps, Judith Weisz, Joanna Floros. – Abstract 177

10:00 AM **The Effects of the Catalytic Antioxidant MnTBAP and Neonatal Hyperoxia on Airway Hyperresponsiveness (AHR) in Conscious Mice**
Serguei Kishkurno, Robert C. Welliver, Sr, Karen H. Hintz, Huamei Wang, Rita M. Ryan, Vasanth H. Kumar. – Abstract 178

10:15 AM **Respiratory Function Parameters in the Peri-Surfactant Period Normalize Earlier with Increased Levels of Positive End Expiratory Pressure (PEEP) in the Sprague-Dawley Rat**
Kristin J. McKenna, Joseph Hudak, Shetal Shah. – Abstract 179

10:30 AM **A Comparison of the Effects of Short Term CPAP or Mechanical Ventilation and Moderate Hyperoxia on Cultured Human Airway Epithelial Cells**
Yan Zhu, Kevin Dysart, Thomas H. Shaffer, Aaron Chidekel. – Abstract 180

10:45 AM **Nitric Oxide Inhibits NF-κB Activation in Human Neonatal Pulmonary Endothelial Cells Exposed to Hyperoxia**
Clyde J. Wright, Tiangang Zhuang, Ping La, Guang Yang, Phyllis A. Dennery. – Abstract 181

11:00 AM **The Genetic Susceptibility to Respiratory Distress Syndrome (RDS)**
Orly L. Levit, Yuan Jiang, Matthew Bizzarro, Naveed Hussain, Catalin Buhimschi, Jeffrey Gruen, Heping Zhang, Vineet Bhandari. – Abstract 182

11:15 AM **Incidence of Respiratory Distress Syndrome (RDS) among Term and Late Preterm (LPT) Neonates**
Sean M. Bailey, Karen Hendricks-Munoz, Nicole Allen, Julie Ahn, Pradeep Mally. – Abstract 183

11:30 AM **Effects of Oscillatory Amplitudes on Respiratory Mechanics of Preterm Infants during High Frequency Oscillatory Ventilation**
Rachana Singh, Sherry E. Courtney, Mike Weisner, Robert H. Habib. – Abstract 184

11:45 AM **Predictors of Survival in Patients with Congenital Diaphragmatic Hernia (CDH) Requiring Extracorporeal Membrane Oxygenation (ECMO): CNMC 15 Year Experience**
Suma Bhat, An Nguyen-Massaro, Cynthia Gingalewski, Billie Lou Short. – Abstract 185

Developmental Biology II Platform Session

9:45 AM-12:00 PM **Freedom**

Moderator: Phyllis Dennery, MD

9:45 AM **Noonan Syndrome-Causative *PTPN11* Mutations Induce Long-Term Memory Defects in Transgenic *Drosophila* Models**
Mario R. Pagani, Kimihiko Oishi, Bruce D. Gelb, Yi Zhong. – Abstract 186

10:00 AM **Redundant Pathways for Aversive Memory Consolidation**
Melissa Murray, Ming Ouyang, Steven Thomas. – Abstract 187

10:15 AM **Mechanism of Cyclic AMP Response Element Binding (CREB) Protein Phosphorylation during Hypoxia in the Cerebral Cortex of Newborn Piglets**
Gabriela I. Mihalache, Qazi M. Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 188

10:30 AM **Mechanism of Apaf-1 Expression Following Hyperoxia in the Cytosolic Fraction of the Cerebral Cortex of Newborn Piglets**
Subhasri Sangam, Alan Zubrow, Om P. Mishra, Maria Delivoria-Papadopoulos. – Abstract 189

10:45 AM ***In Vivo* Metabolic Flux Profiling in *C. elegans* Mitochondrial Mutants**
Marni J. Falk, Meera Rao, Julian Ostrovsky, Evgueni Daikhin, Ilana Nissim, Itzhak Nissim, Marc Yudkoff. – Abstract 190

11:00 AM **How Do Gestational Age and Gender Affect miRNA Expression Profiles in Developing Lung?**
Sana Mujahid, MaryAnn V. Volpe, Heber C. Nielsen. – Abstract 191

11:15 AM **Function of microRNAs in Human Fetal Lung Epithelial Cell Differentiation**
Tiangang Zhuang, Linda Gonzales, Qing S. Lin. – Abstract 192

11:30 AM **Characterization of the Lung Mesenchyme-Specific Dermo-1Cre Conditional PTHrP Knock out Phenotype**
Ding Wei, Shi Wei, Virender K. Rehan, John S. Torday. – Abstract 193

11:45 AM **Leptin Stimulates Xenopus Tadpole Lung Development**
John S. Torday, Kaori Ihida-Stansbury, Virender K. Rehan. – Abstract 194

Neonatology IV - Clinical Studies Platform Session

9:45 AM-12:00 PM **Liberty C**

Moderator: Ivan D. Frantz, MD

9:45 AM **The Illusion of the Best Interest Principle**
Kirstie R. Marcello, Kim Lampron, John L. Stefano, Keith J. Barrington, Amy B. Mackley, Annie Janvier. – Abstract 195

10:00 AM **A Randomized Phase 1 Trial of Four Thyroid Hormone Supplementation Regimens for Transient Hypothyroxinemia in Neonates < 28 Weeks Gestation: The THOP 1 Trial**
Edmund F. LaGamma, Aleid G. vanWassenaer, Susana Ares, Joke H. Kok, Jose Quero, Gabriella Morreale de Escobar, Sergio G. Golombek, Ting Hong, Mohammad H. Rabhar, Delbert A. Fisher, Nigel Paneth. – Abstract 196

10:15 AM **Use of near Infrared Spectroscopy (NIRS) as a Tool To Determine the Need for Blood Transfusion in Preterm Neonates**
Sean M. Bailey, Karen Hendricks-Munoz, John T. Wells, Pradeep Mally. – Abstract 197

10:30 AM **Variability in Regional Cerebral and Splanchnic Tissue Oxygenation during Blood Transfusions in Preterm Neonates Using Near Infrared Spectroscopy (NIRS)**
Sean M. Bailey, Karen Hendricks-Munoz, John T. Wells, Pradeep Mally. – Abstract 198

10:45 AM **Utilization of Cerebral Magnetic Resonance Imaging (MRI) and Ultrasonography (US) in Diagnosis of Neonatal Neuropathology**
Radha N. Ekbote, Rajeev Mehta, Anna Petrova. – Abstract 199

11:00 AM **Increased Susceptibility of Neonates to Phthalate-Induced Inflammatory Toxicity**
Anna M. Vetrano, Faith E. Archer, Kirin Syed, Nkiru Nwebube, Joshua P. Gray, Debra L. Laskin, Barry Weinberger. – Abstract 200

11:15 AM **Timing of Antenatal Steroid (AS) Administration Modulates Postnatal Blood Pressure (BP) and Inotrope Use in Premature Infants**
Zachary H. Ibrahim, Joseph Schulman, Jeffrey M. Perlman. – Abstract 201

11:30 AM **Restricted Diffusion Changes (RDC) in the Splenium of Corpus Callosum (SCC) Are Common Findings and Associated with Unfavorable Outcomes in Term Neonates with Hypoxic-Ischemic Encephalopathy (HIE)**
Toshiki Takenouchi, Linda A. Heier, Murray Engel, Jeffrey M. Perlman. – Abstract 202

11:45 AM **Diffuse Correlation Spectroscopy Reveals That Cerebrovascular Autoregulation Is Intact in Preterm Infants Undergoing a Postural Challenge**
Noah Cook, Erin Buckley, Turgut Durduran, Meeri Kim, Chou Zhou, Chandra Sehgal, Peter Arger, Hallam Hurt, Arjun Yodh. – Abstract 203

General Pediatrics III Platform Session

9:45 AM-12:00 PM **Liberty A**

Moderator: David Rubin, MD

9:45 AM **Developmental Screening and Surveillance – Residents' Knowledge and Implementation of Current AAP Guidelines**
Kapil Arya, Kanchana RoyChoudhury, Fernanda Kupferman, Susana Rapaport. – Abstract 204

10:00 AM **What Do Pediatric Residents Know about Medical Malpractice?**
Amy Roy, Lei Chen, Karen Santucci. – Abstract 205

10:15 AM **Resident-Led Quality Improvement Effort Succeeds in Increasing Medication Ordering Compliance**
Samantha Fish, Kathleen Donnelly. – Abstract 206

10:30 AM **Measuring the Evolution of Parental Grief after Sudden Infant Death**
Barbara M. Ostfeld, Joan Arnold, Michael Corwin, Sheila Coutant, Linda Esposito, Danita Hall, Evelyne Longchamp, Mary McClain, Linda Cushman, Thomas Hegyi. – Abstract 207

10:45 AM **Parental, Practice and Community Factors Affecting Return for Immunization Visits**
Melissa S. Stockwell, Sally Findley, Raquel A. Martinez, Matilde Irigoyen. – Abstract 208

11:00 AM **Camphor: An Ongoing Public Health Concern for Children**
Alfredo A. Maldonado, Jeffrey R. Avner, Swapnil N. Rajpathak, Hnin Khine. – Abstract 209

11:15 AM **Do Mothers of NICU Babies Understand Delivery Risks?**
H.L. Brumberg, A. Chill, C. Hunter-Grant, J. Lund, J. Joymon, D. Tahara, D. Viola. – Abstract 210

11:30 AM **Factors Contributing to Parental Stress in a Neonatal Intensive Care Unit (NICU)**
Kristin C. Voos, Gail Ross, Mary J. Ward, Anne-Lise Yohay, Jeffrey Perlman. – Abstract 211

11:45 AM **Are Birth Certificate Data Really Accurate?**
H.L. Brumberg, D. Dozor, A. Pluzyczka, C. Nugent, S. Marchwinski, A. Lakhkar, S. Golombek. – Abstract 212

Endocrinology/Metabolism Platform Session

9:45 AM-12:00 PM **Declaration**

Moderator: Lorraine Katz, MD

9:45 AM **Partial Cholinergic Nicotinic Agonists as Adjunctive Therapy To Preserve Epinephrine (Epi) Responses during Recurrent Hypoglycemia**
Dumitru S. Turcanu, Bistra Nankova, Edmund F. LaGamma. – Abstract 213

10:00 AM **Bedside Blood and Plasma Glucose Measurements in Diabetic Ketoacidosis (DKA)**
David F. Rodriguez, Maria L. Quintos-Alagheband. – Abstract 214

10:15 AM **Norms for Advanced Glycation End-Products Via Auto-Fluorescence in Healthy Children**
Radhika Purushothaman, Amrit Bhangoo, Sunil Sinha, Oswaldo Aguirre, Kate Pavlovich, Michael Rosenbaum, Deborah DeSantis, Lisa Altshuler, Steven Shelov, Svetlana Ten. – Abstract 215

10:30 AM **Maternal Response to High Fat Diet Programs Fetal Growth**
Harpreet Kaur, Patricia Vuguin, Maureen J. Charron, Kirsten Hartil, Michael Kruse, Ariana Fiallo, Amy Anzovino. – Abstract 216

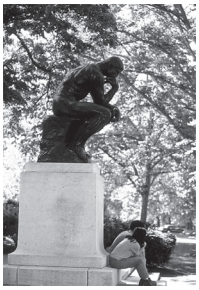
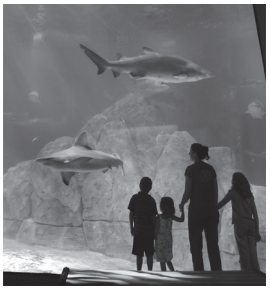
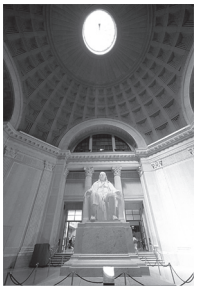
10:45 AM **Obesity Prevention, Screening and Treatment – Current Practices of Pediatric Providers**
John Rausch, Emily Rothbaum, Patricia Hametz. – Abstract 217

11:00 AM **Cues to Action, Adolescent Version**
Alexis S. Lieberman, Arlene Terras, Sherry C. Pomerantz. – Abstract 218

11:15 AM **Prevalence of Vitamin D Deficiency in Lean as Compared to Obese Children**Radhika Purushothaman, Amrit Bhangoo, Sunil Sinha, Oswaldo Aguirre, Kate Pavlovich, Michael Rosenbaum, Deborah DeSantis, Lisa Altshuler, Steven Shelov, Svetlana Ten. – Abstract 219

11:30 AM **Screening of Anemia in 2 Year-Old Children: Role of Weight Disparities**
Adriana M. Rojas, Fazlul Yusef, Roberto Rojas, Fernanda Kupferman, Susana Rapaport. – Abstract 220

11:45 AM **Goals Set by Teen Weight Loss Club Website Users**
Alexis S. Lieberman. – Abstract 221

2009 ESPR Abstracts

Poster Session I

Friday, March 13, 2009
6:00 PM-7:30 PM

1 Fellow in Training

Economic Disparities in the Use of Environmental Control Practices among Children with Asthma

Angkana Roy, Juan Wisnivesky.
Departments of Pediatrics and Community and Preventive Medicine, Mount Sinai School of Medicine, New York, NY; Department of Medicine, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Asthma is one of the most common chronic diseases of childhood with disproportionately high rates among low-income children. Environmental triggers play a significant role in asthma morbidity, and environmental control practices (ECPs) have been shown to improve asthma control. Little is known about potential barriers to adopting ECPs among asthmatics. Previous studies have not shown any demographic predictors of use.

OBJECTIVE: To assess the influence of household income level on the use of certain ECPs among children with asthma.

DESIGN/METHODS: Data was gathered on 2003 children ages 0-17 years with asthma through the CDC's National Asthma Survey from 2003. Information was collected on use of air filters, dehumidifiers, and mattress/pillow covers. Univariate and multivariate analyses were performed to examine the association between income level and use of these ECPs.

RESULTS: Only 4.5% of children used all four ECPs regularly. 31% used an air filter, 22% used a dehumidifier, 27% used mattress covers, and 26% used pillow covers. The use of both mattress and pillow covers was positively associated with household income level >$75,000 (OR= 1.4, $p<0.05$) in a model adjusted for sex, race, gender, metropolitan statistical area, insurance status, MD advice, number of routine asthma MD visits, others in the house with asthma, and asthma severity. Conversely, use of air filters and dehumidifiers was not significantly associated with income in multivariate models.

CONCLUSIONS: Although it is known that control of environmental triggers is crucial in the management of asthma, the majority of patients in this national sample did not use ECPs. Income appears to be a barrier to the use of mattress and pillow covers, suggesting that making these ECPs more accessible, for example through insurance reimbursement, may ultimately lead to increased use and therefore improved asthma morbidity.

2 House Officer

Parental Observations with Levalbuterol Use in Children

Chee Chun Tan, Archana Singh, Melodi Pirzada.
Pediatric Pulmonary, Winthrop University Hospital, Mineola, NY.

BACKGROUND: Levalbuterol is the R-enantiomer of racemic albuterol. It has been promoted as being more efficacious and with fewer adverse effects than racemic albuterol. Nevertheless, recent randomized controlled trials showed no differences between the two in terms of clinical outcome and their adverse effects in the pediatric population thus many hospital pharmacies prefer the usage of racemic albuterol.

OBJECTIVE: The purpose of this study is to determine the prevalence of asthmatic children whose short acting β2 agonists (SABA) has been changed from racemic albuterol to levalbuterol and describe the reasons behind their change.

DESIGN/METHODS: This is an independent descriptive, exploratory cross-sectional study involving a questionnaire distributed to parents or caretakers of children between 3 and 11 years old with asthma seen at Winthrop Pediatric Associates Pulmonary Clinic in Mineola, New York.

RESULTS: A total of 111 children participated in our survey with a mean age of 6 years. 60 (54 %) of them stated that their SABA had been changed from racemic albuterol to levalbuterol. Of the 60, 45(78 %) reported levalbuterol to have less side effects while 20(35 %) reported it to have worked better. In regards to the adverse effects, the participants noted racemic albuterol was associated with increased in heart rate with a mean severity score of 3.15 (0 = absent;1 = mild; 3 = moderate; 5 = severe), increased energy level and hyperactivity (2.4), increased restlessness (1.91), body trembling (1.34) and decreased ability to concentrate (1.21). Increased nervousness and body trembling were found to be significantly more severe with increasing age ($r = +0.28$, $p=0.03$; $r = +0.33$, $p=0.01$ respectively).

CONCLUSIONS: Multiple studies have shown no differences between racemic albuterol and levalbuterol in clinical outcomes and adverse effects. Nevertheless, our study found that the majority of parents reported levalbuterol had less side effects and worked better. This perception may affect their compliance on the use of racemic albuterol and may influence physicians' decision to prescribe levalbuterol over racemic albuterol.

3 Fellow in Training

Physician Views on Incentives-for-Adherence in Childhood Asthma

Evan Fieldston, Andrea Puig, Judy Shea, Susmita Pati, Joshua Metlay.
University of Pennsylvania SOM; Wharton School University of Pennsylvania.

BACKGROUND: Asthma is the most common chronic illness of childhood & leading cause of hospitalization, with costs of billions of dollars. Adherence rates to medications & disease maintenance activities are very low. Multiple approaches have been tried to improve adherence, with mixed results. Providing incentives-for-adherence (I4A) to parents has had limited consideration.

OBJECTIVE: Assess physician views regarding appropriateness & effectiveness of I4A in childhood asthma.

DESIGN/METHODS: Cross-sectional, web-based anonymous survey of ~1200 Pennsylvania physicians in general pediatrics, pediatric pulmonology, pediatric emergency medicine, pediatric critical care, and allergy.

RESULTS: 329 physicians (30%) responded, reflecting demographics and practice patterns of state's physicians. Overall, 61% said I4A would be appropriate and 77% effective. Half said I4A would be appropriate & effective; 12% said I4A would be inappropriate & ineffective (and did not answer all follow-on questions). Majority favored linking I4A to 4 activities and favored only 1 incentive-delivery method.

Table 1: Endorsement of I4A targeted activities and delivery methods

Activities to incentivize	%
Asthma check-up appointments	85
Annual flu shot	78
Refill of controller medication(s)	71
Proven adherence to controller medications with electronic home monitoring	58
Initial pickup of controller medication(s)	48
Less ED use	36
Refill of beta agonist	35
Less hospital admission	27
Less oral steroid use	20
Performance in pulmonary function tests	20

Methods to deliver incentives	%
Refund of copayment(s)	71
Accruing points that can be traded in for gifts	35
Gift card(s)	32
Gift(s)	20
Accruing points that can be traded in for cash	17
Cash	15
None of above or Opposed	6
Low-expected value daily lottery	5

]41% said incentives should be valued at ≤$20/month and 66% said all patients with asthma should be eligible. Majority of respondents did not think incentives would threaten patient/parent autonomy, undercut social fairness, or interfere with patient-doctor relationships. 56% said I4A would improve asthma outcomes; 33% were uncertain. Bivariate and regression analysis did not reveal any substantial differences in reported attitudes by physician demographic or practice characteristics.

CONCLUSIONS: Majority of physicians viewed I4A in childhood asthma as appropriate & effective, but some had reservations about the specific design. Certain approaches were favored over others, particularly those emphasizing prevention, but not those that could lead to adverse outcomes, such as avoiding emergency care. A parallel survey will be undertaken to understand parents' views to aid in design of a pilot program of I4A.

4 Research Assistant

Innovative Way To Improve Asthma Severity Documentation in the ED

John M. Corsi, Marvin C. Culbertson III, Sharon R. Smith.
Emergency Medicine, Connecticut Children's Medical Center, Hartford, CT; Pediatrics, University of Connecticut School of Medicine, Farmington, CT.

BACKGROUND: Subjective measures of asthma severity can have significant variability. The Modified Pulmonary Index Score (MPIS), a validated measure of asthma severity, is used at our institution. Severity documentation is important to: determine appropriate therapy, determine response to therapy, and facilitate communication among providers. Audits of 2000-5 paper charts revealed that only 49% of ED charts had MPIS documented. The move to an electronic medical record (EMR) provided an opportunity to improve asthma severity documentation. A specific MPIS template was developed for the ED EMR.

OBJECTIVE: Improve ED nurse and physician documentation of asthma severity.

DESIGN/METHODS: We developed a simple template to document MPIS for the EMR. The template was inserted into 4 areas where nurses and respiratory therapists (RN) document respiratory assessments and asthma therapy. Six months later the same template was inserted in the physician's (MD) physical examination section of the EMR. We audited all ED charts for one month before and after the template insertion for both groups. Inclusion criteria were: 2 or more years of age, final diagnosis of asthma, signs of an acute exacerbation, and receipt of at least one β agonist. Documentation was deemed present if MPIS was specifically stated or the template was used. MPIS docmentation was measured by provider (RN or MD). Basic demographic information was collected as well as length of stay (LOS) and disposition.

RESULTS: 370 charts were audtied, 118 for RNs and 252 for MDs. Children in all groups were similar: age (7.1 yrs), gender (59% boys), race (46% Hispanic) and insurance (66% Public). For RNs: MPIS before template was 53.6% and 50.0% after, p=0.71. For MDs: MPIS before template was 39.2% and after 76.3%, p<0.01. 100% of children admitted to the ICU had MPIS documented by RN or MD, compared to 96.3% admitted to the floor and 67.8% discharged (p=0.02). LOS was longer for children with RN MPIS documented before (239min vs 157min, p<0.01) and after template (195min vs 152min, p=0.02).
CONCLUSIONS: MPIS template was inserted into an area that is always used by MDs. This is the most likely reason MD documentation improved. RNs had to locate asthma specific assessment or treatment areas to find the MPIS template. We believe this is the reason RN documentation did not improve. Children admitted had much higher rates of MPIS documentation than children discharge. Perceived asthma severity appears to affect documentation.

5

Complementary/Alternative Medicine Use among Children Hospitalized with Asthma

Bernice M. Vicil, Sandra F. Braganza, Iman Sharif.
Pediatrics, Children's Hospital at Montefiore/AECOM, Bronx, NY; Pediatrics, Nemours/AIDHC, Wilmington, DE.

BACKGROUND: Multiple studies have illustrated that patients with chronic illness have high prevalence rates of complementary/alternative medicine (CAM) use. In a previous study of children with asthma in the outpatient setting, we found that 89% used CAM. Little is known about CAM use among patients hospitalized for asthma.
OBJECTIVE: To determine the prevalence of CAM use among children hospitalized with asthma.
DESIGN/METHODS: We conducted an anonymous cross-sectional survey of parents of children admitted for asthma at an urban tertiary care center, between Oct 2007-Feb 2008. Patients with an admitting diagnoses of asthma were selected by viewing the hospital's computer system. A bilingual investigator interviewed parents regarding: their child's CAM use over the past year, who introduced them to CAM, their perceived efficacy of CAM methods used, and whether they had discussed CAM use with their child's pediatrician. We also asked questions about asthma symptoms and demographics. Frequency of symptoms was used to classify each child's asthma severity. Univariate analysis tested for differences in CAM use by demographic characteristics. Pearson's chi-square analyses were used to test differences in CAM use among asthma severity groups.
RESULTS: Of 625 patients with asthma admitted during the study time, 100 (16%) parents were surveyed. Of these, 60% were Caribbean/Central American; 29% African American. Mean age of the child was 6, mean parental age was 33. Overall, 92% of parents reported treating their child with CAM. The most common types of CAM used were: Vicks VapoRub (43%), prayer (43%), and massage (22%). CAM was perceived as efficacious by 81% of parents, but only 6% of them reported discussing its use with their child's medical provider. Respondents from Caribbean/Central American backgrounds were more likely than their African-American counterparts to report CAM use for their children (82% vs. 59%; p=0.03). CAM use was also higher for children with persistent asthma than for those with mild intermittent asthma (83% vs. 17%; p=0.029). 91% of parents surveyed were introduced to CAM by a family member or friend.
CONCLUSIONS: In this study, we found a higher prevalence of CAM use among children hospitalized with asthma as compared to studies conducted in outpatient settings. Similar to findings in the outpatient setting, few parents discussed CAM with their child's doctor. Inquiry about CAM in the inpatient setting may help pediatricians enhance asthma care and management.

6

Pediatric Resident

Knowledge, Attitudes and Practices of Caretakers Concerning Respiratory Infections in Their Children

Ana Valdes Roque, Fernanda Kupferman, Apostolis Tsoumpariotis, Humberto Martinez Canalejo.
Pediatrics, Flushing Hospital Medical Center, Flushing, NY; Biosthatistics, Superior Institute of Medicine, Havana, Cuba.

BACKGROUND: Acute respiratory infections (ARI) occupy a prominent role in the morbidity and mortality of children.
OBJECTIVE: To assess the knowledge, attitudes, and practices (KAP) of caretakers regarding ARI in our community in relation to their educational level, age, relationship to child, number of children, marital status, nationality, ethnicity, language, employee status, employment as a health care worker, and child's age.
DESIGN/METHODS: A descriptive, observational, cross-sectional study. A 22 question-survey was used to assess the caretakers' demographic data and their KAP. The educational levels were divided in: **Low:** 9th grade or less, **Middle**: higher than 9th grade, associate degree or incomplete college, and **High:** College graduate or higher. KAP were classified in three levels: **I:** scoring at least 50%, **II:** achieving at least a 60% score, and **III** 70% or more. The risk of children were classified according to their caretaker's KAP as: **Lower:** scoring ≥70%, **Middle**: scoring 51 to 69%, and **Higher**: scoring 50% or less. **Statistical analysis**: Percentages, mean, and standard deviation were used for descriptive analysis; Chi-squares (habitual and for trend) were done to assess relationships between variables and educational levels and KAP using a MedCalc software. We considered P values <.05 as statistically significant.
RESULTS: One hundred and fifty subjects participated in the study. KAP scores of ≥70% was not reached by any of the caretakers. KAP scores ≥60% were achieved by only 10% and KAP scores ≥50% by 39% of them.KAP scores of <50% were obtained by 61% . There was a positive relationship between KAP and caregivers' educational levels (Level I P=.0009; Level II, P=.004), ethnicity (Level I P=0.03; Level II P=.003), caretakers' age (Level I P=.008; Level II P=.04), marital status (Level II P=.04), and language (level II P=.02). All our children have been at risk, **Higher** (61.3%), **Middle** (38.7%), **Lower** (0%). The percentage of children in the Higher Risk had less educated parents(X^2=14.1, P=.0009; X^2 for trend=12.8, P=.0003).
CONCLUSIONS: Our community demonstrated a lower than desired level in KAP scores regarding ARI. The level of education, age, marital status, ethnicity, and language of caretakers influenced their KAP scores. Less educated parents, younger than 25 years, unmarried, Black (no Hispanic) and non-English speaking can increase the risk of their children to an incorrect management of an ARI.

7

How Parents' Experiences at Immunization Visits Affects Child Immunization Status

Melissa S. Stockwell, Sally Findley, Raquel A. Martinez, Matilde Irigoyen.
Division of General Pediatrics, Columbia University, New York, NY; Dept of Population and Family Health, Columbia University, New York, NY; Dept of Pediatrics, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: Few, if any, studies have looked at how parents' previous immunization experiences affect their child's immunization status.
OBJECTIVE: To assess the association between immunization experiences and underimmunization.
DESIGN/METHODS: 392 parents of children ≤36 months completed surveys about immunization experiences and provided their child's immunization record. Families were interviewed at community health centers, hospital based clinics, private practices and community based organizations in New York City. Families rated their satisfaction with the last two immunization visits on a scale of 0-10, and gave the reasons for that rating. Responses were field coded. Immunization data was abstracted from parental held card, patient chart, and/or immunization registry. The primary outcome was child not up to date on past immunizations for the age appropriate 4:3:1:3:3:1 series. The main dependent variable was negative previous immunization experience(s) (0- 5 rating). Multivariate analysis was used to control for maternal education, insurance and presence of WIC benefits as a socioeconomic marker.
RESULTS: 94% of children had a regular doctor; 65% were Latino, 25% AA; 76% had Medicaid, 21% private insurance. The majority of families (83%) did not report a previous negative immunization experience. Children in families who reported a negative experience were twice as likely to have been underimmunized (AOR 2.20 95%CI 1.1,3.6). After stratifying by race/ethnicity, this relationship was only positive for Latinos (AOR 2.2 95%CI 1.1,4.5). Over half of responses indicated that practice factors were associated with negative ratings including medical/administrative staff attitude (31.7%) and waiting time (25%). Child's emotional/physical reaction (39.4%) was also a factor, as was the importance of staff paying attention and taking time to explain (3.9%). Responses for Latinos were similar, but with an even greater weight on the importance of medical/administrative staff attitude (37.3%) and waiting time (26.7%), and less on the child's reaction to the immunization (32%). Staff paying attention and taking time to explain (4.0%) was similar.
CONCLUSIONS: Previous immunization experiences were associated with underimmunization, suggesting a potential impact on children returning for immunizations. Strategies improving family satisfaction with immunization visits may lead to improved immunization delivery. CDC/NIP grant: U01 IP000086.

8

Effectiveness of Influenza Vaccine Given to Pregnant Women in Preventing Hospitalization in Their Infants

Issac Benowitz, Kristina DePeau, Daina Esposito, Eugene D. Shapiro, Jeffrey S. Kahn, Marietta Vazquez.
Pediatrics, Yale University School of Medicine, New Haven, CT.

BACKGROUND: Influenza is a major cause of serious respiratory disease in pregnant women and of hospitalization in their infants. Although influenza vaccine is recommended during pregnancy, no vaccine is approved for infants <6 months; preventive strategies for this age group include general infection control and vaccination of close contacts. Vaccinating pregnant women is believed to confer passive immunity against influenza to infants; however the strategy's effectiveness is unknown.
OBJECTIVE: Does vaccinating pregnant women with influenza vaccine prevent hospitalization in their infants?
DESIGN/METHODS: We are conducting a matched case-control study of the effectiveness of immunization of pregnant women in preventing hospitalization in infants. Cases are infants hospitalized with influenza whose severity of disease is determined with a standard scale. Controls are infants negative for influenza, matched to the cases by age and date of hospitalization. Parents are interviewed to determine risk factors for influenza infection. Medical records of infants and mothers are reviewed to determine prior vaccination for influenza. Nasal samples are collected from cases to compare influenza strains circulating to those in the vaccine for each season by PCR analysis.
RESULTS: From 2000-present, we have enrolled 139 cases and 124 controls. Groups were comparable in most demographic characteristics, with differences in race (23% vs. 5% African American, p <0.001), breastfeeding (57% vs. 68%, p = 0.071), and birth defects (4% vs. 12%, p = 0.010). There were no significant demographic differences between vaccinated and non-vaccinated mothers. Thus far, infants >/= 6 months, 17.9% of controls and 6.5% of cases received influenza vaccine (p = 0.010). Of the pregnant women 3/88 cases (3.4%) and 12/73 controls had received influenza vaccine (16.4%, p=0.005). The effectiveness of influenza vaccine given during pregnancy in preventing hospitalization in their infants was 76.1% (95% CI 0-94.8%, p = 0.067) for all infants, 73.1% (95% CI 0-94.3%, p = 0.098) for all non-vaccinated infants, and 87.2% (95% CI 0-98.4%, p = 0.053) for infants under 6 months of age. No protective effect was found for children over 6 months old.
CONCLUSIONS: Influenza vaccine administered to pregnant women reduces hospitalization of their infants < 6 months of age.

9

Administration of Tetanus, Diptheria and Acellular Pertussis Vaccine (Tdap) to Parents of NICU Patients Secondarily Increases Health Care Worker Vaccination Rates

Shetal Shah, Farihah Anwar.

Neonatology, Stony Brook University School of Medicine, Stony Brook, NY.

BACKGROUND: Tetanus, Diphtheria, and Acellular Pertussis (Tdap) vaccine is indicated for healthcare workers (HCWs), particularly those who work with children less than 1 year of age. However, the vaccination rate in this population is estimated at 11%. We implemented a program for the administration of Tdap, targeted at parents of neonatal intensive care unit (NICU) patients.

OBJECTIVE: The determine the secondary effect of Tdap availability in the NICU on immunization rates of neonatal HCWs.

DESIGN/METHODS: For four months in 2007, parents of NICU patients were medically screened and if eligible, administered Tdap. Implementation of the program included education about the risks/benefits of vaccination and the effects of pertussis on preterm infants. Neonatal HCWs were similarly screened and vaccination was available to the staff 20hours/day in the NICU to be administered by other HCWs with no added staff. Data on past vaccination history and co morbidities were compiled. Subjective educational data on HCWs knowledge about Tdap before and after the vaccination program was also compiled (0-10 Scale). Data on past immunization history, co-morbid conditions, time of vaccination, adverse reactions and reasons for deferral were obtained.

RESULTS: During the study period, 118 neonatal HCWs were screened; 83 (70%) were vaccinated in the NICU compared with 13 (11%) prior to the implementation of the program ($p<0.02$, Student's T-test). This group included 100% of physicians, 80% of respiratory therapists, and 66% of nurse practitioners/nurses. Twenty-two (19%) of HCWs deferred vaccination, the majority of which were nursing staff. The most common reason for deferral was "risk of side effects." The self-reported knowledge scores for all HCWs increased by 30.2% at the end of the program. Scores for those who obtained vaccination were greater than those who deferred (3.29 vs. 2.23, $p<0.05$ using Student's T-test).

CONCLUSIONS: Administration of Tdap in the NICU to parent secondarily increases HCW vaccination rates and is an effective, though passive means of increasing knowledge of Tdap vaccination. To further increase immunization rates, educational efforts should be nursing focused, emphasizing the risks of vaccine side-effects versus the benefit of disrupting transmission to neonates.

10 Fellow in Training

Effectiveness of Rotavirus Vaccine in Preventing Hospitalization of Young Children

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BACKGROUND: Rotavirus vaccine is recommended for routine use in US infants to prevent rotavirus gastroenteritis (RGE). The efficacy of rotavirus vaccine (RV) as used in everyday practice, also referred to as effectiveness, in children is unknown.

OBJECTIVE: The primary aim of the study is to assess the effectiveness of RV in preventing hospitalization of children 8 weeks - 3 years. Secondary aims include assessing the effectiveness of RV by severity of illness, by number of doses given, by type of vaccine given, among different risk groups, and against vaccine and non-vaccine serotypes, as well as assessing for relationship between rotavirus viremia and severity of illness.

DESIGN/METHODS: We are conducting a matched case control study. Cases are vaccine-eligible children 8 weeks - 3 years of age, admitted due to lab-confirmed RGE. Cases are matched to 2 different controls. Control group (CG) #1 are children hospitalized for reasons other than RGE matched by age and time of presentation. CG #2 are non-hospitalized children matched by age and medical practice. Prior immunization with RV is determined by medical record review (MRR). Severity of RGE is determined using a validated clinical severity score (0-24). A rotavirus specific RT-PCR technique is used to serotype both stool and blood samples. Vaccine effectiveness (VE) estimates are calculated from the matched odds ratios and adjusted for confounders using conditional logistic regression.

RESULTS: This study is ongoing. We have enrolled 102 cases and 147 controls.Of vaccine eligible children, whose charts underwent MRR, 7% of cases (2/28) and 32% of controls (12/37) received at least one dose of RV ($p=0.016$). Groups did not differ in co-morbidities, medication use, prematurity, daycare attendance, or socioeconomic status indicators. Of controls, 65% were breast-fed (>1 month) but only 50% of cases were breastfed ($p=0.012$). Controls hospitalized for non-rotavirus gastroenteritis had less severe disease on the severity scale than did cases, 9.3 ± 4.2 vs 12.9 ± 3.8, with 4% of controls and 19% of cases falling into the most severe category (>16 out of 24, $p=0.015$). Initial RT-PCR results have shown the presence of G1, G2, and G3 serotypes in stool samples. Preliminary VE against hospitalization with RGE in eligible children receiving at least one dose of RV was 86.8% (95% CI 0-98.4%, $p=0.063$).

CONCLUSIONS: We conclude that RV is effective in preventing hospitalization in children.

11 Fellow in Training

Ethnic Disparities in Influenza Vaccination Coverage for Latino Children Aged 7-36 Months

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BACKGROUND: Although disparities in influenza vaccination have been shown for Latino children, it is unclear if low influenza vaccination rates in this population are attributable to risk factors associated with poor immunization coverage such as access to care, socioeconomic status and insurance status.

OBJECTIVE: To examine the role of known risk factors for underimmunization, including access to care, on receipt of influenza vaccination between Latino and non-Latino children aged 7-36 months.

DESIGN/METHODS: Secondary data analysis was performed using a survey assessing parental immunization experiences and immunization status. The study sample was limited to children aged 7- 36 months, between November 2007 and March 2008, whose caregivers gave consent to review available immunization records (n= 266). The outcome of interest was receipt of ≥ 1 influenza vaccination. The main independent variable was Latino ethnicity. Chi square analysis was performed for the variables of interest. Multivariate analysis was then used to control for underimmunization risk factors affecting access including absence of insurance in the last 12 months, absence of a regular doctor and receipt of WIC benefits as a socioeconomic marker.

RESULTS: 67% of children were Latino, 22% black and 11% white. 76% had Medicaid and 93% had a regular doctor. Latino versus white race/ethnicity was associated with decreased receipt of influenza vaccination (47% vs 92%; $p < 0.000$). Adjustment for covariates did not diminish this relationship between Latino ethnicity and increased risk of influenza underimmunization (RR 7.8; 95%CI:1.14,54.2).

CONCLUSIONS: Young Latino children in this study were less likely than their non-Latino counterparts to receive even one dose of influenza. This significant disparity appears to be unaffected by some markers of access to care and poverty known to be associated with poor immunization coverage. Therefore, in order to improve influenza vaccination rates in Latino children, further investigation assessing other contributory factors to this underimmunization, such as parental attitudes and beliefs concerning influenza vaccination, is warranted.

12 Medical Student

Is HPV Vaccine Being Given on Time? An Inner-City Center's Experience

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BACKGROUND: The quadrivalent HPV vaccine has a recommended schedule of three doses at 0, 2, and 6 months, although immunogenicity has been documented with delayed administration, up to one year. Completion of the series on time represents a challenge for practices, particularly in the inner city.

OBJECTIVE: To measure the actual HPV vaccine delivery performance in an inner city hospital-based pediatric and adolescent center, using a modified schedule.

DESIGN/METHODS: We conducted a retrospective survey at a hospital-based pediatric and adolescent center providing primary care and family planning services. To be consistent with the center's established visit schedule, HPV vaccine doses were to be given at medically and family planning indicated visits. The study population included all teen and preteen patients receiving their first HPV vaccine dose between 2/07 and 4/08. Vaccine administration data were followed through 10/30/08. Data source included the center's vaccine logs.

RESULTS: The study population included 555 girls: 83% were teens (13-21 y/o), 17% were preteen (9-12 y/o); 95% were African American, 85% had capitated Medicaid, 15% were provided services under a Family Planning grant. Of the total population, 7% completed the 3-dose series by 6 months, 22% received only 2 vaccines. Among the teen group, 6% had 3 vaccines (range 72-331 days to completion of series, median 193 days), and 21% had only 2 vaccines. Of the pre-teen girls, 12% had 3 vaccines (range 183-440 days, median 350 days), while 25 (27%) had only 2 vaccines. Of the 432 girls followed for at least a full year, 8% completed the series (range 72- 505 days, median 210 days).

CONCLUSIONS: HPV vaccine delivery performance in an inner city hospital-based pediatric and adolescent center showed a small proportion of girls completed the HPV 3-dose series within the year. Challenges to timely completion of HPV vaccine in inner city practices need to be identified to develop effective vaccine delivery strategies. Because the majority of patients have not completed the series within a year, further immunogenicity studies are required.

13 House Officer

An Assessment of the Current State of Palliative Care Education in Pediatric Hematology/Oncology Fellowship Training

Roth Michael, Kim Mimi, Moody Karen.

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BACKGROUND: Despite improved survival rates for pediatric oncology patients, childhood cancers continue to be the number one cause of non-accidental death in children. Studies show that many children receiving end of life care, and their families, believe that physicians can improve significantly upon many areas of palliative care. These studies have led to the recommendation of increased palliative care training for physicians taking care of terminally ill pediatric patients.

OBJECTIVE: To assess the state of palliative care education in fellowship training programs in pediatric hematology/oncology.

DESIGN/METHODS: We designed a 28 question survey and sent it via electronic mail to all 66 pediatric oncology fellowship program directors in the United States. The questionnaire focused on the amount of palliative care education pediatric oncology fellows currently receive.
RESULTS: Thirty four pediatric oncology program directors responded to the survey for a 52% response rate. Ninety four percent of all respondents reported that it is very important or extremely important for pediatric oncology fellows to learn about palliative care during their training. Seventy one percent of fellowship training programs do not currently have a palliative care curriculum and less than one third of training programs have any evidence based journal clubs devoted to palliative care issues. More than 70% of fellowship directors would like to see education increased in the areas of establishing goals of care, re-evaluating these goals of care, as well as communicating advanced directives. Eighty eight percent of program directors believe their program will increase palliative care education for their fellows within 5 years.
CONCLUSIONS: Pediatric oncology fellowship directors believe it is very important for fellows to learn about palliative care issues, however, currently the majority of fellowship programs do not have a palliative care curriculum and lack significant formal education in area of end of life care. In order to improve end of life care pediatric oncologists give to patients and their families, increased education must be implemented during the fellowship training years.

14

Fellow in Training

Midnight Census Is a Misleading Metric for Hospital Capacity-Planning

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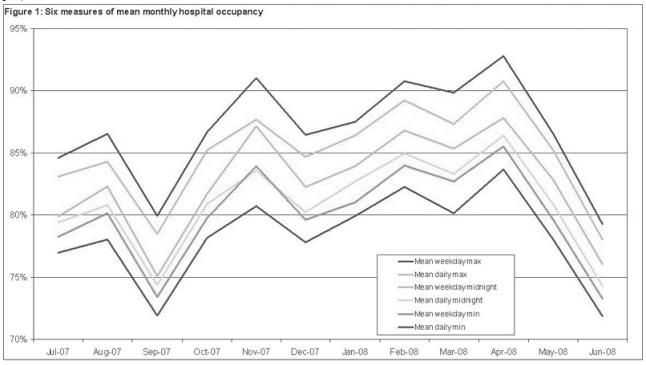
BACKGROUND: Hospital crowding is a growing problem for safety and quality reasons. Avoiding crowding requires accurate measurement and good management of hospital occupancy. The traditional measure of occupancy uses midnight census, often as monthly or annual means. Midnight census may not be an accurate measure of hospital occupancy, especially for children's hospitals.
OBJECTIVE: Determine how one large urban tertiary children's hospital's occupancy data compare over time of day.
DESIGN/METHODS: Admission-discharge-transfer (ADT) data for 22,320 inpatients from fiscal year 2007 were abstracted. Each record included dates/times of patient arrival to an inpatient unit and departure from it, as confirmed by registrar staff. Using the timestamps, a statistical inpatient hospital census was generated for every hour of each calendar day; midnight, peak, and minimum census figures were extracted for each day. Hospital occupancy was calculated as (census / mean beds available for the month).
RESULTS: Mean midnight occupancy was generally closer to mean minimum occupancy than mean peak occupancy, particularly when excluding weekends/holidays (shown as "weekdays" in graph).



On 2/3 of days, midnight census was >2.5%-points lower than daily peak occupancy. On average, peak occupancy was 4%-points higher than midnight occupancy, but the difference was as large as 13%-points. Daily peak census usually occurred between 10AM-12PM.
CONCLUSIONS: Midnight census does not accurately reflect demand for hospital beds, but is the routinely used metric for capacity-planning, budgeting, and staffing purposes. Hospitals and ADT-system vendors should review their census data and build systems that automatically report out peak census in each 24-hour period and/or a routine daytime census figure (i.e. 12 PM census) in order to optimally plan for and manage hospital occupancy.

15

Successful Strategies for Enhancing Inpatient Subspecialty Exposure in a Small Pediatric Residency Program

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BACKGROUND: Small pediatric residency programs are increasingly struggling to provide sufficient inpatient subspecialty exposure for their trainees. Limited subspecialty patient exposure can pose a threat to continued ACGME program accreditation.
OBJECTIVE: Employ multiple strategies to increase subspecialty exposure in the inpatient setting and track measurable outcome of subspecialty patient percentages on a teaching service log.
DESIGN/METHODS: Based on declining census and limited pediatric subspecialty exposure, in 2003, Albert Einstein Medical Center closed its pediatric inpatient unit and established the Einstein inpatient teaching service at St Christopher's Hospital for Children. To increase inpatient subspecialty exposure, we implemented the following strategies: 1) encouraged the Einstein primary care network to direct all pediatric admissions, both general and subspecialty, to the Einstein inpatient teaching service at St. Christopher's; 2) initiated a surgical co-management partnership with five surgical subspecialties; 3) directed selected medical subspecialty admissions to the Einstein service; 4) partnered with St. Christopher's pediatric residency program to develop and staff a collaborative Oncology service. We report on the proportion of subspecialty admissions for the Einstein residents 2001-2008. These numbers were obtained from lists of 100 consecutive diagnoses sampled on an annual basis from the Einstein teaching service log (a data set similar to that required for ACGME accreditation.)
RESULTS: Under the old independent inpatient unit, subspecialty patients accounted for only 11% and 13% of admissions (2001, 2002). Inpatient subspecialty admissions increased to 22% and 27% during the first two years of the Einstein service at St. Christopher's (2003, 2004). Addition of surgical co-management yielded an increase of subspecialty patients to 26%, 30% and 30% (2005-07). Selective admissions from the Hematology and Pulmonary services further increased subspecialty admissions to 39% in 2008. The collaborative Oncology rotation provides a one month exposure of 100% oncology subspecialty patients.
CONCLUSIONS: A small pediatric residency program was successful in increasing its inpatient subspecialty exposure and improved the reportable diversity to the Pediatric Review Committee through increased utilization of its primary care network and multiple collaborative strategies in partnership with a children's hospital.

16

Family-Centered Rounds: The Residents' Perspective

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BACKGROUND: In family-centered rounds (FCR), an interdisciplinary medical team works in partnership with hospitalized patients and their families to develop and implement the medical care plan. FCR have emerged from the principles of family-centered care, including individuality, flexibility, cultural competence, and partnership with families. Since 2004, the American Academy of Pediatrics has recognized FCR as the preferred format for inpatient rounds. Few studies have examined the impact of FCR on housestaff, especially regarding their opinions of interdisciplinary communication, teaching, and patient care.
OBJECTIVE: To determine housestaff perceptions regarding strengths and weaknesses of FCR.
DESIGN/METHODS: Cross-sectional survey at children's hospital staffed by 78 pediatric and medicine-pediatrics residents. FCR involving families, physicians, nurses, and other medical staff were instituted in fall 2006. Multiple-choice surveys were mailed to all pediatrics and medicine-pediatrics residents in May 2008, about 18 months after implementation of FCR. Specifically, we asked about resident satisfaction with FCR, FCR impact on "didactic" and "nondidactic" teaching, residents' preferred structure of FCR, perceived FCR impact on care quality, and residents' overall assessment of FCR.
RESULTS: Of 78 eligible residents, 28 (36%) completed the survey. Overall, 89% of respondents somewhat (50%) or strongly (39%) supported the FCR model. Factors significantly contributing to overall satisfaction with FCR included the attending physician on service (86%), patient volume (57%), coincident clinic day (46%), and geographic distribution of patients (36%). Perceived strengths of FCR included improved relationships with other care providers (71%), increased patient/family satisfaction (71%), increased patient safety (39%), decreased need for clarification of plans from nurses (61%), and improved quantity (64%) and quality (57%) of "non-didactic" teaching (64%). Concerns persisted about quantity (61%) and quality (39%) of "didactic" teaching and workflow efficiency (36%).
CONCLUSIONS: Residents support the use of FCR as a model for rounds for pediatric inpatients, though they have concerns about efficiency and didactic teaching. These concerns should be considered as institutions implement FCR. Residents' satisfaction with FCR is intimately related to the attending physician. Training for inpatient attending physicians should therefore include a component on facilitation of FCR.

17

Challenges Implementing PEDS Screening in a Resident Continuity Clinic

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BACKGROUND: The AAP recommends using more sensitive/specific tools, such as the PEDS developmental screener, a brief parental questionnaire, to identify children at-risk for developmental delays. Implementing new screening tools in resident continuity clinics may pose challenges.
OBJECTIVE: Describe the process of implementing PEDS screening in a resident continuity clinic using the rapid cycle (Plan-Do-Study-Act or PDSA) improvement model.
DESIGN/METHODS: Using the PDSA model, we implemented PEDS in an urban resident continuity clinic. Planning involved training faculty and residents, and meeting with clinic staff to develop implementation strategies. PEDS was piloted in June with faculty, then residents and rolled-out by mid-July. Monthly audits of randomly selected ≤ 8 yr. old well-child visits assessed use of Denver and PEDS. Two study cycles (Aug/Sept, Oct/Nov) were completed. In Nov 2008, physicians were anonymously surveyed (32 residents, 7 faculty) to assess utilization, perceptions, barriers, and solutions.
RESULTS: 212 charts were audited over 6 months. During the June-July pilot/roll-out period, PEDS use went from 11% to 38%. The Aug/Sept cycle showed PEDS use remained at 38%; investigation revealed inconsistent PEDS distribution by staff. By the Oct/Nov cycle, PEDS use increased to 71%, but 20% were improperly scored, leading to inadequate responses to parental concerns in 2 (3%) cases. Use of the Denver alone decreased 33% to 7%, but concurrent use of PEDS and Denver increased 11% to 23%. The physician survey (100% faculty, 72% residents) helped understand these trends: 83% used PEDS routinely but only 50% consistently scored it (forgot or no parental concerns); 23% did not trust the PEDS to identify developmental problems (personal experience, perception that parents lack ability to raise concerns); 60% used abbreviated Denver and PEDS concurrently at all visits; 63% (43% faculty, 68% residents) felt

their abbreviated Denver identified developmental problems better than the PEDS. Physicians also listed suggestions to help improve PEDS use.
CONCLUSIONS: Barriers to implementation of the PEDS screener in a resident continuity clinic were identified early and addressed using the rapid cycle improvement model. Chart audits provided ongoing surveillance of PEDS usage while physician surveys helped clarify more complex barriers, such as trust in the PEDS developmental screener.

18

Medical Students' Response to Teaching and Counseling about an Awkward Topic

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BACKGROUND: Teaching and counseling patients about 'awkward or touchy' topics, such as domestic violence, gender orientation and shaken baby syndrome (SBS) is an important physician role in health and prevention. Medical students need to learn teaching and counseling skills during training but rarely have the opportunity.
OBJECTIVE: To give medical students a structured opportunity to teach and counsel about an awkward topic and qualitatively study their attitudes and response to the experience.
DESIGN/METHODS: An interactive computer presentation about SBS was developed. During the 2007-08 academic year 21 medical students on the pediatric clerkship used the presentation to teach first time mothers one-on-one on the post-partum floor. Semi-structured interviews with each student were recorded, transcribed and coded. Overall student response was categorized, and factors related to teaching and counseling patients were identified using grounded theory.
RESULTS: Student response was negative (n=4), both positive and negative (n=5) or positive (n=12). Many students mentioned that SBS was an awkward topic. Based on their comments, students' attitudes emerged as patient-centered -"If it ends up saving a child I would gladly spend 15 minutes"- or self-centered - "It's part of the curriculum so you just do it." Patient-centered students, who believed that this was a valuable use of their time and wanted to learn to teach, overcame self-identified barriers and had positive responses

Response of Students to SBS Teaching/Counseling Experience, N=21

	Negative	Neg & Pos	Positive
n =	4	5	12
% Female	50 (2)	60 (3)	67 (8)
# Barriers	15	8	15
% Patient-centered attitude	0 (0)	60 (3)	100 (12)
% Awkward about topic	100 (4)	80 (4)	50 (6)
% I want to learn to teach	25 (1)	100 (5)	92 (11)
% This is a valuable use of my time	0 (0)	20 (1)	50 (6)

Numbers in parentheses represent actual

CONCLUSIONS: A patient-centered attitude and a belief that teaching patients is important are the factors that divide students in our study into distinct groups. Evaluating attitudes towards teaching and counseling about awkward topics is important for the quality and outcomes of future patient care given by medical students once they graduate. Whether it is possible to change students' attitudes from negative to positive through curricular intervention is not known and should be studied.

19 House Officer

Improving the Screening and Documentation of the Use of Over-the-Counter Medications and Home Remedies at an Academic Community-Based Health Center

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BACKGROUND: Pediatric patients are often given over-the-counter medications (OTC) and home remedies (HR) by their caretakers in an effort to treat a variety of common ailments. Use of these therapies are frequently not discussed or documented in the medical record, nor are their risks and benefits addressed. In an effort to provide enhanced care and proper anticipatory guidance, a longitudinal quality improvement project was designed and implemented by pediatric residents.
OBJECTIVE: To educate providers on commonly used products in a largely immigrant community and develop effective methods of screening and documentation for OTC and HR use through the use of a prompt in the medical record.
DESIGN/METHODS: This quality improvement project was performed at an academic practice based in an urban, hospital-affiliated community health center. Using PDSA cycle methodology, 8 general pediatric attendings, 1 pediatric nurse practitioner and 15 pediatric housestaff completed a self-assessment of the screening and documentation patterns of OTCs and HRs. All providers participated in an educational didactic or a one-on-one session about commonly used HRs, their effectiveness and risk/benefit profiles. A chart review to assess the rates of documentation prior to the intervention of a prompt in the medical record was completed. A visual prompt, or "sticker", was included in all visit notes which included headings for medications, OTCs, and HRs, and a specific space for doses and names of therapies. A final randomized chart review was conducted after implementation of the prompt.
RESULTS: From the self-assessment, 65% of providers reported documenting the use of the OTCs and HRs. A randomized chart review showed that 39% of providers documented the use of OTCs and HRs. After the implementation of the sticker and the didactic session, there was an improvement in the documentation rates of OTCs and HRs to 70%. Overall, rates of the documentation of all medications including prescription medications, OTCs, and HRs improved from 3% to 47% after sticker was implemented.
CONCLUSIONS: The use of a visual prompt and completion of an educational session may improve the documentation rates of OTC and HR use. Future plans include ensuring the sustainability of this project with transition to an electronic medical record and identifying a clinic champion to ensure continued didactics for new providers on OTC and HR use and documentation.

20 Fellow in Training

Associations between Causes of Prematurity, NICU Course and Beyond

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BACKGROUND: The etiology of preterm birth (PTB) is heterogeneous. In order to address the prevention of PTB we first must identify the numerous causes and how they are distributed. Preterm (PT) infants are comprised of a wide spectrum of gestational ages (GA) within which their causes of prematurity may differ. PTB pathophysiology may impact the child in the newborn period and beyond.
OBJECTIVE: To identify how causes of PTB are distributed across GA categories, and to assess correlations between causes of PTB, NICU course and early childhood morbidity
DESIGN/METHODS: Retrospective observational cohort study included PT infants (≤37wks) evaluated at The Regional Neonatal Follow up Program in the Lower Hudson Valley Region of NY. Subjects were dichotomized according to their cause of PTB: spontaneous labor/rupture of membranes (SB) and medically indicated deliveries (MI). Causes of PTB were compared across 3 GA categories: very preterm (VP<32wks), moderately preterm (MP 32-33wks) and late preterm (LP 34-37wks). Demographic and antenatal variables, morbidities of prematurity and early intervention (EI) needs at 12 mo corrected age (CA) were compared across PTB categories. χ^2 analysis was used for categorical variables, t-test for continuous variables, odds ratios established associations.
RESULTS: Of 685 PT subjects, 384 (56%) were SB, 301(44%) MI. The most frequent causes of MI were preeclampsia (34%), fetal distress (21%) and placental abruption/previa (16%) VP patients were associated with MI [OR=1.210(1.003-1.460)]; MP infants had equal distribution between SB and MI. LP births were more likely due to SB[OR=1.370(1.126-1.666)]. PTB resulting from SB was associated with vaginal delivery [OR=1.733(1.534-1.958)], while MI PTB with C-section [OR=0.391(0.302-0.514)] Comparing causes of PTB to NICU morbidities, MI was associated with BPD [OR=0.664(0.542-0.815)] and other respiratory morbidities: CPAP days (d) (6.5 v 4.3d p=0.007) nasal cannula d (11.2 v 6.4d p=0.002). Infants from MI PTB, had a longer hospital stay (40.1 v 32.9d p=0.011). There was no association with the cause of PTB and other demographic antenatal or neonatal morbidities. The causes of PTB did not impact the need for EI at 12 months CA.
CONCLUSIONS: Causes of PTB vary among GA categories which may be the result of distinct processes. The pathology precipitating MI PTB may induce stress in the fetus which can result in inflammation predisposing them to morbidities in the neonatal period. However, there was no effect into later infancy.

21

US Fetal Mortality Rates Are Insensitive with Rising Late Preterm Induction Rates

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BACKGROUND: Late preterm induction (LPI) rates have been rising in the US since the 1990s. The association between this rise in LPI rates and fetal mortality is unclear.
OBJECTIVE: To estimate the association between rising late preterm induction and fetal mortality rates in the US.
DESIGN/METHODS: Data from the National Center for Health Statistics were used to identify women who delivered singletons between 34 0/7 - 43 6/7 weeks' gestation in the US between 1995 and 2004. Women who were ineligible for induction of labor, had a prior cesarean, had fetuses with congenital anomalies, or had missing data elements were excluded. Annual LPI rates were calculated as the frequency of induction per 1000 eligible gravid women. Annual fetal mortality rates were calculated per 1000 eligible pregnancies at 34 weeks' gestation. Trends for changes in fetal mortality and LPI rates were determined by linear regression. Medical and demographic characteristics of the gravid population that changed the association between LPI and fetal mortality by 10% were included in the regression models. Significance was defined as α=0.01.
RESULTS: Over the 10-year study period, an average of 3,102,391 (SD 44,351) live births occurred annually among eligible women. Despite the fact that the LPI rate rose steadily (9.8 per 1000 in 1995 to 15.9 per 1000 in 2004, p<0.001), fetal death rates remained stable (mean = 1.78 per 1000; time-trend, p=0.6). Univariate and multivariable analysis demonstrated no association between rising LPI rates and fetal mortality over the 10-year study period.
CONCLUSIONS: Rising LPI rates have not been associated with a decrease in fetal mortality. Further research should elucidate the ramifications for neonatal health in light of the rising frequency of obstetric interventions in the late preterm period.

22 House Officer

The Impact of Maternal Medical Comorbidities on the Preterm Birth Rate of Women in a Methadone Treatment Program

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Obstetrics and Gynecology, Thomas Jefferson University Hospital, Philadelphia, PA; Obstetrics and Gynecology, U.M.D.N. J-Robert Woood Johnson University Hospital, New Brunswick, NJ; Neonatology, Thomas Jefferson University/Neumors Foundation, Philadelphia, PA.

BACKGROUND: There is a high rate of preterm birth among opiate exposed neonates.
OBJECTIVE: To determine whether the increased risk of preterm birth (PTB) among gravid

women in a methadone treatment program is associated with medical comorbidities or infectious diseases.

DESIGN/METHODS: Case-control study of opiate-addicted gravid women in a methadone treatment program. We defined cases and controls as those with a preterm or term delivery, respectively. Women who delivered a live-born neonate between 2000-2006 were included. Odds ratio (OR) and 95% confidence interval (CI) for PTB were calculated for selected medical comorbidities and infectious diseases.

RESULTS: Our study included 258 opiate-addicted gravid women on methadone. The rate of PTB was 29.1%. The most common reasons for PTB were preterm premature rupture of membranes (28.0%) and fetal compromise (14.7%). Overall, the rates of pregestational diabetes, chronic hypertension, thrombophilia, and history of preeclampsia were 0.8%, 2.7%, 1.2%, and 2.3%, respectively. Prevalence of infection with human immunodeficiency virus (HIV), hepatitis B, hepatitis C, and herpes simplex virus were 4.3%, 7.4%, 53.5%, and 5.8%, respectively. No significant associations were found between the above measures and PTB.

Medical Comorbidities of Mother in a Methadone Treatment Program

Medical Condition	Term Delivery (n=183)	Preterm Delivery (n=75)	p-value
Pregestational Diabetes	2 (1.1%)	0 (0%)	-
Chronic Hypertension	5 (2.7%)	2 (2.7%)	.98
Thrombophilia	3 (1.6%)	0 (0%)	.27
History of Preeclampsia	4 (2.2%)	2 (2.7%)	.82
HIV	5 (2.7%)	6 (8.0%)	.06
Hepatitis B	13 (7.1%)	6 (8.0%)	.80
Hepatitis C	91 (49.7%)	47 (62.7%)	.06
Herpes Simplex Virus	13 (7.1%)	2 (2.7%)	.17

Data presented as n(%).

CONCLUSIONS: Among opiate-addicted gravid women on methadone treatment, prevalence of medical comorbidities was low and none were associated with PTB. Prevalence of HIV and hepatitis C were higher when compared to the general population, yet no infectious diseases increased the risk for PTB.

23 Fellow in Training

Delivery Room Triage of Infants of Medication Dependent Diabetic Mothers (IMDDM): Validation of a Risk Score for Hypoglycemia

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BACKGROUND: Some maternity centers admit asymptomatic IMDDM to neonatal intensive/special care nurseries (SCN) for close monitoring due to risk of hypoglycemia, while other centers admit these infants to mother-baby units. In a previous study at our level III university hospital we developed and tested a 4-component hypoglycemia risk score to aid in appropriate triage of IMDDM after birth.

OBJECTIVE: To validate externally this hypoglycemia risk score in a population of IMDDM at a level I community hospital.

DESIGN/METHODS: Eligible infants were IMDDM (insulin or glyburide), ≥35 wks and without other indications for SCN care. Components of the risk score were collected retrospectively by chart review: maternal age ≥ 35 yrs (AMA), maternal blood glucose before delivery ≥120mg/dl (MBG), infant delivery room blood glucose <40 or ≥120mg/dl (DRBG) and infant size for dates (LGA/SGA). The risk score had a maximum value of 5 points (presence of AMA, MBG or LGA/SGA=1; DRBG =2). Primary outcome was hypoglycemia requiring IV dextrose. The total risk score for each infant was calculated and the infants were divided into 2 groups: low risk (≤ 1) and high risk (≥ 2) for developing hypoglycemia requiring IV dextrose. The score was considered valid if an infant with a low risk score was at least 90% likely not to develop hypoglycemia requiring IV dextrose (95% CI of NPV 0.9-1.0). To achieve this with α= 0.05 and power = 0.8, a sample size of 71 patients was required.

RESULTS: Among 78 infants, 1/68 who scored low risk and 4/10 who scored high risk required IV dextrose (overall prevalence 6.4%). The NPV of a low risk score met our criteria for validity (NPV 0.99, 95% CI 0.92-1.00). Other characteristics of the risk score were: sensitivity 0.8, specificity 0.92, PPV 0.4. A high risk score had a positive likelihood ratio (LR) of 9.7. A low risk score had a negative LR of 0.2.

CONCLUSIONS: This study validates a 4-component risk score as a strong and reliable predictor of hypoglycemia requiring IV dextrose among IMDDM in our 2 hospitals. Recently, the risk score was implemented in both hospitals to triage these infants from delivery room to appropriate level of care for glucose monitoring. By keeping low risk infants with their mothers after birth we hope to improve maternal-infant bonding and early breastfeeding success.

24 Pediatric Resident

Knowledge, Attitudes and Understanding of Mothers Concerning Breastfeeding Their Infant

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BACKGROUND: Few analyses review the factors associated with maternal knowledge of breastfeeding (BF). Understanding the knowledge and attitude of mothers in our community, regarding BF is needed.

OBJECTIVE: To know the maternal population's knowledge and attitude toward BF in our community.

DESIGN/METHODS: This is a cross-sectional, observational study. Data was collected from mothers on Obstetric floor and Pediatric clinic. The study included mothers able to read and understand English, with full term infants with no obvious malformations. Exclusion criteria were contraindications to BF, obvious physical and developmental abnormalities, preterm babies, NICU admission and infants requiring or receiving acute surgical intervention. Data statistical analysis was performed using Chi square test, ANOVA and Kendall's rank correlation.

RESULTS: The survey was completed by 52 subjects. Fifty were included for analysis. Subjects' age range: 18 to 42 yr (mean 30.24yr); ethnicity: 54% Asian, 28% Hispanic, and 18% other; marital status: 74% married and country of birth: 78% non U.S. Education status: 44% college, 28% less than high school, and 28% post-graduate degree. Eighty eight percent of mothers planned to BF their infants; 60% planned to combine with formula and 62% confirmed BF is more beneficial. No significant statistical correlation was found between plan to BF and above demographics. Sixty-four percent of mothers had support for BF, 46% by their partner or baby's father. Of the benefits of BF: 86% reported that is more nutritious, 94% related BF to bonding and 63% thought BF is more convenient. When asked about contraindications to BF: 64% answered fever, 54% answered if mother has cold, 68% reported if mother is taking antibiotics, 78% answered HIV and 86% answered if mother taking cancer medications. There was no association between plan to BF and mother receiving education to BF, or with previous history of BF. Mothers tended to plan to BF for similar duration to prior BF.

CONCLUSIONS: There is a high preference to plan BF their infants amongst the mothers surveyed. There was a strong understanding of the benefits of BF, but not of its contraindications. Exposure to education did not impact the plan to BF.

25 Fellow in Training

Late Preterm Twins: Increased Neonatal Morbidity

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BACKGROUND: Twin births have increased 70%. Mean gestational age (GA) of twins is 35 wks. Increased morbidity in late preterm (34- 36 wk) infants is now known but few studies are in late preterm twins (LPT).

OBJECTIVE: Test the hypothesis that LPT have increased morbidity compared to late preterm singletons (LPS) and term twins (TT, ≥ 37 wk).

DESIGN/METHODS: **Retrospective data analysis** of LPT, LPS and TT born at Georgetown University Hospital from 1/05 - 12/07. Infants with major anomalies excluded. **Morbidities evaluated**: NICU admit (NICU), respiratory distress (RD), temperature instability (Temp), Rule-out sepsis (Sepsis), IV nutrition (IV), apnea of prematurity (AoP), home monitor (HM). **Statistical methods**: Fisher exact test, Student *t*-test, multiple regression analysis.

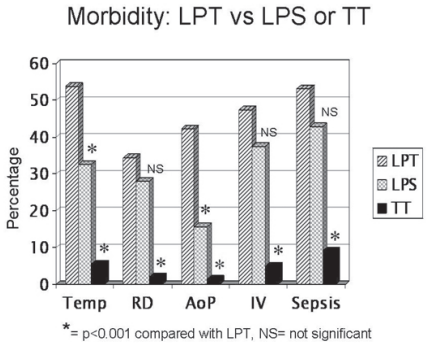
RESULTS:

Demographics

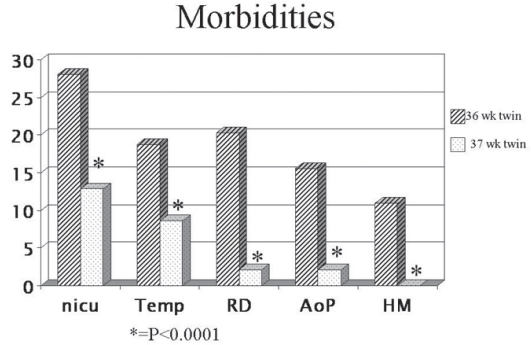
	LPT	LPS	TT
n	152	242	141
Birth wt g mean ±SD	2362 ±380	2632 ±276*	2832±375*
GA mean±SD	35.2±0.8	35.4±0.8	37.5±0.8*
M. age mean±SD	35.4±6.1	32.7±6.4*	35.5±5.4
White Race %	71	55*	80
C-section %	76	48*	72
M.diabetes %	5.2	11.9*	5.6
M. hypertension%	12.9	18.1*	9.8

*= p <0.001compared with LPT, M= maternal

NICU admit : LPT: 61%, LPS 52%, TT 10% [LPT vs TT p<0.0001, OR 14.7 (CI 7.8, 27.7)].
NICU stay: LPT:11.6±2.7d, LPS 10.5±4.5d, TT 4.9± 2.7 (LPT vs TT p<0.001).



SUBGROUP ANALYSIS



Regression analysis shows correlations between LPT and Temp (p=0.01) and AoP (p< 0.0001). Other morbidities correlate with prematurity.

CONCLUSIONS: LPT are significantly smaller, need thermal support, have AoP more often than LPS, and have more neonatal problems compared to TT. Twins at 36 wk GA have significantly

more morbidity than 37wk GA twins.

26 Ph.D. Student

In Vitro Comparison of the Caleo® and Giraffe® Warming Devices

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BACKGROUND: Preterm infants lack necessary thermoregulation. An ideal incubator microenvironment should maintain a uniform and constant thermal environment.

OBJECTIVE: To compare the 1) heating characteristics of 2 commercially available neonatal incubators; and 2) impact of a heating blanket on these characteristics.

DESIGN/METHODS: The Caleo® (Draeger Medical) and Giraffe Omnibed®(GE Healthcare), with and without a heating blanket (HB: Harvard Instruments), were instrumented with a distribution matrix of multiple temperature (n = 11) and humidity probes. These data were serially measured during warm up to 37°C (WU) and for 10 minutes with the side door opened (SDO). The time constant (min), temperature matrix variance expressed as root mean square (% RMS), and change in air temperature (ΔT) were calculated. Data were analyzed by 2-factor ANOVA for device and blanket condition. Mean ± SE; ∗ $p < .05$ vs device; † $p < 0.05$ vs blanket.

RESULTS: The Caleo® warms faster then the Giraffe® but has a greater %RMS. The heating blanket enhances the Caleo® thermal responses during WU but does not alter those of the Giraffe®. With the SDO, the Caleo® shows greater %RMS than the Giraffe; the heating blanket attenuates %RMS of both devices. Humidity data analysis is on-going.

	Time Constant (min)		RMS (%)		ΔT	
	WU	SDO	WU	SDO	WU	SDO
Caleo	17.65±0.59∗	2.36±0.11	42.56±3.28∗	69.15±2.91∗	14.65±0.96	2.90±0.34∗
Caleo w/HB	15.06±0.74†	2.31±0.16	19.37±1.64†	34.21±2.84†	16.21±0.26	2.58±0.54
Giraffe	26.69±0.58	2.08±0.20	25.23±2.95	41.86±11.38	16.15±0.33	4.15±0.31
Giraffe w/HB	26.43±1.34	2.30±0.13	22.56±2.44	31.28±3.31†	15.74±0.45	2.16±0.12†

CONCLUSIONS: During WU, the Caleo® warms faster but the Giraffe® has less temperature variance. With the SDO, 1) the Caleo® cools down less but temperature variance remains greater than the Giraffe®; 2) the heating blanket reduces temperature variance in both devices and mitigates the ΔT in the Giraffe®. These results demonstrate device-related differences in control of the thermal environment that may impact clinical care. *In vivo* studies are on-going to characterize device and heating blanket-augmented thermal responses. (Support in part by: Draeger Medical, Inc.).

27 Resident

Early Neonatal Hypotension (ENH) in Neonates with Gestational Age (GA) ≤ 32 Weeks Born to Mothers with Pregnancy-Induced Hypertension (PIH)

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BACKGROUND: Very premature neonates often have a low blood pressure (BP), especially on the first day of life. Previous studies have shown that ENH depends on neonatal and maternal factors. However, none used normotensive neonates in a case-control design to better ascertain an association of ENH with maternal PIH and/or its associated risk factors.

OBJECTIVE: To assess relationships between ENH in neonates with GA ≤ 32 weeks and their mothers with PIH and/or associated risk factors (tocolytic therapy, magnesium sulfate therapy and antihypertensive therapy).

DESIGN/METHODS: We conducted a **retrospective case control study** of neonates with GA ≤ 32 weeks admitted to the neonatal intensive care unit of our community based Flushing Hospital Medical Center and their mothers between January 2007 and July 2008. ENH (defined as persistence of mean arterial pressure < the GA in weeks in first 24 hours of life) in neonates with GA ≤ 32 weeks was used as the **criterion variable**. **Major covariates** used were maternal (PIH, tocolytic therapy, magnesium sulfate therapy and antihypertensive therapy) and neonatal (GA). PIH included: maternal preeclampsia; maternal eclampsia; and HELLP syndrome **Other covariates** studied were neonatal respiratory distress syndrome (RDS) and patent ductus arteriosus (PDA). To determine significance ($p < 0.05$) between ENH and covariates, chi-square analysis was used for each of the categorical variables, and Pearson correlations were used for the one continuous variable (GA). For multivariate analysis, logistic regression was used, with a criterion for significance of $p < .20$.

RESULTS: We enrolled fifty neonates for the study. Among all neonates with ENH, 57.9% had mothers who were given magnesium sulfate therapy (p=0.019). 100% of neonates with ENH had RDS (p=0.006). Neonatal GA had a negative correlation with ENH (-0.338). Univariate analysis revealed that maternal magnesium sulfate therapy and neonatal RDS and GA were significantly related to neonatal ENH. By multivariate analysis, only GA and maternal magnesium sulfate therapy were significantly related to ENH.

CONCLUSIONS: Among maternal PIH and associated risk factors, administration of **magnesium sulfate** therapy to mothers was a **better predictor** of ENH in neonates. The **lower the GA** of neonates, the higher their chance of developing ENH.

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Thrombopoietin in Infants Born to Mothers with Preeclampsia Compared to Those with IUGR

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BACKGROUND: Maternal preeclampsia is a common etiology of neonatal thrombocytopenia. Although the pathophysiology of neonatal thrombocytopenia is unknown, placental insufficiency, and thrombopoietin (TPO) have been shown to play a role.

OBJECTIVE: To further investigate TPO, maternal factors, and placental factors in relationship to neonatal platelet count in infants born to mothers with preeclampsia.

DESIGN/METHODS: After informed written consent, cord blood was obtained from infants born to mothers with preeclampsia delivering <34 weeks gestation. Infants were also enrolled in a control group of infants with antenatal diagnoses of intrauterine growth restriction (IUGR), without maternal preeclampsia. Blood was obtained for TPO, soluble vascular cell adhesion molecule (VCAM), Platelet factor 4 (PF4) as well as platelets and other routine hematologic parameters. Placental pathology was reviewed, and maternal factors including body mass index (BMI), peak systolic and diastolic blood pressure were recorded. Statistical analysis included chi-squared, Pearson's correlation, Mann-Whitney U test, and multivariable linear regression.

RESULTS: There were no differences in birthweight or maternal platelet count in the preeclampsia (n=21) or IUGR control groups (n=7). There were no differences in platelet count (162 ± 47 vs 179 ± 90 k/ul, p=.52), TPO (81.3 ± 44 vs 57.6 ± 18 pg/ml, p=.19), soluble VCAM (2000 ± 693 vs 1829 ± 346 ng/ml, p=.4), or PF4 (651 ± 201 vs 689 ± 215 IU/ml, p=.67) between the preeclampsia and control groups respectively. After controlling for confounding variables, placental weight was directly correlated (r^2=.43, p<.01), while cord blood TPO (r^2=.09, p=.05), and maternal age (r^2=.03, p=.05) were inversely correlated with neonatal platelets. Other factors including placental infarction, maternal BMI, maternal peak systolic or diastolic blood pressure, and maternal platelet count were not correlated with neonatal platelet count.

CONCLUSIONS: TPO, VCAM, and PF4 levels were similar in infants born to mothers with preeclampsia and those with IUGR without preeclampsia. These data suggest a model where placental factors, rather than maternal factors, are associated with neonatal thrombocytopenia in infants born to mothers with preeclampsia. In support of this model, placental weight was directly correlated with neonatal platelet count in the pregnancies complicated by maternal preeclampsia.

29 Fellow in Training

Use of Hydrocortisone To Prevent Cardiovascular and Respiratory Instability after PDA Ligation in Preterm Infants

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BACKGROUND: In the immediate post-operative period after PDA ligation, preterm infants often develop profound hypotension and respiratory failure. Giving stress doses of hydrocortisone (HC) prior to surgery has emerged in an effort to prevent these complications, postulating that premature infants are unable to synthesize their own steroids in the face of stress due to an immature hypothalamic-pituitary-adrenal axis.

OBJECTIVE: To compare cardiovascular and respiratory outcomes in patients treated with stress dose HC prior to PDA ligation compared to those who did not receive pre-operative steroids and to identify possible risks of this therapy.

DESIGN/METHODS: A retrospective chart review of all infants who underwent a PDA ligation at Johns Hopkins Hospital from January 2003-June 2008 was performed. Data was collected on infant demographics, hospital course, and exposure to HC. Respiratory (FiO2, ventilator requirements) and blood pressure support (doses and duration of treatment with vasopressors) for 24 hours prior to and 3 days post surgery was documented. HC use varied based on attending preference.

RESULTS: A total of 70 infants were identified, 30 were treated with HC preoperatively and 40 did not receiving any steroid therapy. Gestational age and birth weight were lower in the HC exposed group, but age at time of surgery was similar.

	HC exposed	Non-HC exposed
Age at surgery	25.1 (21.4, 28.9)	21.2 (17.9, 24.6)
GA	24.4 (23.9, 24.9)	25.8 (25.2, 26.4)
BW	667.7 (619, 716)	836.4 (774.4, 898.4)

Mean (95% CI)

Cardiovascular and respiratory support was similar between groups both preoperatively and postoperatively. Adverse outcomes, such as mortality and gastrointestinal perforation were also not different. In regression models that adjusted for gestational age, HC treatment was not independently related to respiratory support postoperatively, but was associated with a decrease in postoperative dopamine dose. Respiratory support postoperatively was predicted by preoperative respiratory support. Gestational age and age at surgery were not independently associated with outcome.

CONCLUSIONS: Use of stress dose HC prior to PDA ligation was not associated with improved cardiorespiratory stability, regardless of gestational age. Further investigation is needed to identify which infants may benefit from this therapy.

30 Fellow in Training

Transfusion Related Acute Gut Injury (TRAGI): Necrotizing Enterocolitis (NEC) in VLBW Neonates Following PRBC Transfusion

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BACKGROUND: The phenomenon of transfusion-associated acute lung injury (TRALI) & related transfusion reactions are well documented in adults and are typically attibuted to: immunologic, mechanical, metabolic, embolic, and storage-related blood cell injury. Transfusion related acute

gut injury (TRAGI) is a term we propose to characterize severe abdominal reactions in premature neonates culminating in NEC shortly after an infusion of packed red blood cells (PRBC) for anemia.
OBJECTIVE: The purpose of the present review was to determine whether the association of NEC within 48 hours of a PRBC transfusion continued to occur in our Regional Neonatal Center (Mally et al, Am J Perinatol; 23(8):451-8, 2006).
DESIGN/METHODS: We conducted a retrospective review of all very low birth weight (VLBW) neonates with NEC Stage IIb admitted to our NICU over an 18-month period. We defined 2 groups of patients, those who developed NEC < 48 h after a PRBC transfusion and those who developed NEC unrelated to the timing of PRBCs. Demographic and clinical data were collected from both groups. Statistical analysis was performed using paired student t-test, with chi-squared analysis for dichotomous variables.
RESULTS: 25% of all NEC was TRAGI. Cases had lower birth weight, gestational age and hematocrits. They showed a more rapid onset of disease following transfusion even compared to our previous report (5 vs. 22 h). There was no statistically significant difference in weight at onset of NEC; however we noted that most NEC showed a curious centering at 30-32 weeks post-conceptual age.

TRAGI vs. Non-Transfusion-Related NEC

Mean ± SEM	TRAGI	Non-Transfusion-Related NEC
* P < 0.05	N=9	N=27
Birthweight (grams) *	770 ± 57	948 ± 54
Gestational Age (weeks) *	26 ± 0	28 ± 1
Weight at onset of NEC (grams)	1089 ± 98	1191 ± 49
Postconceptual age at onset of NEC (weeks)	30 ± 1	32 ± 1
Hours after PRBCs to first signs of NEC *	5 ± 1	257 ± 66
Hematocrit before NEC *	26 ± 2	35 ± 2

CONCLUSIONS: TRAGI exists as an association between PRBC transfusions and the development of NEC in VLBW neonates. An adequate theory of pathophysiologic mechanisms is in order. The 30-32 weeks PCA of occurrence approximates the age of peak presentation of other O_2 delivery and neovascularization issues (e.g. ROP) possibly linking mucosal barrier defense to maturational mechanisms. Protocols designed to prevent the problem would require a multicenter trial.

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A Single Center Retrospective Study of Risk Factors for Spontaneous Intestinal Perforation (SIP) in Neonates

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BACKGROUND: Spontaneous intestinal perforation (SIP) is a clinically distinct disease process, different from necrotizing enterocolitis, occurring in extremely premature infants. Factors such as maternal infection, postnatal indomethacin and glucocorticoid administration have been implicated as risk factors for SIP.
OBJECTIVE: Our objective was to study the maternal and postnatal risk factors for SIP.
DESIGN/METHODS: This is a single center retrospective study of all infants with SIP from January 2001 to October 2008 (n=32). Each infant with SIP was matched for completed weeks of gestation with 2 control infants (n=64) with closest birthdates. Data were collected to the date of perforation in cases and up to 8 days (median time to perforation) in controls. Student's t test, Chi square and Mann Whitney U tests were used for analysis.
RESULTS: Of SIP infants, 23 (74%) were ELBW (birth weight <1000g) infants and 80% were ≤ 28 wks GA at birth. Most (70%) SIPs occurred at 7-10 days of life. SIP was more likely in infants whose mothers received antenatal steroids. There was no association between SIP and a diagnosis of patent ductus arteriosus (PDA), but SIP was increased in babies whose PDA was treated with indomethacin and was significantly related to cumulative postnatal indomethacin dosage. SIP was also increased in babies with prior coagulopathy, hyperglycemia or insulin treatment.

	SIP Cases (n=32)	Controls (n=64)	P value
Gestational Age (wks)	26.4 (0.7)	26.4 (0.5)	NS
Birth Weight (Kg)	1.013 (0.1)	1.064 (0.1)	NS
APGAR (median) at 1, 5 min	5, 8	6, 8	NS
Antenatal Steroids	25 (78%)	31 (48%)	0.005
Antenatal Procardia	8 (25%)	9 (14%)	NS
Prophylactic Indomethacin	23 (72%)	46 (71%)	NS
Patent Ductus Arteriosus (PDA)	15 (47%)	22 (34%)	NS
Indomethacin for PDA	12 (39%)	7 (11%)	0.002
Cumulative Indomethacin (mg/kg)	0.47 (0.07)	0.27 (0.04)	0.01
Hypotension	17 (57%)	37 (58%)	NS
Inotropic support	14 (47%)	26 (41%)	NS
Postnatal Hydrocortisone	5 (17%)	5 (8%)	NS
Cumulative Hydrocortisone (mg/kg)	1.13 (0.58)	0.4 (0.18)	NS
Coagulopathy	15 (47%)	9 (14%)	0.001
Hyperglycemia	17 (55%)	19 (30%)	0.018

data presented as mean (SEM) or number (%)

CONCLUSIONS: Antenatal steroids, indomethacin and PDA requiring treatment were associated with SIP. The relationship between antenatal steroids and SIP needs to be examined in larger populations.

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Undergraduate Student

Follow-Up of Urban ICN Graduates (ICN-G): Assessing Barriers to Care

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BACKGROUND: Survival of preterm infants is increasing with a concomitant increase in children with medical and developmental morbidities. Early recognition of such morbidities is critical to providing intervention, yet many ICN-G do not receive consistent follow-up care.
OBJECTIVE: To identify barriers to follow-up (F-up) in an urban ICN F-up clinic by assessing: 1) caregiver demographics; 2) caregiver understanding of visit purpose; and 3) practical barriers to care.
DESIGN/METHODS: In summer 2008 a convenience sample of families scheduled for F-up were interviewed in person for those attending clinic or by phone for those who missed or cancelled their appointment. Surveys addressed: 1) demographics; 2) knowledge of visit purpose; and 3) barriers to care. Surveys were scripted and conducted by non-clinic personnel. Participant anonymity was assured.
RESULTS: Of the 138 families scheduled, 106 (77%) "showed" (SHOW) and 32 (23%) were "no-shows" (NO-S). All 106 SHOW families and 9/32 (28%) NO-S were interviewed (total of 115 surveys). Forty-four of the scheduled visits were 1st visits and 71 were subsequent visits. For the 1st visit SHOW families, 72% had appointments scheduled prior to ICN discharge vs. only 17% of NO-S (p=.009). Further, of 1st visit SHOW families, 84% understood the purpose of the visit vs. 33% of NO-S (p=.006). For all visits (1st and subsequent), factors associated with SHOW vs. NO-S were: greater attendance for afternoon vs. morning appointments (p=0.043), white race (p=.006), more than high school education (p=.036), married parents (p=.02), and employed fathers (p=.035). Factors not associated with SHOW vs. NO-S were: birth weight, gestational age, neonatal morbidities (RDS, IVH, PVL, and NEC), and baby's health as perceived by caregivers (all p>.13). Barriers to care (115 surveys) were identified as: transportation (n=12), taking off work (n=5), childcare (n=4), money issues, distance, and "baby does not need F-up" (n≤3).
CONCLUSIONS: For this urban ICN-G sample, the data suggest that those given appointments prior to ICN discharge and those who understand the purpose of F-up visits are more likely to show. Participant marital, education, and employment status, as well as race, also influenced show rate. **Speculation:** We speculate that F-up of ICN-G will be improved if F-up teams: 1) target discussion, prior to discharge, with families likely to "no-show"; and 2) proactively address practical barriers to care.

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Validity of Apnea, Bradycardia, and Desaturation Monitoring during NICU Hospitalization for Prediction of Subsequent Apparent Life-Threatening Events

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BACKGROUND: Premature infants can experience cardiopulmonary instability manifested as apnea, bradycardia, and desaturation (ABD) episodes, which resolve over time as the premature neonate matures. The utility of ABD descriptions in nursing charts for assessment and prediction of an premature infant's readiness for hospital discharge (DC) has been anecdotal regarding its ability to predict apparent life threatening events (ALTE) after neonatal intensive care unit (NICU) discharge but its use is still routine.
OBJECTIVE: To assess the predictive nature of ABD event documentation for subsequent hospital encounters (HE) for ALTE among premature infants recently discharged from NICU.
DESIGN/METHODS: This retrospective cohort study included infants born < 34wks gestational age (GA), birth weight (BW) <1500g, discharged from two NICUs in 2005-2008. Nursing documentation of ABD events were collected only after NCPAP was discontinued. HE and diagnoses were identified from emergency department (ED) and admissions records from regional pediatric hospitals. A parental questionnaire captured HE data outside of this regional network. Home monitor use was recorded; SIDS data was obtained from state death certificates (data pending). Summary statistics were calculated as appropriate and multivariate logistic regression (MLR) modeling assessed the relationship between NICU ABD events and outpatient ALTE.
RESULTS: A total of 246 infants met study criteria (BW 1077±277g, GA 28±3wks, 52% male). The mean number of ABD events was 20 per infant (range 0-169) and after NICU discharge, 5% had an HE for ALTE. In MLR analyses, there were no statistically significant associations between number of ABD events and HE for ALTE (OR 0.93, 95%CI 0.86-1.01) nor for total number of apneic episodes (OR 1.1), days from last apnea to DC (OR 1.1), days from last gavage feeding to DC (OR1.1), days from or last caffeine dose to DC (1.1). Analyses adjusting for home monitor use is pending at the time of this abstract.
CONCLUSIONS: In this population, although documented ABD events were routinely used to guide discharge readiness, there was no association between the number or frequency of ABDs and subsequent HE for ALTE. While it should not be concluded that ABD documentation is of no utility for specific patients, caveats must be taken when interpreting the predictive value of these events for ALTE.

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Factors That Predict Successful Transition of Infants from Car Beds to Car Seats

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BACKGROUND: Since the introduction of AAP guidelines recommending car seat testing for premature and select at-risk infants, thousands of children across the nation have been screened by some form of Infant Car Seat Challenge (ICSC). Infants who fail ICSCs are recommended to travel in an alternative restraint device, the car bed. However, limited data exists to identify risk factors for failing the ICSC, and despite the widespread use of car beds, no published guidelines are currently available to determine readiness to transition from car beds to car seats.
OBJECTIVE: To identify patient characteristics that predict failure and then subsequent passing of the ICSC.
DESIGN/METHODS: A retrospective chart review was conducted for all patients referred to the Boston Children's Center for Healthy Infant Lung Development (CHILD Clinic) for follow-up car

seat challenge testing. Data was extracted and entered into a statistical database.
RESULTS: A total of 32 infants were referred to the CHILD Clinic for repeat ICSC. The average gestational age was 35 wks 3 days, and almost equal numbers of males and females were referred. A majority of infants passed their initial rechallenge (25/32, 78%). Infants who failed the repeat challenge were slightly smaller (3487 gm vs 3666 gm) and younger (CGA 41 wks 3 days vs 42 wks 2 days) compared to those that passed subsequent rechallenge.

	Infants Who Passed Subsequent ICSC	Infants Who Failed Subsequent ICSC
GA (Range)	35 3/7 wk 29 0/7 – 38 0/7	35 2/7 wk 34 0/7 – 36 5/7
CGA at retest (Range)	42 2/7 wk 39 2/7-47 5/7	41 3/7 wk 38 4/7-45 6/7
Sex		
Male	14 (56%)	1 (14%)
Female	11 (44%)	6 (86%)
Birthweight	3000 gm	3000 gm
Weight at retest	3666 gm	3487 gm

CONCLUSIONS: Specific factors that predict failure of and subsequent passing of the ICSC are not clearly identifiable. This suggests that repeat testing remains an important component to assess readiness to transition from car beds to car seats. Standardization of the ICSC and tracking of characteristics of infants who pass and fail the ICSC would assist in identifying risk factors for failure of ICSC. Future studies to evaluate outcomes of infants who pass and fail ICSC are also necessary.

35

Evaluation of Our "Back To Sleep " Program

Rachel Porat, Claudia G. Lares, Shilpa Hundalani, Mariya L. Koval, Lina Huerta-Saenz.
Pediatrics, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: To reduce the incidence of SIDS the AAP recommended in 1992 that all newborns be placed on their backs or sides when put to sleep and in 2005 back only. We introduced a policy whereby both physicians and nurses are responsible to discuss appropriate sleep position with mothers.As several years have passed since the policy's initiation, adherence may have slipped.
OBJECTIVE: To describe the practice of sleep positioning among mothers of infants born in our hospital. To assess our program according to AAP recommendation.
DESIGN/METHODS: Mothers were approached with a 10 item questionnaire either in person at follow-up clinic visits (75%) or by phone. Questions involved what information they recalled being taught about sleep position prior to discharge, why and by whom, and what they are actually practicing.
RESULTS: A total of 80 patients were interviewed, 67 were discharged from Term Nursery and 13 from NICU. Mean BW was 3.04 $\pm$ 0.69 kg and mean GA 38$\pm$ 2.6 wks. Though 94% of mothers remembered being told at discharge to put the baby to sleep on their back (3 back and side), only 77.5% were actually doing that, and 9% placed their babies on their side. 9 mothers reported placing the baby to sleep on their belly even though 8 knew that "back" is the recommended sleep position. 4 of the 9 mothers reported getting information on sleep position from a video, brochure or family member. When asked who provided information at discharge, 40% of mothers reported from nurses, 25% nurses and physicians and only 20% reported doctors as the source of information. 88% of mothers were placing infants to sleep in cribs or bassinets and in 12% infants slept with caretakers. In 23% of households there was smoking and in 5% a history of SIDS. When asked why sleeping on the back is the recommended position, only 43% said that it was related to SIDS, 24% said to decreased choking, 17% didn't remember why and 13% related it to sleeping better.
CONCLUSIONS: Despite awareness of the appropriate sleeping position adherence is only fair. One reason may be poor understanding of SIDS and particularly questionable contact with physicians. Strategies to improve adherence to the AAP recommendation should include improved parental education, increased documentation and development of tracking system to ensure compliance.

Neonatology I - Neonatal Pulmonology Platform Session

Saturday, March 14, 2009
8:15 AM-10:30 AM

36

Fellow in Training

8:15 AM

Disruption of Heme Oxygenase-1 Alters Postnatal Lung Development

Tiangang Zhuang, Phyllis A. Dennery, Sara Q. Lin.
Children's Hospital of Philadelphia, Philadelphia, PA; University of Philadelphia, Philadelphia, NJ.

BACKGROUND: Newborns are exposed to relative hyperoxia during adaptation to extrauterine conditions. Part of the adaptation mechanism is the rapid degradation of fetal hemoglobin and the oxidation of its heme moiety by heme oxygenase (HO). Heme oxygenase-1 (HO-1) is induced by and protective against oxidative stress.
OBJECTIVE: We hypothesized that HO-1 may play a role in neonatal lung development during the adaptation to the relatively high oxidative stress extrauterine environment. We sought to determine whether deletion of this gene would impact the morphology of the developing lung, and identify the molecular mechanism underlying these phenotypes.
DESIGN/METHODS: To assess the function of HO-1 in alveolar development under hyperoxia stress, wild type (WT) and HO-1 knock-out (KO) littermates were exposed to 95% oxygen for 72hrs after birth, and recovered in room air until P14. In a separate experiment, 0.3μg/pup of dexamethasone was IP injected daily from P1 to P14. WT and HO-1 KO littermates were sacrificed at P14, right lung tissues were collected for RNA and protein analysis; the left lungs were fixed and sectioned for histological analysis. The alveolar development was assessed by radial alveolar count (RAC). Expression of epithelial markers Pro-SPC and T1alpha, cell proliferating marker PCNA were measured by Western blot or immunofluorescence staining. Endothelial cell markers Tie1 and FLK-1 mRNA expression were determined by real-time PCR.
RESULTS: Compared to WT mice, HO-1 KO mice manifested multiple aberrations of lung development. In HO-1 KO mice, the alveolar structure was simplified and disorganized. The RAC was decreased as well. Both epithelial markers (pro-SPC and T1_α) and endothelial markers (Tie1 and FLK-1) were expressed at a lower level in the HO-1 KO mice. Both hyperoxia and dexamethasone treatment adversely affected postnatal lung development. These effects were more severe in HO-1 KO mice, indicating that HO-1 is an essential protective molecule.
CONCLUSIONS: Without the protection against oxidative stress provided by HO-1, lung development during the immediate postnatal period was distinctly abnormal. We speculate that HO-1 is critical for neonatal lung development, particularly during alveolarization.

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Medical Student

8:30 AM

Nuclear Localization of HO-1 Enhances DNA Repair after Oxidative Stress

Amal P. Fernando, Ping La, Guang Yang, Maurice D. Hinson, Phyllis A. Dennery.
Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA; Neonatology/ Pediatrics, Unniversity of Pennsylvania, Philadelphia, PA.

BACKGROUND: Heme oxygenase (HO) is the rate limiting enzyme in the degradation of heme and its inducible isoform HO-1 is highly expressed in the neonatal lung. Recent study shows nuclear localization of HO-1 but its role is poorly defined. Nuclear migration increases in the neonatal lung but not in adults in response to hyperoxia. Neonatal mice are more tolerant to hyperoxia than adults. Nuclear HO-1 lacks a C-terminus and is catalytically inactive, however several DNA repair proteins associate with nuclear HO-1 after oxidative stress.
OBJECTIVE: To determine whether nuclear HO-1 participates in DNA repair and contributes to hyperoxic tolerance.
DESIGN/METHODS: We designed retroviruses expressing full-length (FL), C-terminal truncated (TR), and catalytically inactive mutant (mFL and mTR) mouse HO-1 tagged with Flag at the C-terminus and nuclear localization sequences at the N-terminus. RAW 264.7 murine macrophage cells were infected with control or HO-1 viruses. The cells were incubated in 200 mM H_20_2 for 2 hours, treated with diflouroethidium (DFE), and visualized with fluorescent microscopy for production of reactive oxygen species (ROS). We also infected cultured HO-1 knockout mouse endothelial fibroblast (MEF) cells with the retrovirus constructs. This allowed for elimination of native HO-1 activity.
RESULTS: Western blot of MEF samples showed equal expression of FL, mFL, TR, and mTR while endogenous HO-2 expression was unchanged. Immunoflourescence staining showed FL and mFL HO-1 in the cytoplasm while TR and mTR forms were in the nucleus. Gas chromatography confirmed FL expressing cells had notably higher HO activity compared to TR and control cells. FL and mFL accumulated more ROS while TR and mTR infected cells accumulated less ROS when compared to control. Western blotting showed 8-oxoguanine DNA glycosylase (Ogg1), a DNA repair enzyme, was higher in TR HO-1 cell lines versus FL lines by Western blot. The loss of HO-1 activity had no effect on Ogg1 levels. In the MEF cells, phosphorylated p53, a tumor suppressor, was increased in the TR line suggesting a role for nuclear HO-1 in DNA repair.
CONCLUSIONS: Our data indicates that nuclear HO-1 enhances cellular DNA repair while over expression of cytoplasmic HO-1 elevated ROS production and diminished DNA repair. We speculate that HO-1 nuclear translocation plays a role in neonatal tolerance to hyperoxia. This work was sponsored by NIH RO1 HL058752 (P.A.D).

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8:45 AM

C/EBPα Is Induced in Hyperoxia and Modulates Type II Cell Proliferation during Postnatal Lung Development

Guang Yang, Jessica Bordner, Tiangang Zhuang, Clyde Wright, Phyllis A. Dennery.
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BACKGROUND: Postnatal alveolar development involves a complex series of coordinated events that occur at specific times. Alveolar type II (TyII) cell proliferation increases after birth, peaks at 2 weeks of life then decreases to its lowest levels in adulthood. This process can be disrupted by hyperoxia. The transcription factors, C/EBPα, β and δ, have a general role in cell proliferation and differentiation, and C/EBPα is essential to postnatal lung development.
OBJECTIVE: To investigate whether hyperoxia regulated C/EBP in the neonatal lung and whether this affected alveolar development.
DESIGN/METHODS: Litters of C57BL/B6 neonatal mice (<12 h old) were exposed to either air or hyperoxia for 72 h (72h O2). In some experiments siRNA against C/EBPα or a control siRNA was delivered to the left lungs transthoracically 12 h prior to the exposures. Some mice were allowed to

recover in room air for 2 weeks (recovery). Lung C/EBP mRNA and protein levels were examined using quantitative RT-PCR and Western analysis respectively. In lung slides, alveolar development was assessed by radial alveolar counts (RAC). TyII cell proliferation was evaluated by co-staining with PCNA and proSPC or ABCA3, type II cell markers. The number of PCNA and proSPC positive cells per 10 high powered-fields were counted and normalized to DAPI positive cells.
RESULTS: Hyperoxia increased C/EBPα transcription as well as protein expression of C/EBPα, C/EBPβ and C/EBPδ in the neonatal lung. Unlike C/EBPβ and C/EBPδ, C/EBPα exclusively localized to the TyII cells. RAC loss was observed after 72 h O2 and remained low after recovery. The number of proliferating TyII cells was decreased at 72 h O2 but increased in recovery as compared to air exposed groups. SiRNA to C/EBPα prior to hyperoxia resulted in a 50% reduction to the C/EBPα protein as compared to the control siRNA group. This did not rescue the RAC loss at the 72h O2, however the RAC was improved after recovery. C/EBPα siRNA increased TyII proliferation only in recovery.
CONCLUSIONS: We conclude that hyperoxia-induced C/EBPα expression regulates TyII cell proliferation and modulates alveolar development in the recovery phase.

39
9:00 AM
Effect of Catalytic Antioxidant MnTBAP on Pulmonary Angiogenic and Oxidative Gene Expression to Hyperoxia in Newborn Mice

Vasanth H. Kumar, Babu Paturi, Lori Nielson, Huamei Wang, Rita M. Ryan.
Department of Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: Development of lung injury during prolonged O_2 exposure is a complex process, associated with changes in expression of a number of genes important in the adaptive response to hyperoxia. MnTBAP is a compound with strong antioxidant properties including scavenging of superoxide, H_2O_2, peroxynitrite and lipid peroxyl radicals.
OBJECTIVE: To study the effects of MnTBAP on angiogenic and oxidative gene expression in C57BL6 neonatal mice following hyperoxia.
DESIGN/METHODS: Newborn mice litters were randomized on postnatal day 4 to hyperoxia (> 95% O2)(OX) or room air (RA) for 72 hrs during which they received MnTBAP (MN) 10mg/kg or saline (SL) daily by IP injection for 3 days and then were sacrificed. Whole lung angiogenic and oxidative gene expression profiling (84 related genes for each) was done by real-time, reverse transcriptase, quantitative PCR (n=4). Data was analyzed using an online PCR array data analysis from SA Biosciences, MD.
RESULTS:

Fold Changes in Gene Expression by RT²qPCR Analysis

Angiogenesis Genes	
Downregulated by Hyperoxia	**Fold Change**
Angiopoietin 1	-4.9
Angiopoietin 2	-7.4
Hepatocyte Growth Factor (HGF)	-6.03
Transforming Growth Factorβ1 (TGFβ1)	-14.3
TGFβ3	-11.8
Tumor Necrosis Factor super family member 12	-12.9
Upregulated by Hyperoxia and MnTBAP	**Fold Change**
Angiopoietin 2	2.6
TGFβ1	11.7
TGFβ3	7.5
Midkine	12.9
Chemokine Ligand 5 (CXCL5)	7.1
Oxidative Stress Genes	
Upregulated by Hyperoxia	**Fold Change**
Peroxiredoxin 6	4.5
Downregulated by Hyperoxia and MnTBAP	**Fold Change**
Myeloperoxidase	-4.3
Peroxiredoxin 6, related sequence 1	-9.4

Hyperoxia significantly upregulated peroxiredoxin 6 expression compared to room air exposed newborn mice. Treatment with MnTBAP downregulated the expression of myeloperoxidase and peroxiredoxin 6, related sequence 1. Hyperoxia downregulated the expression of angiogenic genes such as angiopoietin 1 & 2, TGF β1, TGF β3 and HGF; MnTBAP treatment during the hyperoxia reversed this effect and these genes were upregulated.
CONCLUSIONS: MnTBAP reversed the effects of hyperoxia on angiogenic gene expression in newborn mice. It also decreased the expression of myeloperoxidase, a marker of inflammation following hyperoxia. The protective effects of antioxidants need to be studied further to provide additional understanding of the management of bronchopulmonary dysplasia.

40
9:15 AM
The Role of TGFβ in Hyperoxia/Hypoxia-Induced Delay in Alveolarization and Endothelial Dysfunction

Huayan Zhang, Bo Han, Scott G. Worthen, Horace M. DeLisser.
Pediatrics, UPENN School of Medicine-CHOP, Philadelphia, PA; Medicine, UPENN School of Medicine, Philadelphia, PA.

BACKGROUND: Bronchopulmonary dysplasia is characterized by an arrest of lung vascular and alveolar development. Excessive transforming growth factor-beta (TGFβ) signaling may contribute to the disruption of alveologenesis and angiogenesis in the developing lung. Premature infants are frequently exposed to moderate hyperoxia and also experience intermittent hypoxic events (hyperoxia/hypoxia) during their first few weeks of life. Both hyperoxia and hypoxia can affect angiogenesis and the expression of TGFβ.
OBJECTIVE: The objectives of this study are to examine the effects of hyperoxia/hypoxia on alveolar development and TGFβ expression in newborn mice and the effects of hyperoxia/hypoxia and TGFβ on endothelial function in vitro.
DESIGN/METHODS: Newborn mice were placed in room air or 60% O2 with 10 minutes of 12% O2/day from postnatal day (PN) 3 to 21. Alveolar and lung vascualr development as well as TGFβ expression were assessed at PN7, 14 and 21. In a separate group of animals exposed to hyperoxia/hypoxia, anti-TGFβ antibody or IgG (10mcg/g) were given by intraperitoneal injection at PN3, 8, 13, and 18. Animals were sacrificed at PN21 and alveolar development were evaluated. In vitro, Human Umbilical Vein Endothelial cells and immortalized mouse lung endothelial cells(EC) were cultured under room air in the presence or absence of TGFβ, or they were exposed to 60% O2 with 5% O2 for 10 minutes x4 for 24 hours. EC proliferation, apoptosis and migration were evaluated.
RESULTS: As compared to room air controls, mice exposed to hyperoxia/hypoxia showed inhibition of alveolarization with increased active TGFβ and Smad signaling in the lung. Anti-TGFβ antibody treatment given during hyperoxia/hypoxia exposure were able to improve lung architecture and significantly increased radial alveolar counts as compare to IgG treatment (10.45±0.68 vs. 8.22±0.1, $p<0.03$). In vitro, both hyperoxia/hypoxia and TGFβ exposure delayed migration without affecting proliferation or apoptosis in the cultured ECs. A selective type I TGFβ receptor antagonist, SD208, was able to rescue the delayed EC migration induced by hyperoxia/hypoxia or TGFβ back to the control level.
CONCLUSIONS: Hyperoxia/hypoxia exposure in newborn mice causes delayed alveolarization and this is associated with increased active TGFβ. Our data suggests that hyperoxia/hypoxia, possibly through increasing TGFβ activity, may induce endothelial dysfunction that might contribute to delayed alveolarization.

41 Medical Student
9:30 AM
Feeding Enhances Translation Initiation Complex Formation in the Lungs of Hyperoxia-Exposed Newborn Rats

Bethany Edwards, Wesley Konsavage, Whitney Zurat, Jeffrey S. Shenberger.
Pediatrics; Cellular and Molecular Physiology; CHILD Research, Penn State College of Medicine, Hershey, PA.

BACKGROUND: Somatic and lung-specific growth deficiencies are common among preterm infants who develop bronchopulmonary dysplasia (BPD). Hyperoxia, an etiologic factor in the pathogenesis of BPD, is known to diminish global protein synthesis in cultured lung cells. This occurs, in part, via a reduction in the formation of active translation initiation complexes necessary to facilitate mRNA/ribsome interactions. To date, little is known regarding these regulatory processes *in vivo*.
OBJECTIVE: Our objective was to determine if hyperoxia alters translation initiation complex formation in newborn rat pups.
DESIGN/METHODS: Four-day-old Sprague-Dawley rat litters were exposed to 95% O_2 (Ox) or room air (RA) for 24 hr. Additional litters were fasted by maternal separation for 1-8 hrs at the end of the 24-hr exposure. These pups were fed 0.4 ml of water (W) or infant formula (F) and sacrificed after 30 min. Lung and liver protein synthesis was determined after a flooding dose of [^{3}H]phenylalanine in dam-fed pups. Whole lung and liver homogenates were studied for translation initiation complex formation (eIF4G bound to eIF4E) and competitive 4E-BP1:eIF4E binding using affinity chromatography and immunoblotting, respectively.
RESULTS: Hyperoxia reduced global pulmonary protein synthesis after 24 hrs in dam-fed pups (RA: 784±59, OX: 675±53; dpm/mg/hr, $p<0.05$) but had no effect on hepatic synthetic rates. This effect coincided with a 90% increase in eIF4G:eIF4E binding in the lungs. To determine organ-specific changes to feeding, pups were fasted for 1, 4, and 8 hrs by maternal separation. In these groups, Ox increased pulmonary, but not hepatic, eIF4G:eIF4E binding upon feeding ($p<0.05$, ANOVA). Specific alterations in both the water and formula fed groups were found following 8 hrs of fasting (W: RA, 0.5±.0.1 vs Ox, 1.3±0.2; F: RA, 0.8±0.2 vs Ox, 1.4±0.4 arbitrary units, $p<0.05$). No effect was observed in 4E-BP1:eIF4E binding, although significant interactions between Ox and formula feeding were noted in both lung and liver tissues ($p<0.05$).
CONCLUSIONS: Our results show that Ox paradoxically enhances basal and feeding-induced translation initiation complex formation in the lungs despite an overall reduction in lung protein synthetic rates. These findings raise speculation that hyperoxia-induced alterations in nutritional signaling contribute to the aberrant pulmonary growth and development observed in infants with BPD.

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9:45 AM
Prone Positioning Decreases Pepsin in Tracheal Aspirates from Premature Ventilated Infants

Sabeena Farhath, Judy Saslow, Sam Sounder, Zhaoping He, Barbara Amendolia, Riva Eydelman, Keely Pierzchalski, Kee Pyon, Patricia Pearlman, Gary Stahl, Dev Mehta, Zubair Aghai.
Pediatrics, Cooper University Hospital/UMDNJ-Robert Wood Johnson Medical School, Camden, NJ; Pediatric Gastroenterology, Alfred I duPont Hospital for Children/Thomas Jefferson University, Wilmington, DE.

BACKGROUND: Detection of pepsin in tracheal aspirates (TA) is a marker of gastric contents and aspiration. Premature ventilated infants are more susceptible to gastric aspiration. Prone positioning may prevent aspiration of gastric contents in premature ventilated infants.
OBJECTIVE: To study the effects of positioning on aspiration of gastric contents in premature ventilated infants.
DESIGN/METHODS: Stable premature infants (gestational age <30 weeks) on ventilatory support were enrolled in the study. The infants were placed on both prone and supine positions. The order of the position was determined randomly for each infant. TA samples were collected after 12 hours in both positions. An enzymatic assay with FITC-casein as substrate was used to detect pepsin activity. Pepstatin was used to selectively inhibit pepsin A. The final Pepsin A activity was obtained by subtracting pepsin C activity from the total activity. Total pepsin, pepsin A and pepsin

C were compared in supine and prone positions.

	Supine	Prone	p
Total Pepsin (ng/ml)	442.1 ± 234.5	299.7 ± 217.9	0.01
Pepsin A (ng/ml)	59.1 ± 119.6	12.1 ± 15.8	0.02
Pepsin C (ng/ml)	382.5 ± 221.9	287.6 ± 223.6	0.03

RESULTS: Fourteen premature infants were enrolled {birth weight (mean±SD) 690±119 grams, gestational age 25.1±1.7 weeks}. The median age of randomization was 33 days (range 18-56 days). Total pepsin, pepsin A and pepsin C were significantly lower in prone position compared to supine.
CONCLUSIONS: The level of pepsin in TA is decreased in prone position in premature ventilated infants. We speculate that prone positioning may reduce lung injury in premature ventilated infants by decreasing the aspiration of gastric contents.

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10:00 AM
High Mobility Group Box-1 Protein in Tracheal Aspirates from Premature Infants: Relationship with Bronchopulmonary Dysplasia and Steroid Therapy

Zubair Aghai, Judy Saslow, Chinazo Meniru, Catherine Porter, Riva Eydelman, Vishwanath Bhat, Gary Stahl, Sulaiman Sannoh, Kee Pyon, Charles Hewitt, Vineet Bhandari.
Pediatrics/Surgery, Cooper University Hospital/UMDNJ-Robert Wood Johnson Medical School, Camden, NJ; Pediatrics, Yale University School of Medicine, New Haven, CT.

BACKGROUND: High mobility group box-1 (HMGB1) is a potent inflammatory mediator and contributes to acute lung injury in adults. HMGB1 increases the production of pro-inflammatory mediators by inducing translocation of nuclear factor-kappa B into the nucleus. The role of HMGB1 in neonatal lung injury and the development of bronchopulmonary dysplasia (BPD) is unknown.
OBJECTIVE: To study the association between HMGB1 in tracheal aspirates (TA) and the development of bronchopulmonary dysplasia (BPD) in premature infants.
DESIGN/METHODS: Serial TA samples were collected on days 1, 3, 5 and 7 from 55 mechanically ventilated premature neonates [gestational age (GA) <30 weeks (w), birth weight (BW) <1250 grams (g)]. Additional TA samples were collected before and 48-72 hours after steroid therapy. The level of HMGB1 was determined using a commercially available ELISA kit (Shino-test, Kanagawa, Japan). Total protein in TA was measured by Bradford assay to correct for sampling related dilution. BPD was defined as the need of supplemental oxygen at 36 weeks postmenstrual age (PMA).
RESULTS: A total of 199 TA samples were collected from 55 premature neonates (mean±SD, GA 25.6±1.4w, BW 775±174g). HMGB1 was detectable in all TA samples. Thirteen infants (GA 26.2±1.7w, BW 885±203g) survived without BPD at 36 weeks PMA and 42 infants (GA 25.4±1.5w, BW 741±151g) died before 36 weeks PMA or developed BPD. The mean HMGB1 level was higher in infants who died or developed BPD (39.1±37.1 ng/mg of protein) compared to those who survived without BPD (16.9±8.6, p=0.01). The mean HMGB1 was also significantly higher on day 1 (47.2±40.1) in infants who died or developed BPD compared to infants with no BPD (20.5±9.8, p= 0.037). Twenty two infants received 23 courses of steroids. No significant differences in HMGB1 levels were noted with steroid therapy (before 38.8±37.8, after 56.5±61.6, p=0.2).
CONCLUSIONS: Higher HMGB1 levels in TA samples are associated with the development of BPD or death in premature infants. Anti-inflammatory effects of steroids may not be mediated via HMGB1. We speculate that HMGB1 has an important role in acute lung injury in premature infants.

44
10:15 AM
Effects of High Flow Nasal Cannula in the Smaller Preterm Infant

Kee H. Pyon, Zubair H. Aghai, Gary E. Stahl, Judy G. Saslow.
Pediatrics/Neonatology, Cooper University Hospital/UMDNJ-Robert Wood Johnson Medical School, Camden, NJ.

BACKGROUND: High flow nasal cannula (HFNC) has gained increased use as respiratory support even with the paucity of evidence for its use in preterm infants. There is a concern that HFNC may deliver high pharyngeal pressures in infants weighing <1500 grams due to less nasal leak from tighter fitting cannulas.
OBJECTIVE: To compare end distending pressure (ΔP) and work of breathing (WOB) in neonates less than and greater than 1500 grams on HFNC support.
DESIGN/METHODS: 8 preterm neonates < 1500 grams {mean ± SD: birth weight (BW) 1019 ± 303 grams, gestational age (GA) 27.8 ± 2.1 weeks; at time of study, weight 1167 ± 218 grams, age 15.5 ± 18.5 days, FiO_2 0.33 ± 0.16} and 10 preterm neonates >1500 g (BW 1196 ± 494 g, GA 28.6 ± 3.9 wks; at time of study, weight 1841 ± 306 g, age 34.5 ± 27.7 days, FiO_2 0.32 ± 0.11) were studied on HFNC at 3, 4, and 5 L/min (HFNC3, HFNC4, and HFNC5, respectively). Calibrated DC-coupled respiratory inductance plethysmography was used to measure tidal ventilation. An esophageal balloon estimated pleural pressure. ΔP from baseline was calculated at each HFNC flow. Using standard methods, inspiratory, elastic, and resistive WOB (IWOB, EWOB, and RWOB, respectively) were calculated.
RESULTS: There was no significant difference in ΔP which increased slightly at flows 4 and 5 L/min for infants >1500 g compared to the smaller infants. The WOB parameters were significantly higher for infants >1500 g at all flows except IWOB and EWOB at HFNC5.

	< 1500 g (N=8)			> 1500 g (N=10)		
	HFNC3	HFNC4	HFNC5	HFNC3	HFNC4	HFNC5
IWOB (cmH_2O/ml)	2.65±1.52	2.53±1.48	2.43±1.15	4.75±1.50*	4.48±1.52#	4.35±2.19
EWOB (cmH_2O/ml)	1.46±0.76	1.40±0.61	1.54±0.53	2.97±1.18*	2.97±1.38*	2.52±1.49
RWOB (cmH_2O/ml)	1.94±1.24	1.82±1.10	1.72±0.78	3.31±1.41*	3.48±1.40*	3.47±1.69#
ΔP (cmH_2O)	1.23±0.72	1.28±1.35	1.19±0.94	1.22±1.10	1.88±0.53	1.45±0.63

T-test comparison of infants <1500 g to infants >1500 g at corresponding HFNC levels: *p<0.01, #p<0.05

CONCLUSIONS: This pilot study has shown that the WOB was significantly higher for infants >1500 g compared to smaller infants on HFNC. The relatively low ΔP values for all the infants at the flow rates of 3-5 L/min reflect no significant lung overdistension. This is a very small study and additional infants will be evaluated, particularly those <1000 g to determine conclusively whether HFNC can be effectively and safely used in the high risk neonatal population.

General Pediatrics I
Platform Session

Saturday, March 14, 2009
8:15 AM-10:30 AM

45 — Fellow in Training
8:15 AM
Bright Present? The Relationship of Developmentally Focused Anticipatory Guidance and Parenting Practices

Prina Amin, Richard E. Adams, Lawrence Kleinman, Danielle Laraque.
Pediatrics, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: The third edition of Bright Futures recommends that pediatric providers give developmentally focused anticipatory guidance (AG) to promote recommended parenting practices in early childhood. The effectiveness of this AG in promoting a range of parenting practices is unclear.
OBJECTIVE: To examine the association between receipt of developmentally focused AG and the use of recommended parenting practices in early childhood.
DESIGN/METHODS: We analyzed a subset of the 2068 parents telephoned for the 2000 National Survey of Early Childhood Health, focusing on those with children 12-35 months old. (N=1482). Parents reported which of 12 specific AG topics were discussed in the past year. The number of developmentally focused topics (e.g. discipline) and each specific topic were our main independent variables. There were 5 such topics in the 12-18 month group and 7 in the 19-35 month group. The 2 groups were analyzed separately. Appropriate parenting practices, the dependent variable, were categorized into 5 domains as defined by Brooks-Gunn: discipline, language, monitoring, management, and materials. Parenting variables were dichotomized into parents who are high users and low users of recommended practices. Control variables included maternal age and education, SES, race/ethnicity, maternal mental health, number of children, and child physical and developmental health.
RESULTS: The number of developmentally focused topics discussed was related to 1 of 5 parenting domains in the 12-18 month group and 3 of 5 domains in the 19-35 month group based on multivariable analysis. Discussing more topics was associated with greater use of monitoring (safety) practices in both age groups (OR 1.3, p<.001). Discussion of more topics was related to parental use of recommended practices in 3 or more domains in the 19-35 month group (OR 1.2, p<.001). Chi square analysis showed discussion of bedtime routines in those 19-35 months was associated with greater use of appropriate parenting practices in all 5 domains (p <.05). Discussion of words child uses and discipline was associated with 4 domains in the 19-35 month group (chi square values p<.05).
CONCLUSIONS: Developmentally focused AG in early childhood is associated with recommended parenting practices. Discussion of specific topics may promote positive parenting in multiple, seemingly unrelated domains of parenting. This study provides evidence to support Bright Futures' recommendations.

46 — House Officer
8:30 AM
Language Acquisition in Internationally Adopted Children

Melina Harmelin, Patrick Mason.
Pediatrics, Inova Fairfax Hospital for Children, Fairfax, VA.

BACKGROUND: Overcrowding and understaffing is the unfortunate reality in orphanages worldwide and puts internationally adopted children at increased risk for developmental delays, with the vast majority exhibiting some degree of language delay. Several studies show that children with normal cognitive ability should be able to make significant progress in language acquisition within 3 months of their adoption. We sought to determine the level of initial language delays and the extent of language catch-up. By understanding the delays, we will be able to develop interventions that facilitate language acquisition.
OBJECTIVE: To determine the developmental levels of children adopted internationally on arrival and progress made within 3 months.
DESIGN/METHODS: Medical records of 106 children (age 1.8- 45.9 months) at the initial visit were reviewed. All children received medical and developmental assessments one month post-adoption. On average children were seen 3.9 months (range 0.99 – 23 months) after the first visit. Fifty percent of the children were girls. Children were adopted from 12 countries: Russia (34 %), China (20%) and Guatemala (24%). Developmental catch-up was determined as a greater than

50% increase in development per time interval between visits.
RESULTS: Assessment of expressive language revealed that the children were on average 5.75 months behind chronologic age at the initial visit. Receptive language was 5.21 months behind with gross and fine motor skills less impaired (3.29 and 3.63 months delay respectively). Children from Russia (-7.24 months) and China (-7.21 months) showed more language impairment on arrival than did those from Guatemala (-2.25 months). At the follow-up visit, 64% of the children showed no significant catch-up in expressive language while 49% failed to show catch-up in receptive language. Country of origin showed no significant impact on the rate of language catch-up.
CONCLUSIONS: Children learn language in early childhood, and later use language to learn. Although prior research suggests that the majority of developmental "catch up" occurs within the first three months of acclimation to a new environment, our data clearly demonstrates that a significant number of these children remain delayed. Future research needs to focus specifically on developing effective techniques that will facilitate the acquisition of language in this unique population of children.

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8:45 AM
Growth and Development of the Infants Exposed to the High Lead Level In Utero

Tatyana Gabinsky, Claudia Cosmineanu, Dean Stefanov, Melvin Gertner.
Pediatrics, Elmhurst Medical Center, Elmhurst, NY.

BACKGROUND: There is limited and inconsistent evidence on the effect of lead exposure in the achievement of the developmental milestones in the affected children (Bellinger 2004; Koller et al. 2004). Prenatal lead exposure, also, appears to increase the risk of reduced birth weight. Studies that accounted for gestational age suggest that the mechanism may be due to decreased fetal growth.Huseman et al.,(1992) suggested that lead-induced short stature may be due to reduction of IGF-I secretion or/and formation.
OBJECTIVE: Our goal was to describe growth and development of the children with known high lead exposure in utero.
DESIGN/METHODS: Study was conducted by retrospective chart revue. Data on the infants born to mothers with BLL's > 10 µg/dL were collected from January 2002 to October 2006. Women were screened during first prenatal visit. Initial physical examination of the newborns included determination of gestational age, weight, length, and head circumference.We included only those infants who had follow-up for 4 or more years.Data on the growth and development were taken from the individual growth chart and Denver screen stored in the hospital computer database.
RESULTS: From January 2002 to October 2006 146 infants were born to the mothers with median BLL's-17 µg/dL (range 11-56 µg/dL). Median BLL of the newborns was 19 µg/dL (range 11 - 42 µg/dL). 61(42.1%) infants had follow-up for 4 – 4,5 years. By 24 months BLL's declined to 3 µg/dL (range 1 - 6 µg/dL). 9 (14.7%) babies were born small for gestation age (SGA) with weight and length < 3%. Maternal BLL,s in this group ranged from 19 to 37 µg/dL. At 4 years 3 (4.9%) with prenatal lead exposure (range 20 - 37 µg/dL) had height < 3%. 95.1% of the infants had weight and height in the 25 to 50% range. 11(18.0%) children had delay in achievement of normal developmental milestones. Prenatal BLL's in this group ranged from 12 to 56 µg/dL. 3 (4.9%) - at 15 -18 months had delay in acquisition of fine motor coordination(maternal BLL's – 26- -40 µg/dL). 8 (13.1%) children (maternal BLL's 24 – 48 µg/dL) had language delay at 24 – 26 months. 3 (5.2%) had mild/moderate hearing loss.
CONCLUSIONS: In utero lead exposure may cause fetal growth retardation but does not interfere with subsequent reaching of the normal height. Delay in language acquisition presented as a main consequence of high prenatal lead exposure even with later decline in the lead concentration.

48 House Officer
9:00 AM
Needs Assessment: Creating a Mental Health Home for Latino Children

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BACKGROUND: Disparities in access and utilization of mental health (MH) services for Latino communities have been attributed to systemic barriers. A shared understanding between providers and the community can inform intervention planning.
OBJECTIVE: To understand and compare perceptions of Latino parents, pediatricians and MH-providers regarding MH needs and access to care.
DESIGN/METHODS: We performed a qualitative study of parents of children with a history of MH need, pediatricians, and MH-providers from three health centers serving a primarily Latino urban community. We conducted 3 focus groups with parents, 2 with pediatricians, and 1 with MH-providers. Two families participated in in-depth interviews/home visits. Focus groups/ interviews were audio-taped and professionally transcribed. Two investigators independently coded transcripts for thematic content; differences were resolved via consensus.
RESULTS: Themes arose under four main categories: Scale of the Problem, Etiologies of MH problems, Barriers to access, and MH needs. **Scale**: Parents cited consequences of MH problems on self, family and community. Both MH-providers and pediatricians were concerned about the variety and severity of diagnoses seen in primary care. **Etiology**: All groups identified familial disruption, poverty, violence, school stress, parental MH problems, and lack of education as etiologies for MH problems for children. Parents emphasized social isolation and adolescence. **Barriers:** All groups acknowledged difficulty in negotiating systemic barriers, lack of community awareness, and a lack of caring MH-providers. Parents and MH-providers stated mistrust for public institutions. Both pediatricians and MH-providers cited language barriers, myths about psychopharmacology, mistrust for community resources, and a lack of MH training for pediatricians. **Needs:** All groups identified a need for on-site counseling services and the role of spirituality/church as a community coping strategy. Parents expressed a need for preventive services and sense of community. Both pediatricians and MH-providers described a need for improved access, communication between the two disciplines, and training of pediatricians in MH care.
CONCLUSIONS: Collected as part of an AAP Resident CATCH grant, this data will help us plan to develop a community coalition to better address the MH needs of the Latino community. Goals will include community education, MH training for primary care providers, and advocacy for on-site counseling services.

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9:15 AM
Racial Disparities for Ambulatory Care Sensitive Hospital Stays Persist from 1997 to 2006

Suzette O. Oyeku, Ryan Conrad, Andrew D. Racine.
Children's Hospital at Montefiore, Bronx, NY; CUNY Graduate Center, NY, NY.

BACKGROUND: Ambulatory care sensitive conditions (ACSC) are diagnoses for which timely and appropriate outpatient care might prevent a hospitalization. Discharges for ACSC are used as a marker of quality care. Prior studies show that Blacks have higher rates of ACSC discharges compared to the general population. Children with sickle cell disease (SCD) also experience a higher proportion ACSC discharges. It is not known if the racial disparity for ACSC discharges has changed over time or if differences exist in the proportion of ACSC discharges among blacks with and without SCD.
OBJECTIVE: To examine trends in non-pneumonia ACSC hospital discharges among 3 groups: all children without SCD, Blacks without SCD, and children with SCD from 1997 to 2006.
DESIGN/METHODS: Nationally weighted hospital discharge data from 1997, 2000, 2003 and 2006 Kids' Inpatient Databases were used to assess trends in non-pneumonia ACSC hospitalizations for patient's ages 3 months-18 yrs. Multivariable logistic regressions were used to assess time trends in proportion of ACSC discharges controlling for covariate predictors.
RESULTS: 5,939,302 discharges (1997 to 2006) were analyzed. From 1997 to 2006, non-pneumonia ACSC were present in 34% of discharges among all children without SCD. The unadjusted proportion for Black children and children with SCD were 38% and 24%, respectively. Black children without SCD were 30% more likely to have a non-pneumonia ACSC discharge compared to white children (OR 1.30, p< 0.001) Children with SCD had 63% lower odds of non-pneumonia ACSC discharge relative to Blacks without SCD (OR 0.37, p< 0.001). From 1997 to 2006, the proportion of discharges for ACSC increased by 12% for Black children relative to white children adjusting for age, insurance and other covariates (OR 1.12, p=0.010). For the same period, children with SCD relative to Black children had a nonsignificant decline in ACSC discharges (OR 0.42, p=0.080).
CONCLUSIONS: From 1997 to 2006, Blacks without SCD were more likely to have an ACSC discharge than whites. During the same period, children with SCD had a nonsignificant trend towards decreased discharges for ACSC relative to Blacks without SCD. Racial disparities for ACSC discharges still persist over time. These results might reflect differential access to ambulatory care among these populations. Further study of the impact of having a medical home on discharges for ACSC is warranted.

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9:30 AM
Racial Disparities in the National Rates of Labor Induction at Term Gestation in the United States

Karna Murthy, William A. Grobman, Todd A. Lee, Jane L. Holl.
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BACKGROUND: Singleton induction rates from 37-41 weeks gestation have significantly increased in the US from 1991-2004. It remains unclear whether this change in obstetrical practice is equally evident among women of different race.
OBJECTIVE: To estimate the effect of maternal race on the observed increase in the rate of labor induction at term gestation.
DESIGN/METHODS: Data from the National Center for Health Statistics were used to identify women that delivered singletons between 37 0/7 - 41 6/7 weeks gestation in the US from 1991-2004. Women were excluded if placental previa or breech/malpresentation was reported or if their record had missing data elements. The primary outcome was the term Induction rate, and this was calculated as the frequency of induction per 1000 eligible women in each state. Multivariable linear regression analysis was performed to assess whether maternal race (coded as white, African-American (AA), or non-white/non-AA) was an independent predictor of the magnitude of rise in induction rate. Maternal medical and demographic factors were assessed in the equation for potential confounding. The final model included covariates that changed the association between maternal race and induction rates by at least 20%. Statistical significance was defined as α=0.01.
RESULTS: A mean of 3,016,936 (SD 72,231) eligible women delivered annually. The average rate of inductions doubled over the study period from 121 per 1000 in 1991 to 246 per 1000 in 2004 (p<0.001). Unadjusted induction rates stratified by race also doubled over the 14 years studied (white: 122 to 245 per 1000, AA: 98 to 202 per 1000, and non-white/non-AA: 90 to 210 per 1000, all p<0.01). When compared to maternal AA race, both white and non-white/non-AA maternal races independently predicted the magnitude of the increase of induction rates. After adjusting for antepartum risk factors for medically-indicated induction, maternal age, and marital status, each 1% increase in the proportion of the white and non-white/non-AA populations within a state was associated with significantly higher induction rates (16% and 22%, respectively).
CONCLUSIONS: Induction rates at term gestation have increased for all gravid women, however, after accounting for confounding factors, this rise has increased disproportionately among women of non-AA race. Reasons for this racial disparity race are unclear but may be related to systematic differences in health care delivery.

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9:45 AM **Fellow in Training**

Subjective Social Status over a Lifetime and Associations with Prematurity

Erika F. Dennis, Scott Lorch, Leny Mathew, Jennifer Culhane.
Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA; Adolescent Medicine, Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Low socioeconomic status (SES) is widely regarded as an important factor in health research, as it has been shown to be consistently associated with relatively high-risk health behaviors, increased exposure to significant health risks, and a wide range of adverse health outcomes. How to best measure SES is, however, a subject of some debate in the health literature. The efficacy of using subjective self assessment of SES as a measure of socioeconomic status has received some support within the context of this debate, but empirical data linking subjective socioeconomic status (SSS) to health-related behaviors, risks, or outcomes is relatively scant.

OBJECTIVE: To determine associations between current and childhood SSS and the risk of premature delivery in a low income, urban population.

DESIGN/METHODS: A longitudinal prospective survey of 1248 women attending Philadelphia Health Centers conducted at the first prenatal care visit, 3 months postpartum, and 11 months postpartum. Surveys included a 10 rung ladder allowing women to rank their current and childhood subjective social status. Birth outcomes were recorded in surveys and confirmed through medical records. Univariate analysis and logistic regression analyses were used to assess potential associations between prematurity (gestation <37 weeks) and both current and childhood SSS. Three SSS trajectories (upward, downward, and flat) for one's perceptions of their social standing over a lifetime were also created and compared to the risk of prematurity.

RESULTS: We found no relationship with current SSS and rates of prematurity. In contrast, when we compared current SSS and childhood SSS, we found that those who felt they had progressed on a downward trajectory were more likely to experience preterm birth (OR 1.91, 95%CI 1.07-3.40) compared to those who felt they were on an upward trajectory, relative to their childhood status. This relationship persisted after adjustment for income, education, age, race, parity, and marital status in our multivariate analyses (OR 1.88, 95%CI 1.05-3.37).

CONCLUSIONS: Our findings suggest that birth outcomes may be related to childhood socioeconomic status and the progression or deterioration of one's social status throughout a lifetime, as measured by subjective self assessments.

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Medical Student

10:00 AM

Nursing Staff Adherance to Hand Hygiene Protocol in a Regional Perinatal Center

X. Wu, E. Swanson, B. Clones, B. Parvez.
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BACKGROUND: Adherence to hand hygiene protocols is a key factor in preventing HAI. Staff education has been shown to improve compliance. Ongoing surveillance may provide information for targeted interventions for improvement.

OBJECTIVE: To compare the adherence to hand hygiene protocol before and after the introduction of individual bedside alcohol-based sanitizers and staff education; to determine whether hand hygiene practices differ between levels of touch; to elucidate possible reasons for non-adherence.

DESIGN/METHODS: Hand hygiene practices of NICU nursing staff were compared before and after the introductions of bedside waterless hand sanitizers and the staff education focussed on our compliance rates and on the role of hand hygiene in HAI prevention. The observations were categorized into three levels of touch: patient's immediate environment outside or inside the isolette (Level 1), the patient directly (Level 2), and after patient contact (Level 3) and in the following groups: clean hands with or without gloves; unclean hands with or without gloves. It was also noted whether contact occured during routine or emergency care.

RESULTS: A total of 771 observations before and after patient contact and 208 observations for level of touch were made. Adherence increased after the introduction of bedside sanitizers: 73% vs. 80% before and 83% vs. 90% after patient contact ($p<.01$). Hand hygiene was practiced the most with Level 2 (89%) and the least with Level 1 (67% and 68%). The most utilized hand hygiene techniques were clean hands with or without gloves. Emergency situations could not explain the lack of hand hygiene as 69% of non-compliance occurred during routine care. Higher nurse to patient ratio was cited as explanation. After education, compliance rates increased across all levels of touch with a 33% increase for Level 1 touches ($p< .005$) and 22% increase for Level 3 touches ($p<.01$).

CONCLUSIONS: As reported by others, we observed that hand disinfection is not always practiced. Staff education and bedside waterless hand sanitizers produced a significant improvement. The suboptimal adherence to the hand hygiene protocol could not be explained by emergency situation. The system improvement should focus on providing the tools for perfect hygiene, on optimizing staff education and on improving staff motivation. Ongoing surveillance is essential. Furthermore, it is time to find the right balance between system improvement strategies and implementation of personal accountability.

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10:15 AM

Transition Practices at Cystic Fibrosis Treatment Programs Vary Nationwide

Lisa K. Tuchman, Ioanna D. Kalogiros, Kimberly M. Ganster, Ronald C. Rubenstein.
Craig-Dalsimer Division of Adoloscent Medicine, The Children's Hospital of Philadelphia, Philadelphia, PA; Division of Pediatric Pulmonology, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Despite the 2004 Cystic Fibrosis (CF) Foundation consensus statement mandating patients to transition to adult care when developmentally appropriate, there are no guidelines on specific transition programs nor is there data regarding the optimal program model to facilitate smooth transfer of care.

OBJECTIVE: To describe the structure and components of transition practices employed by CF programs in the US as a first step to systematically improve the transition process.

DESIGN/METHODS: An online survey was administered via email to all 305 US based CF program directors between September and November 2008. Descriptive analyses were conducted.

RESULTS: One hundred and twenty program directors from 42 states (39% response rate) participated. Respondents represented pediatric (n=30), adult (n=26), and combined pediatric and adult treatment programs (n=64). Eighty percent of pediatric (24 of 30) and 68% of combined (42 of 62) programs reported having practices in place to help transition patients to adult CF care. Common components of transition practices across programs included providing parental/family support around transition (51 of 64) and discussing self-management goals and skills (45 of 64). Formal review of transition readiness was endorsed by 75% (18 of 24) of pediatric directors compared to 60% (24 of 40) of combined directors. The majority (51 of 64) of pediatric and combined directors had not indicated having a separate transition focused patient visit. Only combined directors reported that adolescent medicine specialists participate in their transition process (4 of 40)**.** Other differences between programs included the availability of a genetic counselor (4% vs 17% vs 28%), gastroenterologist (4% vs 30% vs 23%) or physical therapist (12% vs 23% vs 23%) at adult programs compared to pediatric and combined programs, respectively. Only two directors (both from combined programs) stated that patients were able to see a gynecologist during their visit. The median patient age of initial discussion of transition was 16 years (range, 0-20) and the median reported age at transfer was 19 years (range, 18-25.5).

CONCLUSIONS: The majority of CF programs have established transition practices; however, there is significant diversity with no standardization. Further research needs to explore the relationship between CF transition practices and health status outcomes in order to establish a systematic, evidence-based transition process.

Hematology-Oncology Platform Session

Saturday, March 14, 2009
8:15 AM-10:30 AM

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Medical Student

8:15 AM

Immunotherapy Targeting the WT1 Leukemia Antigen

Chioma Ihunnah, Robert Jenq, Marcel R.M. van den Brink.
Immunology, Memorial Sloan Kettering Cancer Center, New York, NY.

BACKGROUND: Wilms Tumor 1 (WT1) is a zinc finger transcription factor established as a tumor suppressor in many pediatric cancers. Emergent data has demonstrated additional oncogenic roles of WT1. Adult and pediatric leukemias such as AML, ALL, CML and MDS demonstrate overexpression of WT1 while relatively limited expression of WT1 in normal tissues has generated interest in targeting WT1 using cancer vaccines. Peptide vaccines against the protein are currently in clinical trials. Antibody-mediated blockade of CTLA-4 has been shown to enhance anti-tumor immune responses.

OBJECTIVE: To evaluate a WT1 DNA vaccine alone and combined with CTLA-4 blockade in a murine model using leukemic cell lines overexpressing WT1.

DESIGN/METHODS: C57BL/6 mice were challenged with C1498-WT1 murine leukemia cells and then received repeated vaccinations with either a plasmid encoding WT1 with mutations designed to enhance immunogenicity or a plasmid containing a noncoding control sequence, administered by gene gun. Both vaccines were administered with either anti-CTLA-4 antibody or control Ig antibody. Efficacy of immune therapies were assessed by serial tumor measurements. We also performed in vitro assays to evaluate for specific T cell responses against WT1-expressing cells or cells pulsed with WT1-peptide. T cell production of interferon-gamma and cytotoxicity were evaluated using flow cytometry.

RESULTS: Mice that received WT1 vaccinations unfortunately demonstrated tumor growth similar to that of control mice. Additionally, mice given anti-CTLA-4 antibody did not have reduced tumor volumes compared to Ig receiving counterparts. Cytotoxicity and interferon-secretion assays, however, indicate that WT1 DNA vaccination did induce T cell responses against WT1-peptide-pulsed cells and WT1-expressing leukemia cells.

CONCLUSIONS: Our data suggest that WT1 DNA vaccination can produce specific T cell responses and killing of WT1-expressing murine leukemia cell lines. This suggests that DNA vaccines targeting WT1 could have clinical potential for treating leukemias that overexpress WT1. It appears however that efficacy is lacking when using in vivo models. This could potentially be due to selective loss of expression of WT1 in our cell lines, which can be addressed by expanding high-expressing clones. Alternatively, future efforts could be directed at strategies to enhance the efficacy of our vaccine, including directing the WT1 protein to dendritic cells.

55 House Officer

8:30 AM

Maternal Exposure to Medical Radiation and Wilms Tumor in the Offspring: A Report from the Childrens' Oncology Group

Ruchika Goel, Andrew F. Olshan, Julie A. Ross, Norman E. Breslow, Brad H. Pollock.

Pediatrics, Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA; Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, NC; Pediatrics, University of Minnesota, Minneapolis, MN; Biostatistics, University of Washington, Seattle, WA; Epidemiology and Biostatistics, University of Texas Health Science Center at San Antonio, San Antonio, TX.

BACKGROUND: Wilms tumor is the most common primary malignant renal tumor in the pediatric population. Although there have been many putative risk factors for Wilms tumor, none have been unequivocally established except for rare genetic conditions and congenital anomalies. The young age at diagnosis of Wilms tumor suggests that pre-conception and in-utero exposures may contribute to its etiology. Medical radiation has previously been examined as a risk factor for many childhood cancers.

OBJECTIVE: This study examined the association between pre-conception and in-utero maternal medical radiation exposure and Wilms tumor, using data from a large population-based case-control study.

DESIGN/METHODS: Cases were identified from the National Wilms Tumor Study Group. Controls were identified by random digit dialing and frequency matched to child's age and geographic area of residence in the United States and Canada. Interview data from 523 cases and 517 controls were analyzed using multivariable logistic regression. Odds ratios (OR) and 95% confidence intervals (CI) were estimated for Wilms tumor and exposure to: 1) maternal X-ray alone and; 2) all medical radiation types (X-ray, CT, RT, Nuclear scans, Fluoroscopy) combined, for the period from two years before conception until child birth after adjustment for age, geographic area, maternal education, and household income. Data were also analyzed for five different exposure periods: between 2-1 year before conception, 1 year before conception through conception and the three trimesters during pregnancy. Additional analyses were conducted by case subgroups defined by the presence and type of nephrogenic rests, tumor site, stage, and multicentricity.

RESULTS: We found no consistent association between the risk of Wilms tumor and either maternal X-ray exposure (OR 0.9, 95% CI 0.7-1.3) or all medical radiation types combined (OR 0.9, 95% CI 0.7-1.2). No pattern of elevated odds ratios was found for different exposure periods as above. No meaningful associations were seen for analysis of gonadal or non-gonadal radiation exposure and for subgroup analysis.

CONCLUSIONS: This is the largest and most detailed study till date to evaluate maternal radiation exposure and the risk of Wilms tumor in the offspring. Our study did not find any consistent pattern of association between Wilms tumor and maternal radiation exposure during pre-pregnancy or pregnancy period.

56 Medical Student

8:45 AM

Results of a Randomized Trial To Improve Bone Health Knowledge and Behaviors among Adolescent Survivors of Childhood Cancer: The Survivor Health and Resilience Education (SHARE) Program

Allison Heinly, Lara D. Wilson, Sowmya Prahlad, Revonda B. Mosher, Aziza T. Shad, Kenneth P. Tercyak.

Georgetown University Medical Center, Washington, DC; The Children's Hospital at Sinai, Baltimore, MD.

BACKGROUND: More than 80% of children treated for cancer survive 5+ years later. The needs of this special group have attracted outcomes researchers to examine late effects of treatment and ways to prevent or reduce their onset. This includes a focus on healthy lifestyle behaviors. The Survivor Health and Resilience Education (SHARE) Program was developed to promote good bone health behaviors during childhood to reduce potential bone-related late effects such as osteopenia and osteoporosis in adulthood.

OBJECTIVE: To evaluate changes in calcium and bone health knowledge and common sources of calcium intake following a theory-based health promotion intervention among survivors of childhood cancer.

DESIGN/METHODS: Using tumor registries, 75 adolescents were recruited, assessed, and enrolled. Male and female adolescents 11-21 years-old and previously treated for any form of malignancy, one or more years cancer free, and off of treatment were eligible. Participants were randomized to either an experimental, group-based intervention consisting of health education/counseling on the management of cancer late effects or to a wait-list control condition. Standardized assessments of bone health knowledge/behavior were collected pre- and post-treatment.

RESULTS: Intervention and control conditions were similar at pre-test across all areas measured and on all outcomes. At post-test, intervention condition participants reported greater calcium and bone health knowledge than those in the control condition (t = 3.81, p = .0003). Those who received the intervention reported increased calcium intake by more frequent milk consumption (t = 2.16, p = .0347) and taking calcium supplements (χ^2 = 13.95, p = .0002).

CONCLUSIONS: SHARE successfully led to improvements on intervention participants' bone health and calcium knowledge, producing effects of improved bone health behaviors via increasing consumption of milk and calcium supplementation. Short-term results suggest that health promotion interventions are a promising means to effect positive changes in knowledge/behavior among childhood cancer survivors. Ultimately, this may help to prevent the onset and severity of cancer treatment-related late effects.

57 House Officer

9:00 AM

Thrombocytopenia and Neutropenia in Infants Born to Preeclamptic Mothers: Effects of Antenatal Steroids, Gestational Age and Birth Weight

Miriam Salvador, Vishwanath Bhat, Nosrat Razi, Judy Saslow, Sulaiman Sannoh, Kee Pyon, Nicole Kemble, Gary Stahl, Zubair Aghai.

Pediatrics, Cooper University Hospital-RWJMS, Camden, NJ.

BACKGROUND: Maternal hypertension is associated with an increased incidence of neonatal thrombocytopenia and neutropenia. The effects of antenatal steroids on thrombocytopenia and neutropenia in preterm infants born to preeclamptic mothers are unknown.

OBJECTIVE: To study the effects of antenatal steroids, gestational age (GA) and birth weight (BW) on neonatal thrombocytopenia and neutropenia in preterm infants born to preeclamptic mothers.

DESIGN/METHODS: Infants born to preeclamptic mothers and admitted to the neonatal intensive care unit were included. Relevant clinical and laboratory data were collected from the infants' medical records and data base. Preterm infants (GA≤ 34 weeks) who were exposed to antenatal steroids were compared with infants who were not exposed to antenatal steroids.

RESULTS: A total of 532 infants qualified for the study. The incidence and the severity of thrombocytopenia and neutropenia were significantly higher in preterm infants (≤ 34 weeks) compared to near term or full term infants. Out of 287 preterm infants ≤ 34 weeks, 197 (68.6%) infants were exposed to antenatal steroids and 90 (31.4%) were not exposed to steroids. After correcting for BW and GA, antenatal steroids had no effect on the risk for neonatal thrombocytopenia (OR 1.66, CI 0.81-3.39, p=0.2) and neutropenia (OR 1.19, CI 0.48-2.93, p=0.6). Only 74.1% of infants (40/54) with moderate to severe thrombocytopenia received antenatal steroid compared to 94.1% (32/34) with mild thrombocytopenia (p=0.04) and 86.9% (173/199) with no thrombocytopenia (p=0.03).

	≥37 weeks (n=132)	34-36 weeks (n=113)	≤34 weeks (n=287)
Thrombocytopenia (%)	10 (7.6)	12 (10.6)	88 (30.7)*#
Moderate-Severe Thrombocytopenia	5 (3.8)	9 (8.0)	54 (18.8) *#
Platelet transfusion	2 (1.5)	0 (0)	27 (9.7) *#
Neutropenia	3 (2.3)	2 (1.8)	70 (24.4) *#
Moderate-Severe Neutropenia	2 (1.5)	1 (0.9)	45 (15.7) *#

*p<0.05 compared to >37 weeks, #p<0.05 compared to 34-36 weeks

CONCLUSIONS: Neonatal thrombocytopenia and neutropenia are more common in preterm compared to near term or full term infants born to preeclamptic mothers. The use of antenatal steroids does not decrease the risk for neonatal thrombocytopnenia and neutropenia but may decrease the severity of neonatal thrombocytopenia in premature infants born to preeclamptic mothers.

58 House Officer

9:15 AM

Utility of an Hour Specific Bilirubin Nomogram in the Management of ABO Incompatible Coombs Positive Infants

David L. Schutzman, Romal Sekhon, Shilpa Hundalani.

Pediatrics, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: To prevent kernicterus and appropriately manage hyperbilirubinemia in the newborn, the AAP has recommended universal follow up at 24-48 hours following discharge, or plotting a pre-discharge bilirubin on an hour specific nomogram. However the nomogram most commonly used (Bhutani 1999) specifically excluded Coombs positive infants from the data set when it was developed.

OBJECTIVE: To assess the utility of an hour specific bilirubin nomogram in the management of hyperbilirubinemia of the newborn among infants who are ABO incompatible and direct Coombs positive.

DESIGN/METHODS: Retrospective chart review of all infants ≥ 35 weeks gestation born 9/07-8/08 with blood type A+ or B+ and direct Coombs positive and mothers who were O+. Per hospital routine serum bilirubins were drawn with the newborn screening. Bilirubin results were plotted on an hour specific nomogram. Follow up was scheduled as routine for bilirubin values in the low risk zone (zone 1), in 48 hours for the low intermediate zone (zone 2), in 24 hours for the high intermediate zone (zone 3) and discharge was delayed or phototherapy started for the high risk zone (zone 4).

RESULTS: 137 infants were studied. 61% were AA, 15% Hispanic, 10% white, 6% Asian and 8% others. 85% were on Medicaid. 80 were A+ and 57 were B+. There was no significant difference in Hbg. (A= 16.7±2.3, B=16.7±2.6), Retic. ct. (A=5.2±2.5, B=5.7±3.0) or bilirubin (A=6.8±2.8, B=7.2±3.1) between the A+ and B+ infants. 80 (58.4%) of all babies' bilirubins fell in zone 1, 25 (18.2%) in zone 2, 21 (15.3%) in zone 3 and 11(8.1%) in zone 4. There was no difference in percentage of babies in the various zones between the A+ and B+ babies. 12/137 (8.8%) met AAP criteria for initiation of phototherapy before discharge. All babies in zones 3 or 4 either had phototherapy started during their birth hospitalization or were followed post discharge. 2 additional babies required rehospitalization following discharge for hyperbilirubinemia. For infants in zone 4 the sensitivity was 57%, specificity 97.6%, PPV 72.7% and NPV 95.2% (Bhutani data 54%, 96.2%, 39.5%, 97.8%). In zone 3 the sensitivity was 42.9%, specificity 87.8%, PPV 28.5% and NPV 93.1% (Bhutani data 90.5%, 84.7%, 21.6%, 99.5%).

CONCLUSIONS: The 2 highest risk zones of the hour specific bilirubin nomogram have similar sensitivity, specificity and predictive values when applied to ABO incompatible Coombs + infants.

59 House Officer

9:30 AM

Knowledge, Attitudes and Behaviors and the Management of Hyperbilirubinemia in Newborns

Susan Mabrouk, Jean Lee, Karen Carpenter.
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VCUSOM, Inova Fairfax Hospital, Falls Church, VA.

BACKGROUND: In 2004 the AAP published the clinical practice guideline, "Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation". Despite guidelines historically having limited effect on changing physician practice, in Fairfax County, Virginia, the rate of severe hyperbilirubinemia has decreased from 8/1000 live births in 2003 to 4.6/1000 live births in 2007.

OBJECTIVE: To study the impact of the hyperbilirubinemia guideline on physician knowledge, attitudes, and behavior.

DESIGN/METHODS: A questionnaire was mailed to 443 physicans with privileges at a regional medical center. Twenty percent responded. All infants with bilirubins greater than or equal to 20 mg/dL from 2000 to 2008 were identified from electronic laboratory records.

RESULTS: Within 18 months of the 2004 hyperbilirubinemia guideline reaching physicans, a noticeable decrease in the number of children with severe hyperblirubinemia occurred.

YEAR	BILIRUBINS ≥20	FFX CTY BIRTHS	CASES/1000 BIRTHS
2000	85	17423	4.88
2001	90	17955	5.01
2002	129	18159	7.1
2003	149	18164	8.2
2004	119	18768	6.34
2005	146	19085	7.65
2006	94	19763	4.46
2007	90	19544	4.6

Figure 1. Impact of 2004 hyperbilirubinemia guideline on rates of bilirubin values ≥ 20 mg/dL.

Responding physicians were aware of the guideline 98%, 99% agreed with the guideline, 90% felt the guideline would prevent kernicterus, and 94% were familiar enough to answer five knowledge questions. However, only 60% answered all knowledge questions correctly; 73% complied with the guideline in practice 91-100% of the time.

INTERNAL BARRIERS	N	TOTAL	%
Lack of awareness of guideline	2	90	2
Lack of familiarity with guideline	5	90	6
Lack of agreement with guideline	2	88	1
Lack of self-efficacy	6	89	7
Lack of outcome expectancy	8	79	10
Lack of motivation	7	89	8
EXTERNAL BARRIERS			
Believe external barriers prevent compliance	9	80	11
SELF-REPORTED ADHERENCE TO GUIDELINE			
Achieved 100% on knowledge test	51	85	60
Achieved 91-100% in guideline compliance in nursery	60	75	80
Achieved 91-100% guideline compliance in clinic	66	74	89
Achieved 91-100% guideline compliance in both settings	47	64	73

Figure 2. Barriers to complying with hyperbilirubinemia guideline.

CONCLUSIONS: The 2004 AAP hyperbilirubinemia guideline has successfully overcome a large hurdle to implementation, physician attitude. In theory, physicians in this study also denied that knowledge and behavior prevented implementation. However, self-actualization of the guideline was achieved only 73% and this may be due to lack of actual working knowledge (60%).

60 Fellow in Training

9:45 AM

Changes in Regional Cerebral Oxygenation (rCO2) in Preterm Neonates during Neonatal Blood Transfusion (NBT) and Its Correlation to Hemoglobin Levels

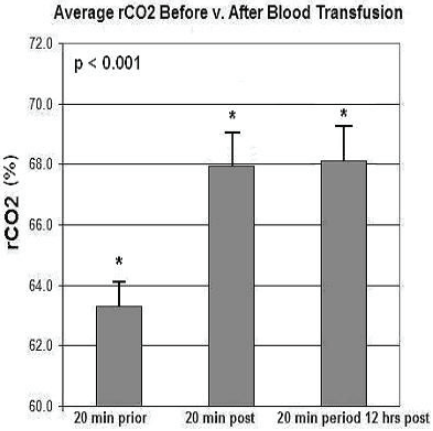
Sean M. Bailey, Karen Hendricks-Munoz, John T. Wells, Pradeep Mally.
Pediatrics, New York University School of Medicine, New York, NY.

BACKGROUND: Near Infrared Spectroscopy measures rCO2 and gives an indication of oxygen supply to the brain. Hemoglobin (Hgb) is a relatively poor indicator of tissue oxygen supply.We hypothesize that NBT results in a change in rCO2 that directly correlates with pretransfusion Hgb levels.

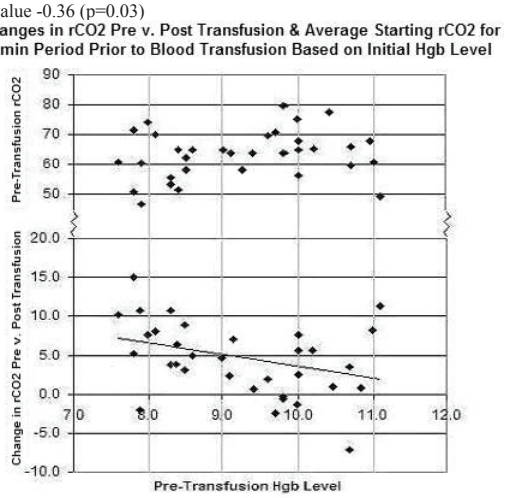
OBJECTIVE: To determine a)if rCO2 values increase and are sustained after NBT and b)if there is a relationship between the degree of change in rCO2 and pre-transfusion Hgb value.

DESIGN/METHODS: Prospective observational study.Preterm neonates receiving PRBCs (15cc/kg) for anemia at >5 DOL were monitored by NIRS. rCO2 values recorded every 5 seconds. Average rCO2 values 20 min. prior, post;12 hours post NBT were calculated.Neonates with CHD,≥grade 2 IVH,hydrocephalus;NEC excluded.Data analyzed using one-way ANOVA w/ Tukey HSD test and linear correlation.

RESULTS: 33 patients. Mean GA 28.3±3.1 wks, mean BW 1111 ±422 g. At transfusion, mean corrected GA was 32.7 ±3.6 wks and mean weight was 1399 ±455 g.



There is no correlation between pre-transfusion Hgb level and rCO2 values, however, there is a negative correlation between pre-transfusion Hgb level and the change in rCO2 after NBT[n=33,r =-0.39, critical value -0.36 (p=0.03)



CONCLUSIONS: RCO2 values increase after NBT. The amount of change correlates with initial Hgb levels.However,Hgb levels do not reflect absolute rCO2 (brain tissue oxygenation).This suggests that rCO2 may be useful to better determine cerebral oxygen supply than Hgb values alone, and assist in determination of transfusion need.

61 Fellow in Training

10:00 AM

Oxygen Saturation Monitoring in the Neonatal Intensive Care Unit (NICU): Evaluation of a New Alarm Management

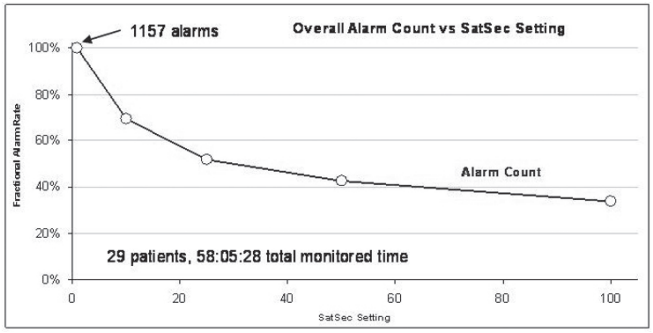
Heather M. Brostowicz, Khodayar Rais-Bahrami.
Neonatology, Children's National Medical, Washington, DC.

BACKGROUND: The standard of care for NICU patients is continuous O_2 saturation and pulse rate monitoring. Clinical application of this technology has been adversely affected by the high rate of alarms. Covidien introduced a new generation Nellcor™ pulse oximeter to improve SpO_2 measurements in the presence of signal interference called OxiMax™ N-600™*. Its efficacy is based on the rhythmic and persistent nature of physiologic signal. It incorporates the SatSeconds™ alarm management feature which is a product of desaturation points and event duration.

OBJECTIVE: The hypothesis was that progressive reduction in percentage of saturation alarms per hour decreased using the SatSeconds™ integral alarm feature.

DESIGN/METHODS: 30 neonates were studied over a 2 hour period. Vital signs, including ECG-derived heart rate from the multiparameter monitor were manually collected at 5 minute intervals. Upper and lower O_2 saturation alarm limits were determined individually, manually recorded, and preset on the test oximeter for later analysis. Caregivers were blinded to test oximeter display and audible alarms.

RESULTS: Consent was obtained and 29 patients were monitored for 2 hours each with the study monitor. Alarm events were recorded while the SatSeconds™ alarm management feature was set at 0, 10, 25, 50 and 100. The total number of alarms, both upper and lower limit, with standard monitoring was 1157 during the study period. With application of the SatSeconds™ alarm management feature, there was an overall decrease in alarms to 40% with a setting of 50. The difference between a 50 and 100 setting resulted in minimal change in the total number of alarms.



CONCLUSIONS: Application of an integrated alarm system such as SatSeconds™ alarm management allows caregivers to respond to clinically relevant alarms and reduces unnecessary alarms. At a setting of 50, the number of alarms was significantly reduced without loss clinically significant alarms.

62
10:15 AM

Parental Perception of Child's Comfort during Routine Venipuncture in Hospitalized Children

Katherine M. O'Connor, Sheila K. Liewehr, Meghan Kelly, Catherine Skae.
Pediatrics, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Studies of hospitalized pediatric patients suggest more be done to control painful experiences. (Ellis 2002) Venipuncture is a common painful procedure for hospitalized children, sometimes the worst part of a hospital stay. (Humphrey 1992) There has been much education to encourage use of topical anesthetics and child life interventions to ease the discomfort of venipuncture. (Cregin 2008, Bandstra 2008) However, when comfort techniques are available in a busy emergency room, they are under-utilized. (MacLean 2007) Little is known about the actual usage of comfort techniques on busy hospital services where many venipunctures are performed by rounding phlebotomists.

OBJECTIVE: Knowing the availability of topical anesthetic and child life specialists at our hospital and the campaigns to increase their utilization, we decided to investigate both the frequency of use of these interventions as well as parents' perception of child's comfort during routine venipuncture during hospitalization.

DESIGN/METHODS: We surveyed 71 parents of children aged 0-12 years admitted to the hospital about the use of "numbing medicine" and the presence of a child life specialist for the child's venipuncture. Excluded were parents of children with chronic illness, admitted following surgical procedure or with severe cognitive impairment. We asked parents to rate the child's comfort during a venipuncture using the Wong-Baker FACES scale. We used frequency tables for descriptive statistics of the data and mean and standard deviation for scaled results.

RESULTS: Of 71 parents surveyed, 18% reported the use of "numbing medicine" and 32% reported presence of a child life specialist during venipuncture. 51% of parents reported the venipuncture performed by a phlebotomist. Parents reported a mean score of 3.4 (standard deviation 1.9) on the Wong-Baker FACES scale (5=hurts the most) for child's comfort during venipuncture.

CONCLUSIONS: Despite education about comfort measures for routine venipuncture, the techniques are under-utilized for hospitalized children. This under-utilization is likely related to parents' perception of significant pain during venipuncture. Education and availability alone are not enough to ensure the use of comfort measures for children. We must develop interdisciplinary initiatives to improve use of these comfort techniques and we are beginning such an initiative at our institution.

Cardiovascular Platform Session

Saturday, March 14, 2009
8:15 AM-10:30 AM

63
Fellow in Training
8:15 AM

Glutamine Restores Myocardial Cytochrome Oxidase Activity and Improves Cardiac Function during Sepsis

Portia Groening, Zhishan Huang, Edmund F. La Gamma, Richard J. Levy.
Pediatrics, New York Medical College, Valhalla, NY.

BACKGROUND: Sepsis is the most common cause of death in critically ill patients. Cardiac dysfunction occurs commonly in sepsis. Impaired mitochondrial function is a potential cause of sepsis-associated myocardial depression. Cytochrome oxidase (CcOX), the terminal oxidase of the electron transport chain, is inhibited in the septic heart. Glutamine increases Krebs cycle intermediates and supports oxidative phosphorylation. Exogenous glutamine has been shown to restore myocardial ATP levels and cardiac function following ischemia-reperfusion. We hypothesize that exogenous glutamine will abrogate sepsis induced myocardial CcOX inhibition and improve sepsis-associated myocardial depression.

OBJECTIVE: To show that exogenous glutamine restores cardiac function and increases myocardial cytochrome oxidase activity during sepsis.

DESIGN/METHODS: Under general anesthesia, Sprague-Dawley male rats weighing 250-350 grams underwent cecal ligation and double puncture (CLP) or sham operation. At the time of operation, rats underwent i.p. injection of either glutamine (0.75mg/kg) or equal volume saline. Twenty four hours post procedure, animals were sacrificed, cardiac ventricles harvested and mitochondria were isolated. Steady state CcOx kinetic activity was measured and normalized to citrate synthase activity. Cardiac function was assessed at 24 hours using an isolated rat heart preparation. Five animals per group were evaluated. Significance was determined with ANOVA and post-hoc Tukey's test.

RESULTS: CLP significantly decreased myocardial CcOX activity, O_2 consumption, left ventricular pressure (LVP), and pressure developed during isovolumic contraction (+dP/d*t*) and relaxation (-dP/d*t*). Glutamine restored CcOX activity to sham levels, significantly increased myocardial oxygen extraction and consumption, increased LVP toward sham values and increased ±dP/d*t* by >30% following CLP.

CONCLUSIONS: Glutamine may be a novel therapy to restore oxidative phosphorylation and abrogate sepsis-associated myocardial depression.

64
8:30 AM

A High Throughput Screen Reveals the DiGeorge Syndrome Gene Tbx1 Interacts with the c-Jun Oncogene

Eldhose B. Thekkethottiyil, Li Huang, Jason Z. Stoller.
Pediatrics/Neonatology, Children's Hospital of Philadelphia, Philadelphia, PA; Animal Biology/Biochemistry, Univ of Penn School of Veterinary Medicine, Philadelphia, PA.

BACKGROUND: DiGeorge syndrome (DGS) is a common syndrome associated with chromosome 22q11 deletions. Most patients with DGS are born with severe heart defects. Congenital heart disease is the most commonly occurring birth defect and relatively little is known about the molecular basis of these defects. Mouse models have implicated Tbx1 as a critical gene within the commonly deleted region. TBX1 encodes a nuclear transcription factor that binds DNA and regulates downstream genes. Tbx1 direct targets and its transcriptional complex are largely unknown. We have identified a potential transcriptional cofactor, c-Jun. c-Jun is known to be part of the AP-1 transcription factor complex and regulates cell proliferation and differentiation.

OBJECTIVE: To identify the molecular mechanisms of Tbx1 function, identify novel Tbx1 interacting proteins and characterize the interaction of Tbx1 with c-Jun.

DESIGN/METHODS: Novel Tbx1 interacting proteins were discovered in a high throughput mammalian coactivator trap. Functional interactions were confirmed in two separate cell lines. Physical interactions were verified by immunoprecipitation experiments.

RESULTS: The screen revealed multiple transcription factors which mediate a significant increase in TBX1 dependent transcriptional activity. Many of these factors are expressed in tissues relevant in the pathogenesis of DGS. These functional interactions were reproducible in different cell types. One intriguing candidate coactivator was the proto-oncogene c-Jun. c-Jun and TBX1 physically and functionally interact. c-Jun mutant mice have cardiac and aortic arch artery remodeling defects reminiscent of both Tbx1 mutant mice and patients with DGS.

CONCLUSIONS: We present several new candidate transcriptional coactivators of TBX1 including the AP-1 transcription factor complex protein c-Jun. c-Jun robustly augments TBX1 dependent transcriptional activation and based on mutant mouse data reveals a potentially novel pathway relevant to human DiGeorge syndrome. NHLBI K08-HL086633.

65
8:45 AM

Optimal PaO_2 Levels in Peristent Pulmonary Hypertension of the Newborn (PPHN)

Satyan Lakshminrusimha, James A. Russell, Sylvia F. Gugino, Daniel D. Swartz, Karen A. Wynn, Robin H. Steinhorn.
Pediatrics, Physiology and Biophysics, SUNY, Buffalo; Pediatrics, Northwestern University, Chicago.

BACKGROUND: Infants with PPHN are managed with high levels of inspired oxygen to promote pulmonary vasodilation. However, high levels of inspired oxygen may result in oxidant stress. Rudolph and Yuan (JCI 1966) showed that PaO_2 levels <60 mmHg increased pulmonary vascular resistance (PVR) in normal young calves, but found no significant change in PVR with PaO_2 levels >60 mmHg. The optimal PaO_2 levels in an animal model of PPHN with high PVR are not known.

OBJECTIVE: To study the relationship between PaO_2 and PVR in 2-3 h old control and PPHN lambs.

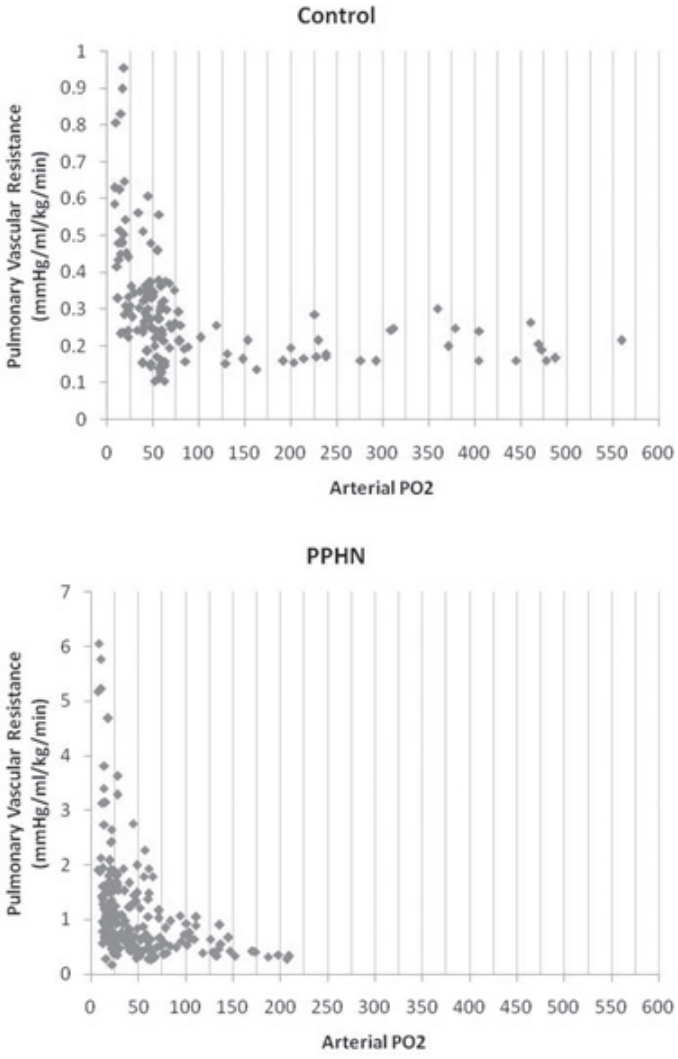
DESIGN/METHODS: We studied term control fetal lambs (n = 16) and lambs with PPHN induced by antenatal ligation of the ductus arteriosus 9d prior to delivery (n = 12). All lambs were instrumented to measure pulmonary arterial pressure (PAP), left atrial pressure and pulmonary blood flow. 2-3 h after delivery, they were randomly ventilated with FiO_2 of 0.1, 0.21, 0.5 and 1.0 for a period of 20 min each. At the end of each period, PVR was calculated and an ABG was obtained.

RESULTS: ABGs and mean PAP (mmHg) are shown in the table. PAP decreased with increasing FIO_2 from 0.1 to 0.21 and 0.5 in control and PPHN lambs. PAP did not decrease with increase in FIO_2 from 0.5 to 1. PVR increased with PaO_2 levels <70 mmHg but did not show any further decrease >70 mmHg in both control and PPHN lambs.

ABG Results and PAP (mmHg) in Control and PPHN Lambs (Mean ± Std Dev)

Lambs	CONTROL			PPHN		
F_{IO2}	pH	pO_2	PA pressure	pH	pO_2	PA pressure
0.1	7.39±0.08	17±5	63±12	7.26±0.1	13±4	65±15
0.21	7.4±0.1	53±13*	42±8*	7.32±0.15	25±15	54±15*
0.5	7.34±0.1	148 ±56*†	35±5*†	7.33±0.15	42±33*†	48±11*†
1	7.37±0.12	358±115*†#	37±7*†	7.34±0.13	67±53*†#	56±15*#

* p < 0.05 compared to FIO2 0.1, † p < 0.05 compared to FIO2 0.21, # p < 0.05 compared to FIO2 0.5



CONCLUSIONS: Maintaining PaO_2 ~70 mmHg reduces PAP and PVR in control and PPHN lambs. Further increases in PaO_2 by increasing FIO_2 do not further decrease PAP or PVR.

66 Medical Student

9:00 AM

Risk of Cardiovascular (CV) or Respiratory Decompensation Following Patent Ductus Arteriosus (PDA) Ligation Surgery

Robert L. Dood, Michael Posencheg, David Munson, Scott A. Lorch.
Center for Clinical Epidemiology & Biostatistics, The University of Pennsylvania, Philadelphia, PA; Neonatology, The Children's Hospital of Philadelphia, Philadelphia, PA; Neonatology, Hospital of the University of Pennsylvania, Philadelphia, PA.

BACKGROUND: CV and respiratory decompensation are potential complications of PDA ligation surgery in neonatal populations, yet incidence and risk factors remain uncharacterized.

OBJECTIVE: To measure incidence and evaluate risk factors for CV or respiratory decompensations after PDA ligation.

DESIGN/METHODS: This retrospective cohort trial enrolled 120 infants who underwent PDA ligation surgery from 2001-2008 at the Hospital of the University of Pennsylvania, and 2005-2008 at the Children's Hospital of Philadelphia. Subjects with positive blood cultures at time of surgery were excluded. Chart review recorded demographics, 5-day peri-operative clinical data, and laboratory results. CV decompensation was defined as an increase of 5 mcg/kg/hr of dopamine ≥2 hours from the 6 hour pre-operative baseline, or the addition of a new pressor. Respiratory decompensation was defined as a 50% increase in respiratory severity score (RSS=MAP*FiO2) for ≥4 hours post-operatively, or a RSS >2 for ≥ 4 post-operative hours if newly intubated. Univariate and multivariate analyses determined risk factors for either decompensation.

RESULTS: CV decompensation occurred in 27 (22%) subjects, and respiratory decompensation occurred in 35 (29%). 10 (8%) met both criteria. Incidence of CV decompensation was higher in infants <26 wks gestational age (GA) (29.7% vs. 14.3%, P=0.04), lower birth weight (783 ± 243 g vs. 1044 ± 602 g, P=0.03), and use of a pressor medication pre-operatively (28.4% vs. 10.3% P=0.03), but not the age at surgery. In multivariate analysis, CV decompensation risk factors included female gender (OR=1.41, 95%CI 1.15-7.23), GA <26 wks (OR=8.59, 95%CI 1.03-71.60), and use of a pressor medication pre-operatively (OR=3.24, 95%CI 1.10-10.3). After controlling for other maternal and perinatal risk factors, more infants had a respiratory decompensation if during the last 6 pre-operative hours they were extubated (OR=5.56, 95%CI 1.48-21.05) or had a RSS<2 (OR 2.76, 95%CI 1.02-7.43).

CONCLUSIONS: PDA ligation surgery carries a notable risk of cardiopulmonary decompensation. Risk factors for CV decompensation include younger GA and need of pressor medication pre-operatively, and female gender. Risk factors for respiratory decompensations include minimal respiratory support pre-operatively. Clinicians should account for these post-operative risks when determining the need for a PDA ligation in premature infants.

67 House Officer

9:15 AM

Pre-Operative LV End Diastolic Dimension (LVEDD) Is Smaller in Very Low Birth Weight (VLBW) Infants Requiring Inotorpes (IT) Post Surgical Ligation (SL) of a Patent Ductus Arteriosus (PDA)

Elizabeth C. Mitchell, Francesca M. Anderson, Patrick Flynn, Jeffrey M. Perlman.
Pediatrics, Weill Cornell Medical College, New York, NY.

BACKGROUND: PDA is a common problem in the VLBW premature infant. A substantial number of infants require SL. A small subset exhibit hypotension and poor perfusion, requiring IT following SL. Potential factors contributing to the hypotension remain unclear.

OBJECTIVE: To identify potential clinical and echocardiographic (ECHO) predictors of the need for IT following SL of the PDA.

DESIGN/METHODS: A retrospective chart and ECHO review was undertaken on 117 premature infants <36 weeks GA who underwent SL of a PDA. Variables retrieved included BW, GA, number of indomethacin (INDO) doses, use of IT or lasix prior to SL, CXR evidence of edema and/or cardiomegaly, postnatal age of surgery (Sx), mean HR, mean ABP, FiO2, saturation (sat) values, fluid intake, urine output for 24 hrs prior to SL, and on ECHO, PDA diameter, left to right (L-R) PDA shunt, LA/Ao ratio > 2, left ventricular (LV) function, LVEDD, presence of Patent Foramen Ovale (PFO) and assessment of diastolic function by Doppler E:A ratio. T Tests and chiquare were used for analysis.

RESULTS: 21/117 (18%) required IT post SL including 6/26 who received preop IT. Those who required IT vs No IT were of ↓ BW i.e. 715 ± 142 vs 888 ± 28 g (p= 0.007), ↓ GA i.e.25 vs 26 wks (p=0.02), required more fluid pre-op i.e. 137 ± 25 vs 126 ± 29 ml/kg/day (p=0.04), had ↑ HR i.e. 158± 10 vs 151±13 (p=0.02), ↓ mean ABP i.e. 31.9 ± 4.8 vs 38.8 ± 5.4 mmHg,(p=0.0005) ↓ O2 sats i.e. 93% vs 95%, (p= 0.03) and ↑ FiO2 pre-operatively i.e. 0.43 vs 0.30, (P = 0.005). No difference in time to Sx i.e. 22 ±13 vs 29±19d, number of INDO doses i.e. 2.9 ± 2.7 vs 2.7±2.7, lasix use, CXR as well as PDA diameter size, presence of PFO (15/21 vs 79/96), LA/Ao ratio > 2 (5/21 vs 32/96), left to right shunt a respectively. However a significantly smaller LVEDD (1.52 ± 0.24 vs 1.7 ± 0.33, p= 0.01) was noted even when corrected for BSA, (Z score 0.09 ± 2.09 vs 1.02 ± 1.96, p= 0.04).

CONCLUSIONS: Infants requiring postoperative IT after SL had lower BP, higher HR, greater O2 requirement and smaller LVEDD preoperatively. These factors may be helpful in predicting need for IT postoperatively. Smaller LVEDD suggests ventricular diastolic dysfunction, however this is not corroborated by LA/AO or Doppler E:A ratio. This could be the subject of further prospective study.

68 Medical School Graduate

9:30 AM

Preliminary Experience with Targeted Biologic Inhibition in Children with Multivessel Intraluminal Pulmonary Vein Stenosis

Maliha Rehman, Jean A. Connor, Mark W. Kieran, Amy Juraszek, Kathy J. Jenkins.
Cardiology, Children's Hospital Boston, Boston, MA; Pediatric Neuro-Oncology, Dana Farber Cancer Institute, Boston, MA.

BACKGROUND: Pulmonary vein stenosis (PVS), caused by neointimal proliferation of myofibroblasts and extracellular matrix, is typically relentlessly progressive with diffuse distal vessel involvement, refractory to surgical and catheter-based treatment, and leads to death rapidly, within weeks or months after diagnosis. We have previously identified biologic markers on the cell surface of myofibroblasts in patients with PVS.

OBJECTIVE: To describe preliminary experience using a combination regimen targeting VEGF (Avastin®) and PDGFR (Gleevec®) in infants with progressive PVS.

DESIGN/METHODS: Selected infants with PVS were offered innovative use of Avastin® and Gleevec® under hospital guidelines. After aggressive surgical and catheter-based treatment to establish vein patency, a planned course of 1 year was initiated. Disease progression was monitored by serial echocardiography, lung scan and CT angiography.

RESULTS: Overall the agents were well tolerated by 11 patients treated (2 isolated PVS, 6 congenital heart disease (CHD), 2 lung disease, and 1 both CHD and lung). Few events possibly related to drugs occurred: 1 GI bleed, 1 hemoptysis, 3 anemia, 1 transient neutropenia, 1 proteinuria. Catheter based interventions or surgery for re-stenosis were necessary in all patients. Five patients were listed for lung or heart lung transplant; 1 was transplanted (and died), 3 died waiting, and 1 remains listed. Evaluation of therapeutic effect was made difficult by frequent interruptions in treatment for infections or procedures, and elective withdrawals, 2 at the time of listing for transplant, 1 care redirection, 1 nonresponse, 1 lack of insurance, and 1 parental choice. Only 4 patients remained on therapy as planned, of whom 3 (all with PVS and CHD) are currently alive, 16, 50 and 113 weeks after starting treatment. One additional patient has survived 17 weeks, after completing 10 weeks of treatment before withdrawal. CT findings and available autopsies suggest a relative lack of distal involvement in most patients.

CONCLUSIONS: Biospecific chemotherapy targeting VEGF and PDGFR was well tolerated, with few adverse events. Despite frequent dose interruption and early termination, 5 patients were transplanted or survived at least 4 months after starting treatment (45%), all with PVS and CHD, suggesting a potential therapeutic effect for some patients with this aggressive, lethal condition.

69 Fellow in Training

9:45 AM

Racial Differences in Left Ventricular Hypertrophy among Children with Primary Hypertension (PHTN)

Cozumel S. Pruette, Barbara Fivush, Joseph Flynn, Tammy M. Brady.
Pediatric Nephrology, Johns Hopkins University, Baltimore, MD; Nephrology, Seattle Children's Hospital, Seattle, WA.

BACKGROUND: LVH has been shown to be more prevalent among non-white children with PHTN compared to white children with PHTN. It is unclear if specific clinical characteristics may contribute to this racial difference.

OBJECTIVE: To determine which clinical characteristics differ among African-American (AA) children with PHTN and LVH at presentation compared to those without LVH, and if these characteristics differ from those found in non-AA children.

DESIGN/METHODS: Cross-sectional study of 139 children aged 3-21 years who were evaluated for elevated blood pressure (BP) at 3 tertiary medical centers,1997-2005, and ultimately diagnosed with PHTN. Pertinent clinical characteristics were compared in children with and without LVH, stratified by race (AA, non-AA).

RESULTS: Overall prevalence of LVH was 42%, with a prevalence of 60% among AA children and 37% among non-AA children (p=.02). BMI z-score was significantly higher in AA and non-AA children with LVH when compared to their counterparts without LVH, but the BMI z-score between the two LVH groups was not statistically different (p=.4). Total cholesterol was significantly elevated in AA children with LVH when compared to AA children without LVH. These differences were not present among non-AA children.

Clinical Characteristics of Children with PHTN, With and Without LVH, Stratified By Race

Parameter Mean(SD)	AA LVH,n=21	AA No LVH,n=14	p-value	Non-AA LVH,n=38	Non-AA No LVH,n=66	p-value
Age(mo)	144(47)	152(38)	.6	158(51)	159(40)	.9
Ht	158(24)	157(14)	.9	157(24)	161(17),n=63	.4
Ht%ile	78(20)	65(35)	.2	67(26)	67(30),n=63	.9
BMI	29(8)	26(9)	.4	29(8)	26(7),n=63	.08
BMIz	2.0(.9)	1.3(1.2)	.04	1.8(1)	1.4(.99),n=63	.05
SBPi95%*	1.1(.09)	1.1(.09)	.9	1.1(.13)	1.1(.11)	.8
DBPi95%	.89(.14)	.97(.16)	.1	.88(.14)	.93(.14)	.1
SBPi90%	1.1(.10)	1.1(.09)	.9	1.1(.13)	1.1(.12)	.8
DBPi90%	.94(.15)	1(.17)	.2	.93(.15)	.98(.14)	.1
Na	140(5),n=19	140(2),n=12	.6	141(2),n=34	141(2),n=61	.4
Tot Chol	195(35),n=13	151(34),n=10	.006	163(34),n=26	166(34),n=45	.8

*BPindex=BP/95%(90%) systolic(S),diastolic(D)

CONCLUSIONS: While LVH is highly prevalent in all children with PHTN, more AA children with PHTN have LVH at initial presentation. As AA children with PHTN and LVH have significantly higher cholesterol levels, they may be at increased cardiovascular (CV) risk and need more aggressive screening for additional CV risk factors and follow-up.

70 Fellow in Training

10:00 AM

High Prevalence of Structural Heart Disease in Children with Methylmalonic Aciduria and Homocystinuria (cblC)

Laurie E. Profitlich, Brian Kirmse, Wasserstein P. Melissa, Diaz A. George, Gelb Bruce, Srivastava Shubhika.
Pediatrics, Division of Pediatric Cardiology, Mount Sinai Hospital, New York City, NY; Genetics and Genomic Sciences, Mount Sinai Hospital, New York City, NY.

BACKGROUND: CblC is a rare inborn error of cobalamin (vitamin B12) metabolism resulting in significant accumulation of methylmalonic acid and homocysteine. Elevation of maternal homocysteine is a risk factor for the development of congenital heart disease in the fetus and in asymptomatic adults it is an independent risk factor for stroke and ischemic heart disease. Children with cblC exhibit neurologic, ophthalmologic and hematologic abnormalities. Cardiovascular involvement is not considered part of the clinical spectrum of disease and currently there are no recommendations for cardiovascular screening in this patient population.

OBJECTIVE: To characterize the frequency and nature of cardiovascular defects in patients with CblC-type Methylmalonic Aciduria and Homocystinuria (cblC).

DESIGN/METHODS: We conducted a retrospective analysis of echocardiographic data collected on nine patients with cblC routinely followed by the Pediatric Metabolic Center at Mount Sinai Medical Center. Patients underwent a complete 2-D echocardiogram including quantitative assessment of left ventricular systolic function.

RESULTS: The study group ranged in age from 2 weeks to 24 years with a mean age of 5.5 years +/- 8.1 years at the time of cardiovascular evaluation. None of the patients had cardiovascular symptoms. The average homocysteine level for the study group from the time of diagnosis to the time of cardiovascular evaluation was 73.9 mcmol/L and ranged from 28 mcmol/L to 134 mcmol/L (normal 0-15 mcmol/L). 55% (5/9 patients) of the study group had significant structural heart disease detected by 2D echocardiography including left ventricular (LV) non-compaction, secundum atrial septal defect, muscular ventricular septal defect, dysplastic pulmonary valve without pulmonary stenosis and mitral valve prolapse with mild mitral regurgitation. One patient had a history of cor pulmonale and right heart failure secondary to pulmonary embolism that resolved with medical management. All patients had quantitatively normal left ventricular systolic function.

CONCLUSIONS: Structural heart defects appear to be highly prevalent in cblC, perhaps due to in utero exposure to elevated homocysteine levels. The types of heart lesions were variable and studies with a larger number of patients are needed to establish which forms are most common. Routine cardiovascular screening may be indicated in patients with cblC.

71 House Officer

10:15 AM

Near-Infrared Spectroscopy Cerebral and Somatic (Renal) Oxygen Saturation Correlation to Continuous Venous Oxygen Saturation Via Intravenous Oximetry Catheter

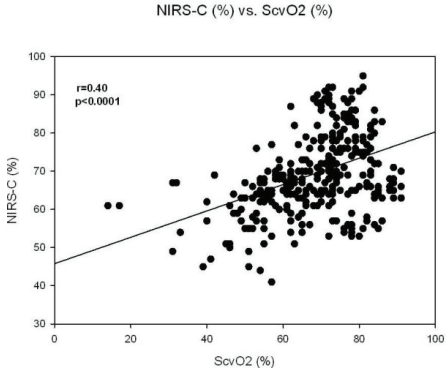
Gilma A. Marimon, W. Keith Dockery, Michael J. Sheridan, Swati Agarwal.
Department of Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA; Department of Medicine, Inova Fairfax Hospital, Falls Church, VA.

BACKGROUND: Near-infrared spectroscopy (NIRS) and continuous central venous oxygen saturation via oximetry catheter (ScvO2) are two modalities available to estimate adequacy of oxygen delivery in post-operative pediatric cardiac patients. NIRS measures regional tissue oxygenation and blood flow and is routinely used in our pediatric cardiac surgery patients. An alternative marker of global tissue oxygenation is true mixed venous oxygen saturation (Sv02). A recently developed pediatric-sized oximetric catheter (PediaSat) fully functions as a central venous catheter and provides a continuous central venous oxygen saturation reading (ScvO2), an accepted surrogate to SvO2 measurements. To date, the possible correlation between NIRS and ScvO2 measurements has not been determined.

OBJECTIVE: The aim of this study is to examine the correlation between NIRS and ScvO2 measurements.

DESIGN/METHODS: Ten pediatric patients undergoing cardiac surgery had the PediaSat catheter placed with the tip in the superior vena cava and NIRS sensors (cerebral and renal) placed in the operating room per routine protocol. Hourly measurements of NIRS-cerebral (NIRS-C), NIRS-renal (NIRS-R), and ScvO2 readings were recorded for each patient up to 48 hours post-operatively.

RESULTS: A total of 323 hours of data were collected. NIRS-R vs ScvO2 and NIRS-C vs ScvO2 measurements were analyzed using a simple bivariate linear regression model with the following coefficients of correlation obtained: r=0.33 (p<0.0001), r=0.40 (p<0.0001) respectively.



CONCLUSIONS: Based on the results of the patients enrolled, there is only a moderate correlation between the PediaSat ScvO2 and the NIRS-renal or NIRS-cerebral values. As such, we cannot determine which technology is more useful in assessing tissue oxygenation in post-operative pediatric cardiac surgery patients. Further studies are needed, utilizing both technologies, to determine which one most aids in the care of these patients.

Infectious Disease Platform Session

Saturday, March 14, 2009
8:15 AM-10:30 AM

72 House Officer

8:15 AM

The Final Surge: What More Can Be Done To Decrease Central Line-Associated Bloodstream Infections in Level III Nurseries?

Nneka I. Nzegwu, Lori Richardson, Rebecca Beck, Jenny Lamb, Barbara Wallen, Jill Duncan, Michael Sheridan, John North.
Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA; Neonatology, Fairfax Neonatal Associates, Inova Fairfax Hospital for Children, Falls Church, VA; Nursing, Inova Fairfax Hospital, Falls Church, VA; Division of Epidemiology and Biostatistics, Inova Research Center, Inova Fairfax Hospital, Falls Church, VA.

BACKGROUND: Nosocomial infections are a major cause of neonatal morbidity and mortality. As a Vermont Oxford Network participant, we have focused on implementing quality improvement initiatives related to central line-associated blood stream infections (CLABSI) in neonates following the Centers for Disease Control and Prevention(CDC) guidelines.

OBJECTIVE: To demonstrate the impact of potentially better practices using Plan-Do-Study-Act (PDSA) cycles of 1) hub care, 2) closed medical systems, 3) hand hygiene and 4) decreased duration of umbilical venous catheter (UVC) placement on CLABSI rate per 1000 central line days.

DESIGN/METHODS: Quality improvement initiatives were implemented over four PDSA cycles from May 2001 to March 2007: 1) hub care, 2) closed medical systems, 3) hand hygiene and 4) decreased UVC placement from 14 to 7 days. CLABSI rates from 2001 to 2008 were extracted

from an electronic NICU database.
RESULTS: CLABSI rates prior to PDSA cycles were 6.6 infections per 1000 central line days. Following CDC guidelines, CLABSI rates from 2001 to 2006 decreased to 2.5 infections per 1000 central line days. Subsequently, in 2007, by decreasing UVC line duration from 14 to 7 days, we achieved an even lower CLABSI rate of 2.2 per 1000 central line days. Preliminary data for 2008 shows a continued downward trend to 1.5 infections per 1000 line days.

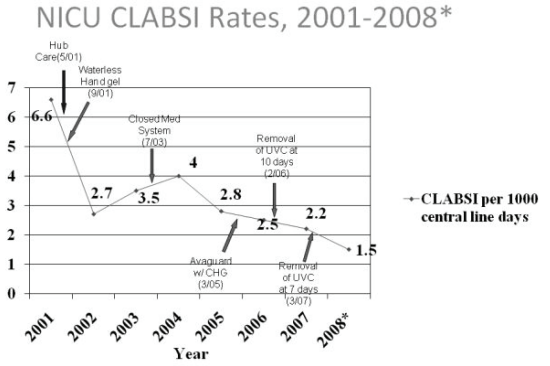


Figure 1. NICU CLABSI Rates, 2001-2008*, *through 10/31/08

CONCLUSIONS: By implementing the 2002 CDC *Guidelines for the Prevention of Intravascular Catheter-Related Infections,* a Level III NICU was able to decrease CLABSI rates from 6.6 to 2.5 infections per 1000 line days. Further, by shortening the CDC recommendation for UVC line duration from 14 to 7 days, we demonstrate that removing UVCs at 7 days can positively impact CLABSI rates.

73

House Officer

8:30 AM

Long Term Morbidity and Healthcare Utilization among Uninfected Children with Perinatal HIV Exposure

Tequa A. Salehi-Rad, Stephen C. Eppes.
Pediatrics, Alfred I. duPont Hospital for Children, Wilmington, DE; Med-Peds, Christiana Care Health Systems, Newark, DE.

BACKGROUND: Several studies have examined issues unique to uninfected children with perinatal HIV exposure (HIVPE) and their impact on physical and mental health. Most studies have focused on children under 18 mo of age and have not included an unexposed control group.
OBJECTIVE: Examine the morbidities and healthcare utilization of HIVPE and the possible relationship with maternal and caregiver factors.
DESIGN/METHODS: This retrospective case-control study was IRB approved. HIVPE born from 1998-2006 were identified in the Pediatric HIV Program records. HIV-negative controls were identified in the electronic medical record (EMR) and matched by age, sex, medical insurance and zip code (the latter two were surrogates for socioeconomic status [SES]). Patients were excluded if they were deceased, did not have at least one primary care encounter in the EMR, or had large gaps in continuity of care (defined >2 years). Patient data was recorded and analyzed in 3 groups (0-18 mo, 18 mo-5 yr, > 5yr). Demographics, maternal characteristics, hospitalization rates, ER visits, sick visits to primary care, specific illnesses, and developmental issues were captured. Statistical comparisons were performed.
RESULTS: •104 HIVPE and 104 control children were identied. •Maternal substance use and a history of caregiver mental health problems were more common in HIVPE ($P < 0.001$) as was the likelihood that they had resided with multiple different caregivers compared with control children ($P = 0.005$). •In children > 5 yr, there were no significant differences in the healthcare utilization between HIVPE and controls. •Among HIVPE <5 yr, compared with controls, there were more hospitalizations (66 vs. 40, $P = 0.12$), more healthcare visits for illness, and more E.D. visits. •Documented developmental problems were more frequent in HIVPE than in controls (44 vs. 17, $P = 0.07$).
CONCLUSIONS: Compared with children of similar age, sex and SES, HIVPE are more likely to have multiple caregivers and caregivers with mental health and substance abuse diagnoses. In this study, among children < 5 yr, healthcare utilization was more intense and there were more developmental issues identified. This study provides further evidence that perinatal HIV exposure creates important concerns (apart from HIV infection) for the health of children, independent of SES. The needs of this population should continue to be addressed even after they are discharged from HIV followup.

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8:45 AM

Evidence of Disproportionate Increase in the Use of Tympanostomy Tubes in US Children: 1996 to 2006

Lawrence C. Kleinman, Leonardo Trasande, Salomeh Keyhani.
Health Policy and Pediatrics, Mount Sinai School of Medicine, New York, NY; Community & Preventive Medicine and Pediatrics, Mount Sinai School of Medicine, New York, NY; Health Policy, Geriatrics, and Internal Medicine, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: Otitis media (OM) is the most common disease of US children. The insertion of tympanostomy tubes (TT) for OM is the most common surgery in US children. Prior studies found that in 1990-91 and 2002 TT were frequently inserted for reasons not consistent with clinical guidelines. Studies also suggest that new vaccines may be reducing the population burden of OM. National data regarding the use of TT in 2006 have recently been made available by the National Center for Health Statistics (NCHS) via the National Survey of Ambulatory Surgery (NSAS).
OBJECTIVE: To compare the epidemiology of tympanostomy tube use in American children in 2006 to 1996 (the most recent prior NSAS), using both population-based and novel health services-based measures
DESIGN/METHODS: We integrated NHCS surveys that provide nationally representative US estimates of visits to physicians offices (MDO, from NAMCS), from hospital outpatient departments (OPD) and emergency rooms (ER, both from NHAMCS), and from facilities that perform ambulatory surgery (NSAS) with population estimates from the US Census Bureau for 1996 and 2006. We calculated the total number of TT surgeries in children ≤ 16, and for children age 0 to 2 and 3 to 5. We further calculated the number of TT surgeries, outpatient visits (OPV), and OPV with a diagnosis of OM per 100 children, as well as the number of TT per 100 OPV with a diagnosis of OM. OPV frequency was considered for MDO, OPD and ER separately and together.
RESULTS: According to the NSAS, in 2006, there were 668,245 TT performed on children ≤ 16 in the US, compared to 493,219 in 1996 (up 35%). Compared to 1996, TT use increased 28% per capita to 0.96 surgeries per 100 children. Since there were 27% fewer OM visits in 2006, this represents an 85% increase from 2.1 to 3.8 TT surgeries per 100 OPV for OM. MDO and ED visits for OM each decreased by about 30%, while hospital OPD visits for OM increased by a similar amount. TT per OM OPV increased 92% relative to MDO and 94% to ED, but only 5% to OPD. Findings were similar for children 0 to 2 and 3 to 5, on whom 64% and 24% respectively of TT insertions are performed.
CONCLUSIONS: Childhood tympanostomy tube use from 1996 to 2006 increased 28% per capita and 85% relative to the number outpatient visits for OM, which had decreased significantly. This disproportionate increase in the use of TT is concerning, particularly given the findings of clinical studies suggestion their persistent overuse.

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House Officer

9:00 AM

Comparison of the Inverness Medical Acceava® Strep A Test to the Genzyme® OSOM® and Quidel® QuickVue® Strep A Tests

Tanya Rogo, Richard Schwartz.
Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA; Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA.

BACKGROUND: Group A streptococcus (GAS) is a significant bacterial pathogen responsible for illnesses such as tonsillitis and pharyngitis in children. Rapid diagnostic methods have been developed to facilitate the timely and appropriate treatment of pharyngitis. Many references in the pediatric literature about the sensitivity of rapid in-office tests for GAS give a range from 70% to 90%. There has not been recent comparative studies of CLIA-waived tests for GAS. This study compares three such rapid methods.
OBJECTIVE: This study was designed to evaluate the sensitivity and specificity of three commercially available Strep A tests using clinical samples: the Acceava® Strep A, Genzyme® OSOM® Strep A, and the Quidel® QuickVue® Strep A tests.
DESIGN/METHODS: A total of 228 patients were enrolled in the study, 200 patients at one site and 28 at the second site.Three throat swab specimens were obtained from each patient. As the reference method for this comparison, swabs were first inoculated onto a Blood Agar plate and then used to perform the Acceava® Strep A, Genzyme® OSOM® Strep A, and the Quidel® QuickVue® Strep A tests. All positive cultures were confirmed by serogrouping for Group A Streptococcus using the Murex® Streptex® Test Kit. Following inoculation of the blood plate, the Acceava swab was used to perform the Acceava Strep A Test, the OSOM swab was used to perform the OSOM Strep A test, and the QuickVue swab was used to perform the QuickVue Strep A test. After inoculation of the BAP culture plate each swab was tested on the respective rapid Strep A kit following manufacturer instructions.
RESULTS: For the Acceava test, 64 culture positive and 164 culture negative results were confirmed. For the OSOM test, 66 culture positive and 162 culture negative results were confirmed. For the QuickVue test, 65 culture positive and 163 culture negative results were confirmed. The Acceava test detected 63 of the 64 culture positives for a sensitivity of 98.5%. The specificity of Acceava was 98.8% (162 of 164). The sensitivity and specificity of the OSOM test was 98.5% (65 of 66) and 99.4% (161 of 162), respectively. QuickVue had a sensitivity and specificity of 92.3 % (60 mf 65) and 96.3% (157 of 163), respectively. Overall agreement with culture was 98.7%, 99.1%, and 95.2% for Acceava, OSOM, and QuickVue, respectively.
CONCLUSIONS: All three CLIA-waived tests performed much better than suggested by the literature on sensitivity of rapid tests for Group A Streptococcus.

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9:15 AM

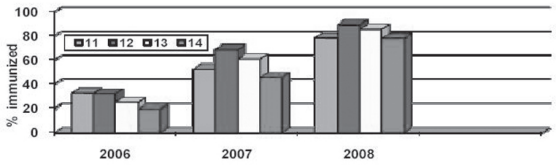
Impact of a Tdap School-Entry Mandate on Tdap and MCV4 Coverage

Elyse Olshen Kharbanda, Melissa Stockwell, James Colgrove, Vaughn Rickert.
Pediatrics, Columbia University, College of Physician and Surgeons, New York, NY; Mailman School of Public Health, Columbia University, New York, NY.

BACKGROUND: National coverage among adolescents for the pertussis (Tdap) and meningococcal (MCV4) vaccines remains low. In 2007 New York became one of the first states to mandate Tdap prior to 6th grade entry.
OBJECTIVE: To determine the impact of the Tdap mandate on Tdap and MCV4 coverage among 11-14 year olds in New York City
DESIGN/METHODS: Using a hospital-based immunization registry we evaluated Tdap and MCV4 coverage for 11-14 year olds at three time points, pre-mandate(10/01/06), mandate year1(10/01/07), and mandate year2(10/01/08). Tdap coverage was determined for those who were Tdap eligible (had not received a tetanus containing vaccine in the previous two years). We examined whether MCV4 was given at the same visit as Tdap. We then created a subset, all Tdap eligible 11 or 14 year olds

at two time points (pre-mandate and mandate year2), and performed logisitic regression with this subset to evaluate the impact of mandate year2 on Tdap, controlling for age and MCV4 (a non-mandated vaccine).
RESULTS: Overlapping cohorts of 4316 (pre-mandate), 4131 (mandate year1) and 3639 (mandate year2) youth studied were 50% male and 95% were eligible for free vaccines through the Vaccines for Children program. In the three time periods, Tdap coverage increased steadily from 29%, 58%, to 83% and MCV4 coverage increased from 10%, 30%, to 60%. Tdap coverage increased among all age groups, including 14 year olds, who were outside the age of the Tdap mandate.

Figure 1 - Tdap coverage by age and year



Among adolescents who received Tdap, co-administration of MCV4 in the three time periods increased modestly from 15%, 30%, to 39%. In a non-overlapping subset of 2577 Tdap eligible 11 or 14 year olds, after controlling for age and MCV4 coverage, mandate year2 was associated with 6.0 (95% CI 4.9-7.3) increased odds of Tdap coverage.
CONCLUSIONS: A Tdap school-entry mandate was associated with substantial increases in Tdap coverage, even in non-mandated age groups. Coverage for MCV4 remained lower than for Tdap as providers did not consistently co-administer these vaccines.

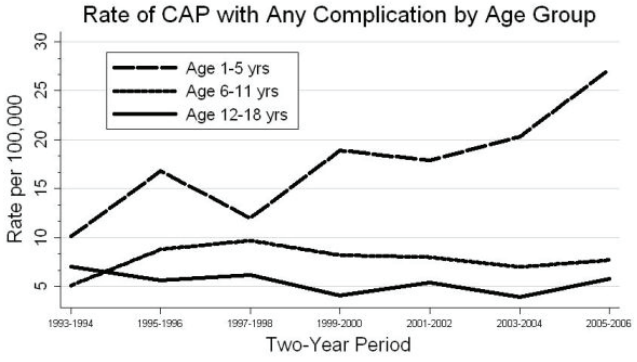
77 — Medical Student

9:30 AM

Pediatric Community-Acquired Pneumonia and Associated Complications in the United States, 1993-2006

Timothy O'Meara, Joshua P. Metlay, Matthew P. Kronman, Yuan-Shung Huang, Samir S. Shah.
The Children's Hospital of Philadelphia; University of Pennsylvania School of Medicine, Philadelphia, PA.

BACKGROUND: The incidence of community-acquired pneumonia (CAP) has decreased nationally since licensure of the heptavalent pneumococcal conjugate vaccine. While local reports have described an increased frequency of empyema complicating CAP, it is not clear whether population rates have increased nationally.
OBJECTIVE: To determine how the rate of CAP and CAP-associated complications have changed over time and whether these changes are more prominent in certain ages.
DESIGN/METHODS: Using the National Hospital Discharge Survey (NHDS) from the National Center for Health Statistics for the years 1993-2006, we identified serial samples of children 1-18 years of age with CAP. Complications were divided into local, systemic, and metastatic manifestations, and patients were subdivided by age group. Time periods were combined into 2-year groups to improve the precision of the estimates, and rates are expressed as the number of hospitalizations per 100,000 population.
RESULTS: 1,923,575 children were hospitalized with CAP between 1993-2006; 55% were male and 57% were white. Most affected children (71%) were 1-5 years of age while 19% were 6-11 years and 10% were 12-18 years. The overall hospitalization rate of children with CAP fell in each age group from 1993-94 to 2005-06, declining from 509 to 477/100,000 among children age 1-5 yrs, from 109 to 99/100,000 among 6-11 year olds, and from 59 to 42/100,000 among 12-18 year olds. During this period, aggregated complication rates were relatively unchanged among children 6-18 years of age, but children 1-5 years of age suffered a sharp increase in CAP complications, particularly of local complications such as empyema. Between 1993-94 and 2005-06, local complications for this age group increased more than four-fold from 3.9 to 13.5/100,000.



CONCLUSIONS: The rate of hospitalizations from CAP decreased from 1993-2006, but the rate of CAP with local complications such as empyema increased over the same time period among children age 1-5 years of age.

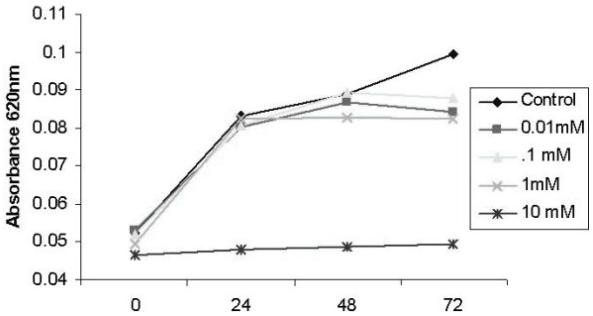
78 — Fellow in Training

9:45 AM

Antifungal Effects of Methylxanthines

Kalliope Tsirilakis, Alfin G. Vicencio, David L. Goldman.
Pediatric Respiratory and Sleep Medicine, Albert Einstein College of Medicine and Children's Hospital at Montefiore, Bronx, NY; Pediatirc Infectious Diseases, Albert Einstein College of Medicine and Children's Hospital at Montefiore, Bronx, NY.

BACKGROUND: Fungi utilize chitinases to remodel their cell walls during replication. Subclinical fungal infection has been implicated in asthma. Methylxanthines have been used in the management of asthma and have recently been shown to inhibit mammalian chitinases.
OBJECTIVE: We sought to determine whether methylxanthines have antifungal activity in vitro.
DESIGN/METHODS: The methylxanthines aminophylline or pentoxifylline were added to fungal cultures of C. albicans, C. neoformans, or B. dermatidis and samples were analyzed for growth using absorbance measurements and manual colony counting. Cell wall changes were documented with calcoflour staining and growth in culture plates containing calcoflour.
RESULTS: Pentoxifylline (PTX) at high dose (10mM) significantly inhibited growth of all three fungi as determined by absorbance measurements. C. neoformans incubated with PTX (10mM) produced a 3log10 fold decrease in fungal growth. Aminophylline (10mM) inhibited growth of C. neoformans and B. dermatidis, but not C. albicans. Lower concentrations of methylxanthines were associated with less consistent effects on fungal growth.



Calcoflour staining of C. neoformans treated with PTX revealed abnormal cell morphology and disproportionately large bud scars, suggestive of deficient cell wall repair. PTX treated C. neoformans also exhibited increased susceptibility to calcoflour.
CONCLUSIONS: Our data suggest that methylxanthines have antifungal properties related to their effect on cell wall integrity, which we speculate is mediated by the inhibition of fungal chitinases. While the concentrations of methylxanthines needed to inhibit fungal growth were often supraphysiologic, our results document the potential utility of chitinase inhibition as a new approach to antifungal and, by extension, asthma therapy. Further experiments are necessary to determine if these antifungal effects are also demonstrated in vivo, and whether methylxanthines act synergistically with traditional antifungal agents.

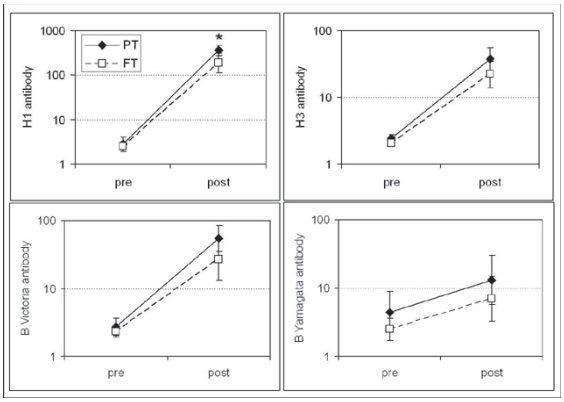
79 — Fellow in Training

10:00 AM

Immunogenicity of Trivalent Influenza Vaccine (TIV) in Extremely Premature Infants

Kristin M. Scheible, Carl T. D'Angio, Premature Infant Vaccine Collaborative.
Pediatrics, Division of Neonatology, University of Rochester, Rochester, NY.

BACKGROUND: Premature infants are at increased risk for morbidity from respiratory infections. It is unclear how frequently TIV generates protective levels of antibody (Ab) in this population.
OBJECTIVE: To compare humoral immune response to TIV in extremely low-birth-weight (ELBW, ≤1000g), preterm (PT, <30 wk) infants with full-term (FT, ≥37 wk) infants. We hypothesized that geometric mean titers (GMT) of influenza Ab would be lower in PT than FT infants.
DESIGN/METHODS: In this multicenter study, PT infants and FT infants aged 6-17 mo received 2 doses of TIV after NICU discharge during the 2007-2008 influenza season. Serum was drawn before dose 1 and 4-6 wk after the second dose. Ab were measured by hemagglutination inhibition (HI).
RESULTS: 31 PT and 34 FT infants were enrolled as outpatients. PT infants were less mature (7.5±3.5 mo, [mean±SD] v. 9.9±3.4 mo corrected age, p=0.01) and lighter (7.2±1.4 kg v. 8.9±1.5 kg, p<0.01) at time of first vaccination. The majority of FT infants were male (59% FT v. 19% PT) and Caucasian (56% FT v. 31% PT). Of PT infants, 78% had BPD and 16% were exposed to postnatal steroids v. none in the FT group. Using univariate analysis, PT infants had higher geometric mean titers (GMT) of H1 Ab than FT infants (Figure shows GMT±95% CI, *p<0.05) following vaccination. A greater percent of PT than FT infants had protective Ab titers (1:32) to H3 (74% v. 48%, p=0.05) and B Victoria (85% v. 60%, p=0.04). Similar percentages of PT and FT infants had Ab titer 1:32 to H1 (100% v. 96%) and (non-vaccine antigen) B Yamagata (30% PT v. 20% FT, p=0.42). By adjusting for multiple comparisons, however, no statistical significance was found between the PT and FT Ab responses. No infant had a vaccine-related severe adverse event.



CONCLUSIONS: Contrary to our hypothesis, no significant differences were found between the humoral responses of PT and FT infants ≥6 mo to two doses of TIV. Further studies of the developmental changes in TIV responses are warranted. (Supported by the Thrasher Research Fund)

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10:15 AM

Implementation of the 2-Dose Varicella Vaccination Regimen among Children Aged 4-6 Years in Philadelphia: A Good Start but a Long Way To Go

Irini Daskalaki, Dana Perella, Claire Newbern, Barbara Watson.

Varicella Active Surveillance Project, Division of Disease Control, Philadelphia Department of Public Health, Philadelphia, PA; Pediatrics, St Christopher's Hospital for Children, Philadelphia, PA; Pediatrics, Drexel University College of Medicine, Philadelphia, PA.

BACKGROUND: In response to concerns over waning immunity and school outbreaks among highly vaccinated populations, the Advisory Committee on Immunization Practices (ACIP) revised varicella vaccination (VV) recommendations in June 2006 to include a routine 2nd dose for children 4-6 years old. Nationally, limited data exist to monitor adherence to new vaccination recommendations for preschool/school-aged children.

OBJECTIVE: To describe the implementation of the 2-dose VV regimen during the 2-year period following the ACIP recommendation among children aged 4-6 years in Philadelphia.

DESIGN/METHODS: We extracted data from the Philadelphia Department of Public Health immunization registry for Philadelphia residents born between July 1999 and June 2004. To assess the application of the ACIP recommendation during our study period (July 2006 to June 2008), 2nd VV doses were defined as "on-time" if administered at age 4-6 years. We calculated 2nd dose VV rates among children who received dose 1 VV at least 1 month before their 4th birthday and compared 2nd VV administration patterns with 2nd MMR (measles, mumps, rubella).

RESULTS: Among 88,871 previously vaccinated 4-6 year olds, 34,706 (39%) received a 2nd VV dose on-time during our study period; 562 (1%) were given dose 2 before their 4th birthday. Private and hospital-based healthcare providers administered most 2nd doses (83%). Compared with the 1st study year, on-time 2nd VV rates increased significantly among all ages during the 2nd year. In each year, 2nd VV rates for 4 year olds were significantly higher (92 and 228 2nd doses given per 100,000 child-days) compared with rates for 5 year olds (76 and 137 per 100,000 child-days) and 6 year olds (47 and 81 per 100,000 child-days). Most of the older children (67%) had received 2nd MMR before July 2006. Among 25,497 recipients of 2nd MMR during the study period, 9,289 (36%) did not receive 2nd VV at the same visit. Only 24% of the children given both vaccines at the same visit received combination vaccine (MMRV).

CONCLUSIONS: Although adoption of the routine 2nd VV dose appears to be increasing with time, on-time 2nd VV rates were lower among 5 and 6 year olds, who were more likely to have received MMR before July 2006. Missed opportunities for simultaneous administration of 2nd MMR and VV appear to be common. Continued catch-up vaccination and school entry mandates are needed to ensure 2nd VV receipt.

Saturday, March 14, 2009
8:15 AM-10:30 AM

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Medical Student

8:15 AM

Normal Cerebrospinal Fluid Protein Concentration in Neonates and Young Infants

Jessica L. Ebberson, Lori A. Kestenbaum, Joseph J. Zorc, Caitlin La Russa, Richard L. Hodinka, Samir S. Shah.

The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Prior studies have demonstrated an age-related decline in cerebrospinal fluid (CSF) protein concentration in normal children from birth to early childhood. The most rapid rate of decline is thought to occur in the first six months of life as the infant's blood-brain barrier matures. Current published reference values for CSF protein concentration in neonates and young infants reflect either the author's expert opinion or cite small studies with significant limitations.

OBJECTIVE: To determine accurate, age-specific reference values for CSF protein concentration in neonates and young infants undergoing lumbar puncture.

DESIGN/METHODS: This cross-sectional study included all infants age 56 days or less who underwent lumbar puncture in the Emergency Department of a tertiary care children's hospital between January 1, 2005 and June 30, 2007. Subjects with conditions known to cause abnormal CSF protein concentration were systematically excluded from the final analysis. Exclusion criteria included traumatic lumbar puncture, serious bacterial infection, congenital infection, seizure, presence of a ventricular shunt device, or elevated serum bilirubin. Subjects with CSF positive for enterovirus by polymerase chain reaction were also excluded. Quantitative protein assay was performed on the VITROS chemistry system. Two-sample Wilcoxon rank-sum tests were used to compare the distribution of CSF protein concentrations amongst four pre-defined age categories.

RESULTS: 381 of 1064 subjects met inclusion criteria; 55% were male, 15% were preterm, and 38% presented during enterovirus season. CSF protein concentration was significantly higher in neonates ≤14 days old than in infants 14 to 28 days old (P=0.01), and was significantly higher in infants 15 to 28 days old than in those 29 to 42 days old (P<0.01). Infants age 29 to 42 days old also had protein concentrations significantly higher than subjects age 43 to 56 days old (P=0.01).

CSF Protein Concentration (mg/dL) in infants age 0-56 days

	3-14 days	15-28 days	29-42 days	43-56 days
	N=53	N=88	N=113	N=127
Median	78	65	56	50
IQR	58-93	56-83	49-65	41-62
Upper Bound 95% CI	132	100	97	84
Mean	79	69	79	55

CONCLUSIONS: Our study demonstrates a clear age-related decline in CSF protein concentration from birth to 56 days of life. These values can be used to accurately interpret the results of CSF studies in neonates and young infants.

82

Medical Student

8:30 AM

Defining Normal Cerebrospinal Fluid White Blood Cell Counts in Neonates and Young Infants

Lori A. Kestenbaum, Jessica Ebberson, Joseph J. Zorc, Caitlin LaRussa, Richard L. Hodinka, Samir S. Shah.

The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: Cerebrospinal fluid (CSF) white blood cell (WBC) counts for neonates and young infants are usually interpreted based on values reported in reference texts or handbooks. However, current texts present normal CSF parameters without citation or cite studies with significant limitations.

OBJECTIVE: To determine accurate, age specific reference values for CSF WBC counts in a large population of neonates and young infants with an indication for a lumbar puncture in whom conditions known to cause CSF pleocytosis have been systematically excluded.

DESIGN/METHODS: This cross-sectional study included patients ≤56 days who had a lumbar puncture performed in the emergency department from January 1, 2005 – June 30, 2007. Patients were excluded from analysis for conditions suspected to cause CSF pleocytosis including traumatic lumbar puncture, serious bacterial infection, congenital infection, seizure, and presence of a ventricular shunt. Children who tested positive for enterovirus in the CSF by polymerase chain reaction (PCR) were also excluded. Two-sample Wilcoxon rank-sum tests were used to compare median CSF WBC values of those with negative enterovirus testing to those without enterovirus testing and to compare median CSF WBC values of age groups.

RESULTS: 381 (36%) of 1064 patients met inclusion criteria; 54% were male, 15% were preterm, and 39% presented during enterovirus season. Among infants who did not have enterovirus PCR testing performed on their CSF, the median CSF WBC was significantly higher in infants ≤28 days old (3 mm^3) than in infants 29-56 days old (2 mm^3, p<0.001). Differences in the median CSF WBC count between infants with a negative CSF enterovirus PCR and without enterovirus PCR testing performed were significant between children ≤28 days (p=0.009) but not between children 28-56 days (p=0.10)of age.

CSF WBC counts of neonates and young infants*

	CSF EV PCR Negative	CSF EV PCR Not Sent
Infants ≤28 days	N=37	N=106
Median	4	3
IQR	3-8	1-5
Mean	13	9
Upper Limit 95% CI	24	16
Infants 29-56 days	N=38	N=200
Median	3	2
IQR	1-7	1-3
Mean	7	2
Upper Limit 95% CI	10	3

*CSF WBC per cubic mm

CONCLUSIONS: We determined clinically relevant age specific CSF WBC reference values in a large cohort of neonates and young infants. These results serve as reference literature and can be used to accurately interpret the results of lumbar punctures performed on neonates and young infants.

83 Fellow in Training

8:45 AM

Characterization of Chest Depth in Neonates Using Chest Computed Tomography To Assess Recommendations for Chest Compression Depth in Neonatal Resuscitation

Andrew Meyer, Anne Ades, Vinay Nadkarni, Avrum Pollock, Matthew Braga, Helge Mylebust, Jon Nysaether, Charlie Babbs.

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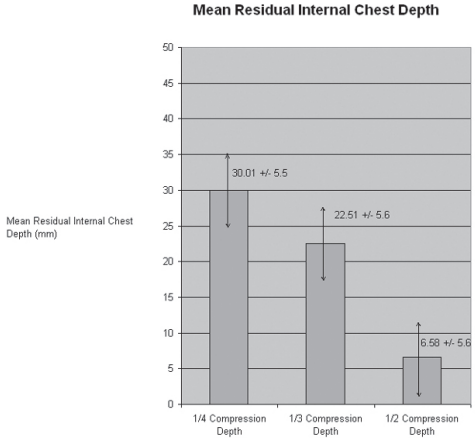
BACKGROUND: Neonatal Resuscitation Program (NRP) guidelines recommend chest compression (CC) of 1/3 the anterior-posterior (AP) chest depth. Appropriateness of this recommendation has not been rigorously assessed. Computerized tomography (CT) has been used to model and evaluate the guidelines for CC depth in children, but not specifically in neonates.

OBJECTIVE: To show that current NRP CC depth target of 1/3 AP depth will minimize cardiac over- compression and optimize cardiac ejection fraction compared to ¼ or ½ AP depth, using data modeled from neonatal chest CT scans.

DESIGN/METHODS: With IRB approval, AP internal and external chest depth, heart depth, and dead space were measured from neonatal chest CTs. Using these measurements, residual internal chest depth was calculated at 1/4, 1/3 and 1/2 CC depth. "Over-compression" was defined as residual internal chest diameter < 0mm. Using a validated bio-mechanical mathematic model, estimated ejection fraction (EF) was calculated for each CC depth. Descriptive data are presented with mean+/-standard deviation for normally distributed data.

RESULTS: The residual internal diameters for each CC depth are shown in figure 1.



A simulated CC over-compresses 1% of patients at ¼ AP depth, 25% at 1/3 AP depth, and 99% at ½ AP depth. The average EF of real infants is reported as 68.1 +/- 9 %. Estimated CC induced EF was 50.3% at 1/4 AP depth and 68.6% at 1/3 AP depth. Simulated 1/2 CC depth over-compressed the heart 99% of the time, completely flattening the heart.

CONCLUSIONS: Mathematical modeling of EF and cardiac over-compression as a function of CC depth, based upon neonatal chest CT scans dimensions, suggests that current NRP CC recommendations of 1/3 AP chest depth is more appropriate than alternative ¼ or ½ AP depth compressions.

84 Fellow in Training

9:00 AM

Educational Opportunities in a Pediatric Emergency Department Parental Attitude and Perceptions of CPR

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BACKGROUND: The incidence of sudden pediatric death in the United States is approximately 6,000 per year. Over 30% of these deaths are of cardiac etiology. CPR training efforts have thus far failed to focus on parents/guardians of children. The 2006 American Heart Association (AHA) recommendations encourage universal training in CPR in an effort to improve bystander-initiated CPR. With the increasing utilization of pediatric emergency departments (PED) across the country, the PED may serve as an opportune place to train parents/guardians in CPR.

OBJECTIVE: To describe the caregivers' attitudes towards CPR education, offered in a PED, while waiting for completion of their child's care.

DESIGN/METHODS: A survey, measuring interest in CPR education, using a 10-point Likert scale, was administered to caregivers of children presenting to an urban, tertiary care PED over a three-month period.

RESULTS: 237 caregivers (82% mothers) completed the survey. The mean age of the caregiver's child was 5.2 years (50.4% males). Ninety-five percent of caregivers lived in the same household as the child. Seventy-eight percent of caregivers completed high school and/or obtained an advanced degree. Mean interest level (1-10) across all caregivers in CPR education was 7.17. A decreased interest in CPR education (5.68) was seen if CPR teaching prolonged waiting time in the PED ($p<0.001$). Previous training in CPR had no effect on interest in CPR education ($p=0.80$). Eighty-one percent of caregivers would be willing to spend up to one hour learning CPR in the PED. Caregivers strongly agree (average: 8.79) that they would be able to perform CPR in their community after receiving CPR training in the PED. They also agree (average: 7.69) that they would thereby make a positive impact on the community in which they live. By learning CPR in the PED, caretakers felt that they would become more comfortable caring for sick children (7.96).

CONCLUSIONS: The PED is a venue where caregivers have significant interest in learning CPR while they wait for completion of their child's care. If instituted in the PED, CPR training would reach populations largely missed by previous AHA efforts, thereby significantly advancing the AHA's goal of universal CPR training.

85 Fellow in Training

9:15 AM

Resident Use of Medical Literature

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BACKGROUND: Evidence-Based Medicine (EBM) refers to the conscientious and explicit use of the current best evidence in making decisions about the care of individual patients. Studies on EBM have focused on knowledge and critical appraisal skills. Resident motivation for utilizing the medical literature remains largely unexplored. We sought to examine pediatric residents' purposes for employing the EBM skill of searching and using medical literature.

OBJECTIVE: To investigate the use of medical literature among pediatric residents.

DESIGN/METHODS: We conducted a repeat measures survey of pediatric residents training at an urban tertiary care academic children's hospital. 69 residents completed anonymous questionnaires to assess their use of the medical literature. Residents were surveyed twice over a 60-day time interval. The period of recall was the preceding week. Descriptive statistics were performed, and Chi square was used to compare dichotomous variables.

RESULTS: A total of 124 questionnaires were completed and analyzed, of which 35%, 35% and 30% were from PGY-1, PGY-2 and PGY-3s, respectively. Residents were significantly more likely to report searching the medical literature during the prior week for general learning (89%) than for direct patient care questions (63%) [p<.0001]. PGY2 residents (95%) were significantly more likely to use the medical literature for general learning than PGY3 (84%) and PGY1 (86%) residents [p<.0001]. Similarly, PGY2s (90%) were more likely than PGY3s (53%) and PGY1 (54%) to use the medical literature for patient care questions [p=.008]. However, all residents at all levels were more likely to use literature for general learning than for patient care.

CONCLUSIONS: In our study, residents were significantly more likely to search the medical literature for general learning than for patient care questions. Surprisingly, second year residents used the medical literature for both general learning and patient care more than either first or third year residents. This is contrary to the hypothesis that use of the medical literature might increase with professional maturation. The reason for the increased use of the literature during the PGY2 year is unclear; further studies are needed to elucidate this.

86 Undergraduate Student

9:30 AM

Screening for Violence in the Pediatric ED

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BACKGROUND: Youth violence is a significant public health concern. Many children are treated in EDs, and the ED may be a good location to identify at-risk youth for future interventions.

OBJECTIVE: To evaluate the feasibility of screening children for exposure to violence in the pediatric ED.

DESIGN/METHODS: A prospective convenience study of children presenting to the ED was conducted. Two questionnaires were piloted in the ED: The Violence Prevention Emergency Tool (VPET) and Violence Exposure Scale for Children (VEX-R). Both were completed by children aged 8-17 years with parents in another room. VPET is verbal with 35 items related to victim, witness and perpetrator of violence. VEX has cartoon pictures, is validated, and has 22 items related to witness and victim of violence. Declined rates, time to complete (minutes), understanding and utility of questionnaires rated by children and interviewers on a visual analog scale (VAS), and demographic data were collected. Individuals critically ill or with acute psychiatric illness were excluded.

RESULTS: To date 63 children were enrolled, 71 approached, and 8 declined. Reasons for declined included: 3 thought it would take too long, 3 did not want child interviewed alone, and 2 thought child too sick. Children had mean age 12.6 yrs (± 2.9), 43% girls, 48% Hispanic, 13% Black, and 53% urban. Mean time to complete VPET was 9.05 (range 4-17), and VEX 4.85 min (range 3-12). 76% of children reported VPET easy or very easy to answer items and 94% reported VEX easy or very easy, and 3/4s thought both would "find kids who needed help". Interviewers rated VEX easier to administer, better understood (95.2% vs 72.4% ($p<0.05$)), and had fewer repeated items (1.6% vs 9.5% ($p<0.01$)) than VPET. VPET results: 15% reported "2 or more times" in past year to victim of violence items, 20-40% reported 2 or more episodes of witness to violence, and few gave positive responses to perpetrator of violence items. 76.1% reported feeling safe at home and 68.2% felt safe at school. VEX results: Only 1 child reported "lots of times" for victim items, and about 10% "a few times" for other victim items. 10% reported "lots of times" and as high as 30% "a few times" to witness items. Only 2 children reported seeing someone stabbed or shot "lots of times", and 20% reported seeing someone arrested "lots of times".
CONCLUSIONS: It is feasible to screen for exposure to violence in the pediatric ED.

87 Fellow in Training

9:45 AM

Ultrasound Evaluation of the Saphenous Vein in Children

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BACKGROUND: Intravenous (IV) line placement in the pediatric emergency department (PED) is an important procedural skill. The combination of small caliber veins and poor patient cooperation can make IV placement in children a difficult task. Multiple attempts are often necessary – an experience that is both frightening and stressful for a child. Studies in adults have shown improved efficacy of peripheral vein cannulation using ultrasound guided techniques. The saphenous vein is a relatively large vein with a consistent anatomic location. No study to date has examined the saphenous vein in the context of peripheral IV placement.
OBJECTIVE: To use ultrasound measurements to compare the physical characteristics of the saphenous vein to other commonly cannulated peripheral veins in pediatric patients.
DESIGN/METHODS: Children age 0 to 3 years located in an urban PED were enrolled. Subjects were excluded if they had congenital or limb anomalies, experienced major trauma, had severe dehydration or shock, required urgent IV placement or resuscitative measures, or had indwelling central lines. After informed consent, a tourniquet was placed proximal to the vein of interest. These included the saphenous, antecubital and dorsal hand veins. A standardized depth view was used with the linear probe of a SonoSite MicroMaxx ultrasound system. Images were recorded for quality assurance. The transverse vein diameter (width) and distance between the top of the vein to the skin (depth) were measured. Additional characteristics included physician assessment of a vein as either visible, palpable or only visible via ultrasound. The patient's skin tone and BMI were also recorded. A paired t-test was used to compare the continuous variables.
RESULTS: To date, ten patients have been enrolled. The mean age of these patients was 18 months (range 2 – 33 months). The mean diameter of the saphenous vein was 2.6mm compared to 3.0mm for antecubital veins ($p=0.214$). Compared with hand veins, the saphenous vein diameter was greater (2.6mm vs. 1.7mm, $p=0.005$) This difference was greater than the standard 24 gauge and 22 gauge catheter calibers which are 0.7mm and 0.9mm respectively. No significant differences were measured between the mean depths the studied veins.
CONCLUSIONS: In children less than 3 years, the saphenous vein is larger than hand veins and is similar in size and depth as antecubital veins. The saphenous vein should be considered a good first choice for IV cannulation in this age group.

88 Fellow in Training

10:00 AM

Reasons for Early Emergency Department Return Visits: A Prospective Assessment

Alliyia B. Ali, Rick Place, John Howell, Sienna Malubay, Christina Issaev.
Department of Emergency Medicine, Inova Fairfax Hospital, Falls Church, VA.

BACKGROUND: A substantial percentage of emergency department patients are seen for a return visit within 72 hours of their initial evaluation. While quality reviews typically focus on initial medical management, most revisits do not seem to be directly related to care provided on the first evaluation. We examined the possibility that return visits are related to non-medical issues on the first visit, most notably patient education.
OBJECTIVE: We prospectively surveyed a cohort of caregivers in a pediatric emergency department to determine why they returned with their children within 72 hours of their initial emergency department (ED) visit.
DESIGN/METHODS: All patients who returned to our pediatric ED within 72 hours of a previous visit were identified. A trained technician prospectively interviewed the caregiver using a survey instrument consisting of questions with nominal (multiple choice) as well as brief descriptive responses. Interpreters were available for Spanish speaking caregivers. Data was entered into an Excel v.11.8 (Microsoft, Inc, Redmond, WA) spreadsheet and analyzed with Prism v. 4.0 (Graphpad, Inc, San Diego, CA). Descriptive statistics were calculated. Nominal outcomes were analyzed with chi square. Alpha was set at 0.05 for all comparisons.
RESULTS: Caregivers of 124 children (mean age: 5 years) were prospectively surveyed. Only 64 (52%) contacted their primary medical doctor (PMD) prior to the second visit; of these, 13 (20%) could not get an appointment, and 42 (66%) were told by the office to return to the ED. Seventeen children (14%) did not have a PMD. The number of children with Medicaid (42%) and private insurance (43%) were equivalent. Discharge instructions were felt to be informative by 114 caregivers (92%) and the same number reported being happy with the first ED physician. Eighty-eight (71%) children returned because they were not improved or clinically worse; of those, 25 (29%) had additional studies on the second visit. Twenty-nine children (23%) were admitted, though no patient was admitted to the intensive care unit.
CONCLUSIONS: Most caregivers were satisfied with the care and instruction provided by ED physicians on the first visit. Though most patients had a PMD, many did not call them prior to their return visit, and those who did either could not get an appointment or were sent in. The majority of patients returned for clinical progression or failure to improve, with a significant number subsequently admitted.

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10:15 AM

The High Rate of Adverse Drug Events (ADE) in Children Receiving Prolonged Outpatient Parenteral Antibiotic Therapy (OPAT) for Osteomyelitis

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BACKGROUND: OPAT has become a common practice in pediatrics since the introduction of home care services and intravascular devices. Although ADE due to parenteral antibiotics are known to occur, the rate of ADE especially in long-term OPAT is not appreciated.
OBJECTIVE: Assess the rate of ADE in children receiving long term OPAT for osteomyelitis
DESIGN/METHODS: Children receiving OPAT for osteomyelitis were managed and monitored by a single infectious disease specialist in a consistent and systematic manner. Antibiotic selection and dosing were standardized. Clinical ADE were monitored by parents, private physicians, and the ID specialist. Laboratory ADE for bone marrow, liver, and renal toxicities were monitored by weekly complete blood counts with differentials, serum glutamine pyruvic transaminase, blood urea nitrogen, creatinine, and serum trough antibiotic levels.
RESULTS: Forty-five children received 82 courses of 14 different antibiotics over 344 weeks. The following courses were given: clindamycin in 25, oxacillin in 17, ceftazidime in 8, vancomycin in 7, ceftriaxone in 6, and cefazolin in 5 along with 8 others administered in < than 5 each.There were 44 ADE: leukopenia in 18, hepatitis in 9, rash in 8, urticaria in 4, and others in 5. ADE rates were vancomycin 86%, oxacillin 76%, ceftriaxone 67%, clindamycin 44%, ceftazidime 38%, and cefazolin 0%. ADE-related discontinuation rates were ceftriaxone 67%, oxacillin 53%, vancomycin 43%, clindamycin 20%, ceftazidime 13% and cefazolin 0%.

Frequency of adverse drug events (ADE, %) and frequency (%) of ADE-related discontinuation of therapy according to antibiotic[a]

	Adverse Drug Event Rate	ADE-Related Discontinuation Rate
Cefazolin	0.0	0.0
Ceftazidime	37.5	12.5
Ceftriaxone	66.7	66.7
Clindamycin	44.0	20.0
Oxacillin	76.4	52.9
Vancomycin	85.7	42.9

[a]Only antibiotics administered for ≥5 courses listed

CONCLUSIONS: ADE occurred in 53% of OPAT courses. ADE led to discontinuation of antibiotics in 33%. Weekly monitoring for ADE is necessary.

Plenary II
Platform Session

Saturday, March 14, 2009
1:10 PM-4:00 PM

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2:00 PM

A Susceptibility Gene for Type 2 Diabetes Is a Genetic Modifier of Diabetes Complicating Cystic Fibrosis

Scott M. Blackman, Stephanie Hsu, Sarah E. Ritter, Kathleen M. Naughton, Mitchell L. Drumm, Michael R. Knowles, Garry R. Cutting.
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BACKGROUND: Insulin-requiring diabetes affects 25% of young adults with cystic fibrosis (CF). Although the cause of diabetes in CF in unknown, heritability studies in twins and siblings indicate that genetic modifiers play a substantial role.
OBJECTIVE: We tested whether the risk for diabetes in CF patients was influenced by family history of type 2 diabetes, or by variation in the largest-effect susceptibility gene for type 2 diabetes, TCF7L2.
DESIGN/METHODS: To assess whether diabetes in CF may be due to genes that contribute to diabetes in the general population, we determined if a family history of type 2 diabetes altered the risk of diabetes in CF patients using in 607 families in the U.S. CF Twin and Sibling Study. A gene highly associated with type 2 diabetes in the general population (transcription factor 7-like 2 or TCF7L2) was evaluated for association with diabetes using 1167 patients from the CF Twin and Sibling Study and an independent collection of 802 unrelated CF patients.
RESULTS: Diabetes risk was increased in CF patients with a family history of type 2 diabetes (OR=3.1; $p=0.0009$). A variant in TCF7L2 that is associated with type 2 diabetes (rs7903146, "T" allele) was associated with diabetes in CF in the family-based study ($p=0.003$) and in the unrelated patients ($p=0.02$; combined $p=0.0003$). In the family study, the hazard ratio for diabetes incidence was 1.71 (95% CI 1.2-2.4; $p=0.001$) corresponding to a decrease of 13 years in the age at which

cumulative incidence reaches 25% attributable to TCF7L2. In the patients not being treated with systemic glucocorticoids, the effect of TCF7L2 was even greater (HR=2.7 per allele, 95% CI 1.6-4.6, p=0.00027).
CONCLUSIONS: A genetic variant that confers moderate risk for type 2 diabetes has a substantial effect as a genetic modifier for diabetes in CF.

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2:15 PM

Modulation of Proinflammatory Signaling by the Cationic Antimicrobial Peptide WLBU-2

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Eudowood Division of Pediatric Respiratory Sciences, Johns Hopkins University, Baltimore, MD.

BACKGROUND: Host-derived (LL-37) and synthetic (WLBU-2) cationic antimicrobial peptides (CAPs) are known for their membrane-active bactericidal properties. LL-37 interacts with LPS and is an important mediator for immunomodulation, though the mechanism of action of WLBU-2 is not clear.
OBJECTIVE: The purpose of this study was to determine if WLBU-2 induces an early proinflammatory response that may facilitate bacterial clearance in cystic fibrosis (CF).
DESIGN/METHODS: For the *in vivo* studies, C57BL6 mice were initially given 1×10^6 cfu/mL *Pseudomonas aeruginosa* (PA) via the intranasal or intraperitoneal route and observed for 2h, followed by instillation of LL-37 or WLBU-2 (2-4mg/kg) with subsequent collection of tissues at 24h for determination of bacterial colony counts and quantitative RT-PCR measurement of TNF-α and IL-1β transcripts. For the *in vitro* studies, CF airway epithelial cells (IB3-1, ΔF508/W1282X) were cultured in appropriate media with supplements. WLBU-2 (25μM) was added to the media with RT-PCR measurement of TNF-α and IL-1β transcripts after 20, 30, and 60min. Flow cytometry analysis was used to determine if WLBU-2 assists in the uptake of Alexa 488-labeled LPS by CF cells.
RESULTS: In the lungs of mice receiving intranasal or intraperitoneal WLBU-2, there was a reduction in the number of surviving PA colonies compared to the control group. The lungs of mice receiving intraperitoneal WLBU-2 showed fewer PA colonies compared to those receiving LL-37. After WLBU-2 treatment for 24h, PA-induced IL-1β transcripts from lungs showed a twofold decrease ($p<0.05$), while TNF-α levels were unchanged. LL-37 treatment did not significantly change TNF-α or IL-1β levels. In IB3-1 cells, WLBU-2 exposure resulted in increased TNF-α and IL-1β transcripts that decreased by 60min. WLBU-2 treatment of IB3-1 cells also resulted in increased LPS uptake, suggesting a potential role for CAPs in inducing a protective proinflammatory response. Taken together, the cytokine response, LPS uptake, and established antimicrobial activity of WLBU-2 demonstrate its ability to modulate proinflammatory signaling as a protective mechanism to clear infection.
CONCLUSIONS: The immunomodulatory properties of WLBU-2 reveal a potential mechanism of its broad-spectrum antibacterial activity and warrant further preclinical evaluation to test the clearance of bacterial infection and rescue of the chronic inflammatory state of the CF airway.

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2:30 PM

Inter-Hospital Standardized Reintubation Ratios: An Index of Quality of Care?

Angela T. Wratney, Stephen C. Kurachek, Christopher J. Newth, Albert Hoang, Murray M. Pollack.
Critical Care Medicine, Children's National Medical Center, Washington, DC; Critical Care Medicine, Minnesota Children's Hospitals and Clinics, Minneapolis, MN; Critical Care Medicine, Children's Hospital of Los Angeles, Los Angeles, CA; Chief Medical and Academics Officer, Phoenix Children's Hospital, Phoenix, AZ.

BACKGROUND: Extubation failure rates from single sites are unsuitable for multi-site comparison because they fail to adjust for PICU patient population differences. Case-mix adjusted extubation failure risk modeling has not yet been developed and could be an important ICU measure of care.
OBJECTIVE: To determine if variation in reintubation rates occurs among pediatric intensive care units (PICUs) and if this variation can be accounted for by case-mix indicators.
DESIGN/METHODS: Retrospective analysis of prospectively collected observational cohort data from sixteen PICUs geographically spread across the U.S. **Patients:** 2,794 patients, age < 18 years and intubated >4 hrs who underwent a planned extubation trial. **Intervention:** Data from the largest published descriptive multicenter observational study of pediatric mechanical ventilation practices in the U.S. was analyzed to develop a multivariate logistic regression (LR) model for extubation failure risk. Extubation failure was defined as requiring reintubation ≤ 24 hrs after a planned extubation trial. The reintubation rates and the unadjusted odds ratio for reintubation were compared across PICUs. The ratio of observed to predicted number of extubation failures generated a standardize reintubation ratio (SRR) for each PICU.
RESULTS: Extubation failure occurred in 174 patients (6.2%). Unadjusted reintubation rates varied significantly across PICUs, ranging from 1.74 % to 8.82% ($p<0.05$). The unadjusted odds ratio for reintubation across sites ranged from 0.21 (95% CI 0.05, 0.87) to 1.51 (95% CI 0.87, 2.62). The final LR model for reintubation risk retained nine case-mix indicators: age >60 months; PRISM II score; chronic respiratory condition; chronic non-invasive ventilation; chronic non-respiratory co-morbid condition; neuromuscular disease; genetic condition; intubation in operating room; and intubation for airway surgery. The c-statistic for the final LR model was 0.70 ± 0.02 standard deviations (95% CI 0.66, 0.74). The SRR was >1.0 for 7 PICUs. Two PICUs had a SRR of 0.34 and 0.33, respectively. A unique PICU identifier added to the final LR model identified one PICU as statistically significant after controlling for all other case-mix variables, ($p=0.03$).
CONCLUSIONS: Significant variation among reintubation rates does exist between PICUs. Standardized reintubation ratios can compare observed and predicted numbers of reintubations across PICUs.

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Fellow in Training

3:00 PM

Pathogenesis of Cardiac Hypertrophy from Noonan Syndrome-Associated Mutant RAF1

Perundurai S. Dhandapany, Ioannis Karakikes, Rahul S. Tonk, Lifan Liang, Kimihiko Oishi, Roger Hajjar, Djamel Lebeche, Bruce D. Gelb.
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BACKGROUND: Noonan syndrome (NS) is a genetically heterogeneous autosomal dominant disorder with cardiac abnormalities including hypertrophic cardiomyopathy (HCM). Gain-of-function (GOF) mutations in RAF1, which encodes a serine-threonine kinase that activates MEK1 and MEK2, are specific for NS with HCM.
OBJECTIVE: To elucidate the pathogenesis of cardiac hypertrophy from RAF1 GOF mutations.
DESIGN/METHODS: We generated adenoviruses to express GFP, wild type RAF1 (WT) or NS-associated GOF mutant RAF1 (L613V). Neonatal rat cardiomyocytes (NRCMs) were infected with adenoviruses at an MOI of 100. At 48 h, protein synthesis rates were determined using [3H]-leucine incorporation and cell size was determined with planimetry after phalloidin staining. Steady-state expression levels of cardiac fetal genes Anf, Myh7 and Acta1 were quantified using real-time qPCR and normalized using Actb expression levels. The activation status of relevant signaling components was determined using phospho-protein specific and total protein antibodies.
RESULTS: Expression of L613V RAF1 in NRCMs increased protein synthesis 3.5-fold over GFP-infected control ($p<.02$) while WT RAF1 increased it 1.7-fold (NS). Average cardiomyocyte area was increased 20% in NRCMs expressing WT or L613V RAF1 compared to GFP-expressing cells and sarcomeric organization was also increased. Normalized, steady-state expression levels of Anf, Myh7 and Acta1 were significantly increased in NRCMs expressing WT or L613V RAF1 (4- to 6-fold vs. GFP-expressing NRCMs, $p < .05$), comparable to phenylephrine-treated NRCMs. Phosphorylation ratios of the mitogen-activated protein kinases (Mapk), Erk1/2 (Thr202/Tyr204 and Thr183/Tyr185) as well as p38 (Tyr138) in WT and mutant RAF-expressing NRCMs were similar to GFP-expressing cells while those phospho-Mapk ratios were increased in phenylephrine-treated NRCMs. Serca2a and phospholamban levels were decreased in NRCMs expressing L613V RAF1 but not WT RAF1.
CONCLUSIONS: Expression of WT and GOF mutant RAF1 induces cardiac hypertrophy but in qualitatively different manners. Induction of the cardiac hypertrophy program from NS-associated mutant RAF1 appears to occur independently of Mapk activation, suggesting involvement of signaling through other effectors such as Ask1. Elucidation of this pathogenesis will inform selection of potential novel therapeutic targets for hypertrophic cardiomyopathy in NS.

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Medical Student

3:15 PM

Development of YAP and γ-Secretase in ErbB4-Receptor Signaling Pathways during Fetal Lung Type 2 Cell Maturation

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BACKGROUND: We have shown the significance of ErbB4 receptors for fetal lung type 2 (T2) cell maturation, but ErbB4 signal transduction in T2 cell maturation is not understood. One important ErbB4 signal mechanism is ErbB4 cleavage at the cell membrane by γ-secretase, an enzyme complex whose active component is Presenilin-1 (PSEN-1). The cleaved intracellular fragment associates with chaperone proteins including YAP (Yes associated protein) and moves into the nucleus where it regulates gene expression. The cell- and development-specific expression of PSEN-1 and YAP in fetal lung, and their role in ErbB4 signaling, is unknown.
OBJECTIVE: We studied the developmental distribution and amount of PSEN-1 and YAP in fetal lung T2 cells and the effect of stimulation with the ErbB4 ligand Neuregulin (NRG).
DESIGN/METHODS: We used T2 cell cultures of gestations e16, e17 and e18. Cells were untreated (control) or stimulated with NRG (30nM) for 5 min. Western blots of whole cell lysates and subcellular fractionations were used to show gestational regulation of, and effects of NRG on PSEN-1 and YAP amount and distribution. Co-immunoprecipitation in e17 and e18 T2 cells using anti-YAP and anti-PSEN-1 antibodies was done to identify interactions with ErbB4.
RESULTS: Subcellular fractionation showed cytosolic but not membrane location of YAP. We observed a strong increase of YAP in the cytosol of e18 T2 cells over e16 and e17. NRG stimulation increased the YAP amount in e17 and e18 T2 cells. PSEN-1 was present in both the membrane and cytosol fractions and was strongly increased in e18 compared to e16 and e17 in both fractions. The membrane/cytosol ratio of PSEN-1 also increased with gestation. NRG increased PSEN-1 in e16 and e18 T2 cells . Co-IPs showed ErbB4 association with both YAP and PSEN-1 which increased with NRG.
CONCLUSIONS: YAP and PSEN-1 are expressed in fetal lung T2 cells, where they increase in amount as term approaches. Co-imunoprecipitations indicate that PSEN-1 and YAP interact with the ErbB4 receptor and this interaction is stimulated by NRG. These results suggest that PSEN-1 and YAP are important in ErbB4 signaling and trafficking during lung maturation.

95 Medical Student

3:30 PM

Pneumococcal Resistance Patterns Do Not Influence Choice of Empiric Antibiotic Therapy for Community-Acquired Pneumonia in Children

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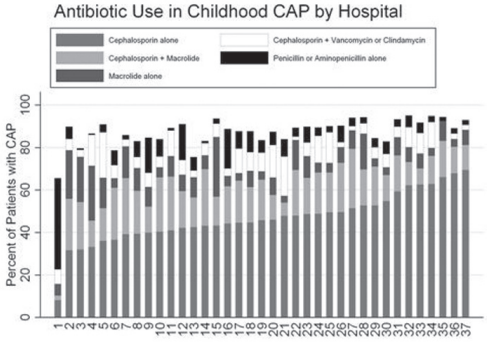
BACKGROUND: There are no published national guidelines for the treatment of community-acquired pneumonia (CAP) in children.

OBJECTIVE: To describe the variability in antibiotic prescribing for children hospitalized with CAP, and to determine whether local pneumococcal penicillin resistance patterns influence broad spectrum antibiotic.

DESIGN/METHODS: This multicenter retrospective cohort study examined data from 37 tertiary care children's hospitals in the Pediatric Health Information System. Children 1-18 years of age hospitalized with CAP during 2006 were eligible. The primary outcome was empiric use of broad spectrum antibiotics, defined as any antibiotics other than penicillin or aminopenicillins within the first 24 hours of hospitalization. The primary exposure was the proportion of pneumococcal isolates that were non-susceptible to penicillin in the prior year as determined by a survey of participating hospitals.

RESULTS: 7,776 patients with a median age of 2 years (interquartile range, 1-6) were included. The five most common antibiotic combinations accounted for 88% of all antibiotics prescribed as follows: cephalosporin alone (46%), cephalosporin plus macrolide (18%), macrolide alone (9%), cephalosporin plus either vancomycin or clindamycin (8%), and aminopenicillin alone (7%). There was variation in empiric antibiotic prescribing among the participating hospitals. For each 10% increase in the proportion of penicillin non-susceptible isolates, there was a 0.7% increase in broad spectrum antibiotic prescribing (coefficient, 0.7; 95% confidence interval: -0.5-1.9; P=0.25).



CONCLUSIONS: There is substantial variability in choice of empiric antibiotic therapy for children hospitalized with CAP. This variability is not associated with local pneumococcal resistance patterns.

96 Medical Student

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What Happens to Inner-City Youth between Ages 8-19: Perceptions and Intentions vs. Reality

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BACKGROUND: Inner-city youth are at risk for altered developmental trajectories through drug use, school failure, adjudication, and parenthood.

OBJECTIVE: 1) To explore the relation of youth perceptions and intentions at ages 8-10 and youth outcome at ages 16-19; 2) to assess factors associated with altered developmental trajectories.

DESIGN/METHODS: In 120 inner-city African American youth of low SES, followed since birth, we administered the Youth Health Risk Behavior Inventory (YHRBI) at ages 8-10. At ages 16-19 we documented presence/absence of 4 trajectory altering events (TAE): 1) drug use (+ urine drug screen [+UDS]); 2) school failure (grade retention/high school dropout); 3) adjudication (Philadelphia juvenile system); 4) parenthood (self-report). Additional variables analyzed were: Participant (IQ [WPPSI-R], self-esteem [Culture-Free Self-Esteem Inventory], depression [Children's Depression Inventory]); Caregiver (drug use, foster care); Environment (home environment [Home Observation for Measurement of the Environment], exposure to violence [Things I have Seen and Heard]).

RESULTS: Data were available for 97 subjects (43% male) for both YHRBI as well as for TAE. Data on perceptions and intentions at age 9.4 ± 0.5 showed: 94% felt it was unlikely they would try marijuana; 92% felt they were likely to go to college/trade school; 87% felt going to prison would ruin their life; 81% did not know one could become pregnant with first time sex. Outcome at age 17.7 ± 1.0 showed: 29% had a +UDS, 26% had school failure, 26% had been adjudicated and 14% had become parents. Fifty-seven percent had at least 1 TAE; of these, 20% had 2, 6% had 3 and 3% had 4. In univariate analyses, variables associated with any TAE vs. none were: lower IQ at age 4, poorer home environment at age 5½ and greater exposure to violence and lower self-esteem at age 7 (all p≤.006). Using logistic regression, controlling for age and gender, variables most strongly associated with TAE were greater exposure to violence (p=.003) and poorer home environment (p=.015).

CONCLUSIONS: Young inner-city children are idealistic regarding their future. In contrast, by ages 16-19 more than half the youth in this cohort had a TAE. Factors most strongly associated with a TAE were greater exposure to violence and poorer home environment. We speculate that altering environmental factors in early childhood may be essential to prevention of TAE in these youth as they transition to adulthood.

Neonatology II - Epidemiology and Follow Up Platform Session

Saturday, March 14, 2009
4:15 PM-5:45 PM

97 Fellow in Training

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Potential Biases in Reports of Outcomes of ELBW Infants

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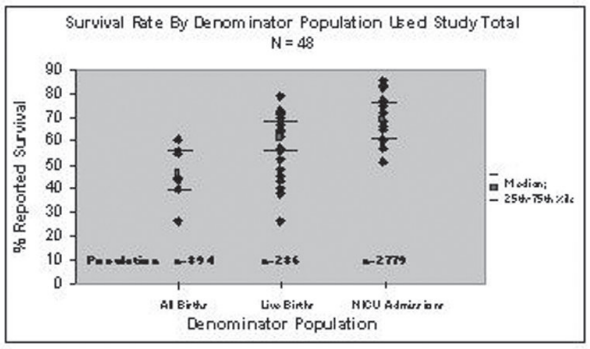
BACKGROUND: Improvements in survival and outcomes of extremely low birth weight (ELBW) infants are reported. Data needs anchoring using consistent denominators describing the intake population. Moreover, loss to follow-up (LTFU) is a potential source of variation.

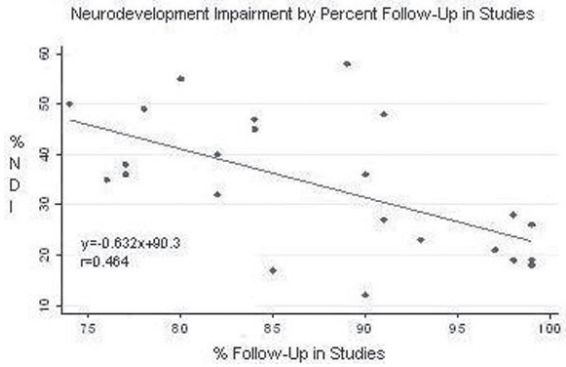
OBJECTIVE: To perform a systematic review of hospital survival rates & 18-24 month outcomes in BW<1000g to assess variation in hospital mortality rates by different denominators; and to assess variation in outcome rates by LTFU.

DESIGN/METHODS: We systematic searched studies between 2000-2008 reporting Neurodevelopmental Impairment (NDI) at 18-24 months. We defined NDI as one or more of: developmental quotient ≤-2SD, cerebral palsy (CP), visual impairment, or hearing impairment requiring amplification.

RESULTS: We found 94 eligible articles: 48 included mortality data for 65,335 infants, showing the denominators used in calculations; and 18 described rates of FU for 26,557 infants. Mortality unadjusted rates ranged from 26-85.5%. Variation depended on the denominator used, whether all births or only NICU admissions (See below).



At 18-24 mths, 12-57.5% of infants had NDI. Higher rates of NDI were seen in studies with greater LTFU.



Marked variation in all components of the NDI existed.[figure2]

CONCLUSIONS: We illustrate potential for two biases in reports of survival and long term outcomes in ELBW infants, that should be considered when counseling parents. Firstly, when survival rates are reported using a denominator of admission to NICU, over-estimation occurs. Secondly, higher LTFU at 18-24 mths overestimates rates of NDI in survivors.

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Fellow in Training

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Parental Reading Behavior and Language Development in Premature Infants

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BACKGROUND: Programs designed to promote parental reading to infants, such as Reach Out and Read (ROR), have been shown to enhance language development in preschool children. The effect of parental reading has been incompletely studied in premature infants, who are at particular risk for language delay.

OBJECTIVE: We hypothesized that parental report of reading to their premature child as a favorite activity would be associated with increased language scores.

DESIGN/METHODS: Parents of infants born at < 33 wks gestation between March 2006 - June 2007 and enrolled in a study of auditory function were approached. When the infants were 15-18 mo corrected age (CA), parents answered an open-ended questionnaire about their favorite activities with their child. We conducted language assessment using the MacArthur Communicative Development Inventories screening test (MCDIs) at 15-18 mo CA.

RESULTS: Seventy three (71%) of 103 eligible infants participated. Children whose parents reported reading as a favorite activity had higher birth weights, but other demographic variables did not differ.

Table 1. Demographics and Outcome

	Reading mentioned N=38	Reading not mentioned N=35	P
Age (months CA)	17.5±2.5	16.8±2.2	0.24
Birth weight (g)	1479±457	1219±372	0.01
Race (white)	25 (66%)	21 (60%)	0.61
Male gender	19 (50%)	20 (57%)	0.54
MCDIs expressive language score	45±30	26±20	0.002

The primary outcome, increased MCDIs expressive language score, was strongly associated with parental reading. Multivariate regression, using factors associated on univariate analysis with both language development and parental reading (birth weight, maternal education, and known sensory risks: retinopathy of prematurity stage III or above, abnormal hearing screen, bilingual houshold) was performed. Parental reading was independently, significantly associated with higher (better) expressive language score ($p<0.001$, coefficient 22) and sensory risk was independently, significantly associated with lower expressive language score ($p=0.02$, coefficient -20).

CONCLUSIONS: Self-reported parental reading behavior, specifically mentioning reading as a favorite activity, is associated with increased expressive language skills in former premature children aged 15-18 mo CA. Interventions aimed at increasing parental reading, such as ROR, may help promote language development in premature infants.

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Fellow in Training

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Neurodevelopmental Outcome of Preterm Infants Born to Mothers with Severe Preeclampsia

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BACKGROUND: Preeclampsia affects 5-8% of all pregnancies and is associated with increased perinatal mortality, morbidity and intrauterine growth retardation. Reduced uteroplacental perfusion is thought to be the contributing factor for growth retardation and possible poor neurological outcome. There are limited data available on the neurodevelopmental outcome of preterm infants born to mothers whose pregnancies have been complicated by severe preeclampsia.

OBJECTIVE: To compare long term neurodevelopmental outcome of preterm infants born to mothers with severe preeclampsia to babies who were born at similar gestational age.

DESIGN/METHODS: Sixty two infants with mean BW of 1167 ±362 SD gm and GA of 29.6 ±2.2 SD wks who were born to mothers with severe preeclampsia (BP ≥160/130, edema and proteinuria) were compared to 377 GA matched controls (BW 1353±377SD gms and GA of 29.5±2.3 SD wks). Neurodevelopmental assessment was done at 6, 9, 12, 18 and 24 months corrected age. Comparison between the groups were made using chi square and Fisher s exact test.

RESULTS: At 6 months post conceptional age 29.4% of preeclampsia infants had abnormal PDI score as compared to 13.2% of control infants. At 9 months PCA 25% of preeclampsia infants had abnormal PDI scores as compared to 16.6% of control infants. At 12 months PCA 22.7% of preeclampsia infants had abnormal PDI as compared to 19.6% of control infants. At 24 months PCA16.3% of the preeclampsia infants had abnormal PDI scores (72.17±14.80SD) as compared to 17.4% of control infants (67.63±12.40SD). At 24 months PCA 7.7% of preeclampsia infants had abnormal MDI scores as compared to 15.3% of control infants. One infant in the preeclampsia group and 5 infants in the control group had spastic diplegia. 8% of infants in preeclampsia and 18% in control group had significant cognitive delay. The incidence of neonatal complications for preeclampsia infants and controls were: RDS treated with surfactant (62.9% vs 41.3%, p=0.002), PDA treated with Indocin (48.4% vs 37.1%, p=0.09), BPD (9.7% vs 11.2%, p=0.72), neonatal culture proven sepsis and meningitis (22.7% vs 17.1%, p=0.29), grade 1&2 IVH (24.2% vs 22.7%, p=0.79), grade 3&4 (0% vs 2.1%, p=0.24).

CONCLUSIONS: In our study population there was no difference in measurements of neurodevelopmental outcomes between infants born to mothers with severe preeclampsia and control infants up to 24 months post conceptional age.

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Late Preterm Infants Have Worse Neurodevelopmental Outcomes Than Full Term Infants

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BACKGROUND: The overall increase in preterm birth is secondary to an increase in late preterm birth (34-37 weeks gestation) for the last 10 years. Although, these infants are perceived by many to be at similar risks for morbidity and mortality as full term infants, recent literature has suggested worse school-age outcomes for this population. However, they have little or no developmental follow-up.

OBJECTIVE: To compare the neurodevelopmental outcomes of a recent cohort of late preterm (LP) infants on the Bayley Scale of Infant Development Short Form-Research Edition (BSF-RE) to their full term (FT) counterparts.

DESIGN/METHODS: Our study sample (7590 FT and 1398 LP infants) came from the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B) dataset. The ECLS-B is a nationally representative longitudinal cohort born in the year 2001, which over-sampled low and very low birth weight children. The BSF-RE was administered to the sample at two years of age. The BSF-RE is a validated research tool with mental index scores (MDI) and psychomotor index scores (PDI). MDI or PDI < 70 is considered developmentally disabled. Bivariate comparisons between LP and FT infants were done using t-test for continuous variables and chi-square for categorical variables. To assess the risk of developmental disability we used multivariate logistic regression to generated odds ratios (OR) controlling for confounding variables.

RESULTS: LP infants compared to FT infants had lower MDI (82 vs. 88; $p<0.0001$) and PDI (83 vs. 90; $p<0.0001$) respectively. A higher proportion of LP infants compared to FT infants had an MDI < 70 (26% vs. 17%; $p<0.0001$) and PDI < 70 (21% vs. 14%; $p<0.0001$). After controlling for other statistically significant or clinically relevant descriptive characteristics, LP infants still had higher odds than FT infants of mental (OR: 1.26 CI: 1.05 – 1.53; $p=0.0155$) or physical (OR: 1.40 CI: 1.147 – 1.704; $p=0.0009$) developmental disability.

CONCLUSIONS: LP infants have neurodevelopmental outcomes worse than FT infants as assessed by the BSF-RE. LP infants have significantly increased odds of having mental (26%) or psychomotor (40%) developmental disability after controlling for other confounders. Intentional late preterm delivery should be approached with caution after careful consideration of their worse neurodevelopmental outcomes and close developmental follow-up should be considered for this population if delivery is necessary.

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Limitations of Neonatal Hearing Screening Program Based on Transient Evoked Otoacoustic Emission in Evaluations of the Newborns with Fetal Lead Exposure

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BACKGROUND: Numerous studies have shown that prenatal lead exposure is associated with a variety of neurobehavioral and electrophysiological abnormalities. However, knowledge about the effects of maternal lead exposure on the neonatal auditory system function is limited. Hearing loss in infants has been associated with lifelong deficits in speech and language acquisition. Universal newborn hearing screening (UNHS) has been proposed as a means to speed diagnosis and treatment and thereby improve language outcomes in these children.

OBJECTIVE: Evaluated if neonatal hearing screening program based on transient evoked otoacoustic emission is a sufficient test for the infants with high lead exposure in utero and to find prevalence of the language delay in the high lead exposure group of the babies.

DESIGN/METHODS: Data were collected as a retrospective chart revue of the infants born in the Elmhurst Medical Center (EMC) from January 2005 to July 2008. Hearing screen was done in the first 24 -48 hours. First test was otoacoustic emissions (OAEs). Newborns who failed the OAE's were tested for auditory brainstem response (ABR). Data on the speech and language delay were collected from the computer database.

RESULTS: From January 2004 to July 2008 14426 babies were delivered in the EMC. 14217 – were born to the mothers with median BLL's 3 µg/dL (range 0 – 10 µg/dL) . 209 (1.4%) born to mothers with median BLL's 17 µg/dL (range 11 - 56 µg/dL). All infants had a hearing screen in the first 24 – 48 hours of life. 346 (2.4%) – failed OAE's and ABR's. 32(9.2%) infants had either malformations or genetic anomalies and were excluded. 313 (2.2%; 95% CI: 1.9 – 2.4%) infants with failure of initial screen belonged to the group with no or low exposure to the lead in utero. 1 (0.4%; 95% CI: 0.08 – 2.6%) newborn was form the cohort of the high maternal BLL's. Only 57 (27.2 %) infants from the group of high maternal BLL's had follow-up in the EMC for more than 2 years (range 2,5 – 3,5 years). 14.0% (8 children; maternal BLL's 26 – 40 µg/dL) of them had language delay at 24 – 26 months and wee referred for the speech therapy. 3 (5.2%) had mild/moderate hearing loss.

CONCLUSIONS: Universal neonatal hearing screening based on OAE may not be a sufficient test for the babies exposed to the lead in utero. Late identification of the hearing problem may lead to the language delay.

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Term Neonates with Hypoxic-Ischemic Encephalopathy (HIE) Treated with Selective Head Cooling (SHC) Have a Favorable Short Term Outcome Even with a Marked Delay in Onset of Sleep-Wake Cycles (SWC)

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Pediatrics, Weill Cornell Medical College, New York, NY; Neurology, Weill Cornell Medical College, New York, NY.

BACKGROUND: Data indicate that the presence, time of onset, and quality of SWC on amplitude integrated EEG (aEEG) reflects the severity of a hypoxic-ischemic insult and also has predictive value for neuro-developmental outcome in neonates with HIE i.e. onset of SWC < 36 hours of life is associated with a more favorable outcome. Seizures (Sz) delay onset i.e. median of 39 hours (Osredkar et al. Peds 2005). We questioned whether SHC used to treat neonates with HIE would modulate the onset of SWC.

OBJECTIVE: To determine the onset of continuous background (CB) and establishment of SWC in term infants with moderate to severe HIE undergoing SHC and the relationship to short-term outcome.

DESIGN/METHODS: Between Aug and Feb 08, 16 consecutive term infants with HIE were treated with SHC (Gluckman Lancet 2005). All were monitored with aEEG during cooling and with video EEG (vEEG) immediately following for at least 72 hrs. All vEEG data were blindly analyzed for background, epileptiform activity and SWC. Antiepileptic drugs (AEDs) were administered for suspected clinical and/or EEG Sz. All infants are followed longitudinally. Unfavorable outcome included death or severe global neuro-developmental disability (NDD).

RESULTS: At cooling encephalopathy was moderate (n=10) and severe (n=6). All 16 infants had aEEG Sz during cooling requiring multiple AEDs. In 12/16 the Sz were controlled by 72 hrs. The onset of CB and SWC was noted between 48 and 72 hrs of life on aEEG (n=4) and confirmed in all on vEEG and one infant following cooling. SWC were established between 100 and 130 hrs (n=6), and 131-150 hrs (n=1). The median onset of SWC was 96 hrs. All 12 with established SWCs have a favorable short-term outcome at 7.6 ± 2.6 m. Four infants never established a CB or SWC's through 168 hrs of whom two died and two have severe NDD.

CONCLUSIONS: These preliminary observations indicate that the generation of SWC is markedly delayed in this high-risk group of infants. Despite this delay, these infants have a favorable short-term outcome. Failure to establish SWCs was associated with an unfavorable outcome. Factors that may have contributed to delayed SWC include the severity of the encephalopathy, Sz, AED's and hypothermia. Both the intensive AED therapy and SHC may have contributed to the unanticipated favorable short-term outcome.

Neonatology III - GI/Nutrition Platform Session

Saturday, March 14, 2009
4:15 PM-5:45 PM

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4:15 PM

Effect of Non-Nutritive Sucking on Gastric Motility of Late Preterm Neonates

Soraya Abbasi, Emido Sivieri, Jeffrey S. Gerdes.

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BACKGROUND: The ability to provide enteral nutrition to preterm infants is limited by immaturity of GI motor function. Non nutritive sucking (NNS) has been reported to improve feeding tolerance, shorten transition to oral feeding, increase rate of weight gain, and reduce length of hospital stay. The effect of NNS on gastric motility of late preterm infants has not been adequately studied. Electrogastrography (EGG) is a non-invasive measurement of gastric myoelectrical activity, obtained by placing electrodes on the skin over the stomach. EGG has been shown to be a reliable non-invasive technique as an alternative to gastric manometry in preterm infants.

OBJECTIVE: To measure the effect of NNS on gastric motility as measured by EGG before and after feeding.

DESIGN/METHODS: The EEG signal was obtained by placing three Ag-AgCl surface electrodes over the stomach in a triangular pattern. EGG signals were recorded at 50Hz and bandpass filtered between 1.2 and 18 cycles/min. Recordings were made with the infant in the supine position, for at least 30 minutes before feeding. Sequential l0 minute segments of the EGG signal, from which movement artifact was removed, were analyzed by FFT spectral analysis to determine the gastric contraction frequency in cycles/min (CPM), and for the presence of 4-10cpm tachygastria (TG). NNS was provided by pacifier (Wee-Soothie) while EGG was recorded 30 minutes before and 30 minutes after feedings. Recordings during NNS were compared to recordings without NNS.

RESULTS: Eleven infants with birth weight of 2938 847SD, range 1891 to 4750 gms. and GA of 36.7 ±1.8SD, range 34.6 to 39.7 weeks had EGG measurements at study age of 3.0 ±1.6SD, range 1 to 6 days. All recordings were done after infants had reached full enteral feedings. All infants had normal gastric activity before and after feedings. All measures of gastric motility increased with non nutritive sucking. CPM increased significantly from 3.63 ±1.63SD to 4.80 ±1.85SD (p=0.004) with NNS as compared to control periods. Further, there was a 19% increase in TG (43 ±20SD % to 51 ±14SD %) with NNS as compared to control period.

CONCLUSIONS: From these preliminary data it appears that non nutritive sucking in late preterm neonates is associated with increased gastric motility which, in part, may explain the reported improved feeding tolerance with non nutritive sucking in tube fed preterm infants.

104 Fellow in Training

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Intestinal Barrier Development of Newborn Rats

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Pediatrics, Division of Newborn Medicine, Mount Sinai School of Medicine, New York, NY; Pediatrics, Division of Allergy and Immunology, Mount Sinai School of Medicine, New York, NY.

BACKGROUND: The production of short chain fatty acids (SCFAs) in the intestinal lumen of premature infants is important for normal intestinal biology and crucial for gastrointestinal adaptation and maturation. However, excessive production and accumulation of SCFAs in the intestinal lumen may cause mucosal injury by interrupting mucosal barrier function and may play a key role in the pathogenesis of necrotizing enterocolitis (NEC).

OBJECTIVE: To test the hypothesis that the undifferentiated cells of immature colonic epithelium have decreased barrier function and are more susceptible to the effects of excessive butyrate, one of the main SCFAs produced in the intestinal lumen.

DESIGN/METHODS: Colonic tissue was obtained from Sprague-Dawley rats pre (17-20 days, n=12) and post-wean (24-41 days, n=13). The intestinal mucosa was directly mounted on Ussing chambers and bathed in oxygenated Krebs solution at 37°C. After a 20 minute equilibration, FITC-dextran (3.3mg/mL) was added to the luminal reservoir as a marker for trans-epithelial permeability. Serial aliquots of 100μL from the serosal reservoir were obtained at 0, 30, 60, 90 and 120 minutes and used for fluorescence analysis in a microplate fluorescence reader. The effect of exogenous butyrate was tested by adding 0, 2, 4 and 8mM of butyrate to each group (n=2).

RESULTS: Pre-wean colonic tissue has significantly increased permeability to FITC-dextran compared to post-wean tissue (P<0.001, 2 way ANOVA), indicating decreased intestinal barrier function. Flux (Δ concentration/time/surface area) for pre-wean tissue was 196.14 nM/hr/cm^2 (SE_M 19.48) and 71.89 nM/hr/cm^2 (SE_M 6.467) for post-wean tissue (from 90 to 120 minutes). There was a suggestion that butyrate, in a dose-dependent manner, decreased intestinal barrier function in colonic tissue.

CONCLUSIONS: Pre-wean colonic tissue has increased permeability and, therefore, decreased intestinal barrier function. Weaning is associated with intestinal barrier function development due to increased exposure to gut flora. Our preliminary analysis suggests that exposure to high dose butyrate induces barrier compromise in colonic tissue. We speculate that the combination of decreased baseline colonic barrier function together with the additional adverse effect of elevated short chain fatty acids such as butyrate, can be a factor in the pathogenesis of NEC in the premature population.

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Ureaplasma Species Respiratory Tract Colonization: Risk Factor for NEC in VLBW Infants

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BACKGROUND: Respiratory tract colonization with *Ureaplasma* species is a risk factor for BPD, but its' association with other morbidities of prematurity has not been described. Since the intestinal and respiratory tracts are directly exposed to infected amniotic fluid containing inflammatory mediators, we hypothesized that very low birth weight babies (<1501 g BW, VLBW) exposed to *Ureaplasma* sp. *in utero* are at increased risk for necrotizing enterocolitis (NEC).

OBJECTIVE: To determine the relationship of *Ureaplasma* respiratory tract colonization with NEC in VLBW infants.

DESIGN/METHODS: One or more tracheal aspirate (TA) or nasopharnygeal *Ureaplasma* cultures were obtained during the first week of life from 284 infants <33 wk enrolled from 2 NICUs (U. Maryland Medical Center, Mercy Medical Center) from 1999-2003 and 2007-2008. NEC was confirmed by x-ray (pneumatosis, portal air, pneuoperitoneum) reviewed by a radiologist blinded to *Ureaplasma* culture status and pathology, if available, and assigned a Bell stage. Age of NEC onset, presence or absence of feeding prior to onset, and WBC and platelets on admission and NEC onset were recorded.

RESULTS: NEC was confirmed in 26/284 (9.2%) of the combined cohorts. The incidence of NEC was 2.8-fold higher in *Ureaplasma*-positive infants (15.1%) than *Ureaplasma*-negative infants (5.4%). *Ureaplasma*-positive NEC infants were less mature (26.3±2.5 vs 28.2±2.1 wk, p=0.017) and lower BW (840.1±168.5 vs 1065.5±266.7 g, p=0.014) and greater postnatal age at onset (28.3±13.7 vs 17.1±7.4 d, p=0.037) than culture-negative NEC infants. All but 1 NEC infant were exposed to feeding prior to NEC onset. Although the admission WBC was higher in *Ureaplasma*-positive infants, there was no difference in WBC between culture positive infants with and without NEC. WBC and platelet counts were similar for culture positive and negative babies at the time of onset of NEC.

CONCLUSIONS: This study identifies *Ureaplasma* respiratory tract colonization, a marker of *in utero* infection/inflammation exposure, as a risk factor for NEC in VLBW infants. Affected infants were less mature and older at time of onset (possibly due to delayed exposure to feeding) compared to culture negative infants. Whether *Ureaplasma* directly contributes to intestinal mucosal injury or alters the local immune response is unknown. Future experimental cell and animal models may determine how *Ureaplasma* contributes to NEC pathogenesis.

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Fellow in Training

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Enteral Feeding Strategies in Low Birth Weight Infants: A Retrospective Analysis

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BACKGROUND: Very little is known about how best to introduce feeds to the low birth weight infant. A few studies have demonstrated possible advantages to bolus feeds, early introduction of feeds, more rapid advancement, and longer periods of trophics. However, there are no data on the impact of feeding frequency on tolerance or the length of time necessary to reach full feeds.

OBJECTIVE: To evaluate the impact of feeding very low birth weight (VLBW) infants every 2 hours versus every 3 hours on: 1) the number of days required to reach full enteral feeds. 2) on the number of hours feeds were held.

DESIGN/METHODS: All live, inborn infants weighing 500-1500 grams and born in 2004-2005 at the Hospital of the University of Pennsylvania (HUP) and Pennsylvania Hospital (PAH) were enrolled. Infants were excluded for outborn status, major congenital anomaly, or death or intestinal perforation prior to introduction of feeds. The primary outcome was the number of days from initiation of enteral feeding to full feeds, defined as 120ml/kg/day. Univariate and multivariate linear regression analyses were performed to compare infants fed mostly every 2 hours (Q2) to those fed mostly every 3 hours (Q3) or continuously, after controlling for significant maternal and perinatal factors including hospital, gender, antenatal steroids, use of breastmilk, gestational age, birthweight, duration of pressor or ventilator use, and patent ductus arteriosus requiring treatment.

RESULTS: 165 infants at HUP and 197 infants at PAH met entry criteria. There were 275 infants in the Q3 group, 82 infants in the Q2 group, and 5 infants in the continuous feeding group. When compared to the Q3 group, Q2 infants were smaller (mean birth weight 1085±18g vs. 1182g±14g, p=0.0006). The two groups showed no statistical difference for other demographic or clinical outcomes, including rates of NEC (p=0.899) or time to discharge (p=0.709). In multivariable analyses, the Q3 patients took 2.2 days longer to reach full feeds (95% CI 0.3-4.1 days) than the Q2 patients. Furthermore, the Q3 group had feeds held for 35 additional hours (95% CI 3-67 hours) and required 2.3 more days of parenteral nutrition (95% CI 0.3-4.4 days).

CONCLUSIONS: After controlling for significant maternal and perinatal factors, VLBW infants who are fed Q2 achieve full enteral feeds sooner, require fewer days of parenteral nutrition, and have feeds held for fewer hours. Thus, VLBW infants demonstrate improved feeding tolerance when fed more frequently.

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Feeding Progression in Preterm Infants from 40 Weeks PCA to 3 Months Corrected Age

Barbara Medoff-Cooper, Kathleen Philbin, Toni Mancini, Soraya Abbasi.
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BACKGROUND: The ability to take all feedings by breast or bottle is a key determinant of a preterm infant's discharge from newborn intensive care. The work centers on an objective, quantitative and automated analysis of the pattern of sucking behavior of individual neonates. Analysis and interpretation of sucking organization during a simple 10-minute test, yield inferences about the maturational status of mechanisms underlying coordination of sucking, swallowing and breathing, and achievement of adequate nutritional intake over the course of the infant's meal.

OBJECTIVE: The goal of this pilot study was to evaluate changes in sucking patterns from 40 weeks post-conceptional age (PCA) until 3 months corrected age (CA).

DESIGN/METHODS: A 10-minute feeding assessment was completed at 40 weeks PCA and at 3 months CA using a research quality feeding device which incorporates a sensor for measuring intra-oral sucking pressure with means for attaching a standard nursery bottle at one end, and a Bionix nipple (Bionix Medical Technologies, Toledo, Ohio) on the other end. The nutrient bottle is then attached and the system is ready to assess a variety of sucking parameters including number of sucks, number of bursts, time off sucking, sucks per burst, and inter-burst width.

RESULTS: Of the 26 infants enrolled in the study, 18 had completed both the 40 week PCA and 3 months CA feeding assessment. The mean GA at birth was 28.5 ±1.68SD weeks, and the mean birth weight was 1104 ±292SD grams. Mean PCA at which oral feeding was initiated was 33.5 weeks (range 32-35) and mean PCA for full oral feeding attainment was 36.5 weeks (range 34-42). At three months CA compared to 40 week PCA number of sucks/burst was 20.6 ±19.0 vs 18.6 ±17.2, mean burst duration was 16.8 ±16.7SD seconds vs 15.2 ±12.0SD seconds, sucks/min was 45.2 ±15.9SD vs 45.9 ±16.9SD. Mean suck pressure at three months CA was significantly higher as compared to 40 weeks PCA (35.5 ±20.8SD mmHg vs 23.8 ±18.2SD mm Hg), p = 0.039. Babies with lower suck pressure at 40 weeks PCA had higher incidence of reported post-discharge feeding problems.

CONCLUSIONS: Although suck pressure significantly improved from term to 3 months CA, there was a large variation in maturation of sucking pattern in our study population which supports the reported post discharge feeding difficulty of LBW infants.

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Protein Safety in Extremely Low Birth Weight Infants

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BACKGROUND: Malnutrition in the early postnatal period may have detrimental effects on growth and development. Increasing amino acid administration in preterm infants improves nitrogen retention, prevents the loss of lean protein mass, and increases the levels of serum amino acids. Amino acid provision to extremely low birth weight (ELBW) infants in the immediate postnatal period is often not equivalent to that required for fetal growth, because of concern for high BUN and metabolic acidosis. One retrospective review showed no association between serum BUN and protein intake; no studies have assessed association between acidosis and protein intake.

OBJECTIVE: The purpose of this study is to determine the correlation between protein intake in the first week of life and serum BUN and acidosis. We hypothesize that there is no correlation between the amount of amino acids administered in the first week of life to ELBW infants and serum bicarbonate (HCO3) or BUN levels.

DESIGN/METHODS: This is a retrospective chart review of 122 neonates 400 to 1000 grams birth weight admitted to Women and Infants' Hospital NICU from 8/1/06 to 10/31/08 who received early hyperalimentation (HAL). Laboratory and nutritional data from days 1 to 7 of life was collected. A random coefficient model was used to estimate the relationship of amino acid intake in the first week of life with BUN and HCO3.

RESULTS: There were 485 separate BUN and 494 separate HCO3 values analyzed. The range of protein intake was between 0 and 4 g/kg/d in the first week of life. The average BUN on day of life 1 was 18.7mg/dl. For every 1g/kg of protein given on day 1 there was an increase of 5 mg/dl in BUN ($p<0.0001$). There was a relative decrease in BUN values by 1.4mg/dl/day on day 2 to 7 ($p<0.0001$) for every 1g/kg/day of protein administered. There was no significant association between protein intake and HCO3 in the first week of life.

CONCLUSIONS: In ELBW infants who are predominantly nourished with HAL in the first week of life, amino acid administration is not associated with metabolic acidosis. The association of protein load with BUN is initially positive, which may reflect a catabolic state in the immediate postnatal period. The relationship of protein with BUN decreases with time, potentially as the neonate develops a positive nitrogen balance.

General Pediatrics II
Platform Session

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Impact of Clinician Computer Skill on Pediatric Primary Care Acute Visits Conducted with Electronic Health Records (EHRs)

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BACKGROUND: EHRs are increasingly prevalent in pediatric primary care. There is little information on how EHRs impact the length and allocation of physician time during acute care visits.

OBJECTIVE: To assess the impact of self-reported computer skill on 1) the length of acute care visits using the EHR and 2) the proportion of total visit time spent using the computer without family interaction.

DESIGN/METHODS: Prospective, direct observational study of pediatric acute care visits. 1 nurse and 1 physician observer measured total visit time and used a modified Davis score to categorize physician activity during 20 second intervals (interobserver reliability $\kappa = 0.75$). **Outcomes:** 1) Total visit time; and 2) Proportion of total visit time spent using the computer without family interaction. **Independent Variables**: A 10-item Likert-scaled clinician self-assessment of computer skill as well as demographic characteristics. **Analysis:** Total visit time and computer time/total visit time (means) were calculated for each clinician. Non-parametric and parametric tests ($p \leq .05$ signifcant) were used to determine the association of independent variables with the outcomes.

RESULTS: 27 pediatricians from 12 practices participated and 529 visits were observed in January and February, 2008 (see Table 1). Increasing physician computer skill was associated with a decrease in the proportion of time spent using the computer only, but not the total visit time.

	No	Mean Total Visit Time (min)	Percent Computer Only Time/Total Visit Time
Gender			
Male	11	10.6	28.7
Female	16	12.6	30.1
p-value		0.06	0.61
Age			
30-39	8	11.6	27.1
40-49	8	12.8	28.1
50-59	11	11.2	32.3
p-value		0.45	1.00
Practice Size			
3-4 providers	4	11.4	29.8
5-11 providers	13	11.0	27.5
> 11 providers	10	15.0	35.8
p-value		0.34	0.55
Status			
Full-time	18	11.6	28.1
Part-time	9	12.1	32.6
p-value		0.65	0.35
Computer Tasks Sum			
Low	8	12.1	**33.4**
Medium	10	11.9	**30.6**
High	9	11.3	**25.0**
p-value		0.81	**0.05***

*p-value significant

CONCLUSIONS: In this study, physicians with higher self-rated computer skills spent a larger proportion of visit time interacting with families. Computer skills training may improve the delivery of family-centered care. Study of the impact of EHR use and computer skill on quality of care is warranted.

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Assessment of Current Practices for Weaning Infants from Car Beds to Car Seats

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BACKGROUND: The American Academy of Pediatrics (AAP) recommends that premature and select at-risk newborns should be screened for breathing issues for a period of time in their car seat, prior to hospital discharge. This screening is referred to as the Infant Car Seat Challenge (ICSC). In response to the AAP's recommendation, the ICSC has become a routine pre-discharge screening procedure. Infants who fail the ICSC are recommended to travel in alternative modes of infant transport, specifically car beds. Despite widespread discharge of infants in car beds, no studies have examined the practice of transitioning infants back to car seats and no published guidelines for such transitions currently exist.

OBJECTIVE: To determine the current practices used by primary care pediatricians to transition infants from car beds to car seats.

DESIGN/METHODS: We conducted a cross-sectional, anonymous survey of Massachusetts pediatric primary care providers about their current practice for weaning infants from car beds to car seats. The survey instrument was designed and mailed to pediatricians identified from the Massachusetts Board of Registration in Medicine registry.

RESULTS: Of the 376 respondents, a majority were primary care physicians in the community (84.5%, n=317), and a small minority worked in a hospital-based practice setting (9.6% (n = 36). Consistent with AAP guidelines, most physicians (90.4%, n=340) reported that ICSCs are performed at the institutions with which they have affiliations. Most physicians reported that they cared for infants who travel in car beds, but management strategies for transitioning infants from car beds to car seats varied dramatically among the respondents.

Management Strategies for transitioning from car bed to car seat (n=352)		
	n	%
Never an issue	124	35
Outgrows car bed	39	11
Timeframe •1-2 weeks after discharge •1 month of age •2 months of age •after retesting in office •after rescreening at birth or other facility •other	1 12 8 31 84 52	<1 3 2 9 24 14
Other (Free Text) Comments (N=52)		
	n	%
Transition at term, due date or 44 weeks gestation	19	37
Uses own weight criteria (i.e. 6.5 lbs., 8 lbs, 10 lbs., term weight)	8	15
Demonstrates improved head control/tone	6	12
Retest in office hospital or clinic	11	21
Parental decision	4	8
Not primary care pediatrician for the infant (filling in), so did not address this issue	4	8

CONCLUSIONS: This study demonstrates that there is substantial practice variability by pediatricians who care for infants who fail the ICSC. Pediatricians lack knowledge about the best methods for transitioning infants from car beds to car seats. In order to address these issues, continued research is needed so that evidence-based national guidelines can be developed.

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Predictors of Caregiver Outreach after a Disclosure of Child Sexual Abuse

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BACKGROUND: According to the ACE Study (1997) 1 in 4 girls and 1 in 6 boys are sexually abused before the age of 18 years. Despite a child's disclosure of sexual abuse being important in the short and long-term victim-to-patient process, timely outreach by a caregiver is also essential to that child's receipt of medical and mental health services . Exploring the actions of caregivers and identifying predictors for outreach after disclosure is an important area of study that to our knowledge has been unexplored.

OBJECTIVE: To examine caregiver management strategies should a child disclose sexual abuse (CSA) and to examine if the physical intrusiveness of the act as well other factors influence caregiver decision to outreach.

DESIGN/METHODS: A sample of caregivers recruited from a pediatric practice was asked to rate actions following hypothetical disclosures of CSA utilizing a Taking Action Strategies (TAS) Scale. Scenarios included: exposure to pornography/masturbation, fondling and penetration. Actions after disclosure included: fighting, blaming child, or outreaching to the authorities/pediatrician. Ratings ranged from 1=strongly disagree to 5= strongly agree. Mean rating of "1" indicated a lower likelihood of taking the action specified, while "5" indicated a greater likelihood of taking such action. Key independent variable was the type of sexual abuse and dependent variable was the actions after disclosure. Repeated Measures ANOVA was used to compare TAS scores across scenarios. Multivariate analysis was used to identify predictors of caregiver decision to outreach.

RESULTS: TAS scores reflected greater preference for "doing something" if the abusive act was perceived as more physically intrusive (exposure to pornography/masturbation- TAS 3.5, fondling-TAS 3.7, intercourse-TAS 3.8). Overall, caregivers reported being less willing to handle a disclosure without outreach (TAS 2.5 and 2.0 for fighting and blaming the child respectively) and more willingness to manage a disclosure with outreach (TAS 3.8, 4.5, and 4.7 for outreaching to ACS, to the pediatrician and police respectively). A statistically significant predictor for outreaching was caregiver past interaction with the Child Protective Services (CPS).

CONCLUSIONS: Perception of invasiveness of CSA and demographic factors can have an effect on caregiver decision to outreach after disclosure of CSA. Additional factors influencing this decision warrants further study.

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Fellow in Training

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Do Children's Hospitals Respond to Predictable Fluctuations in Patient Volume?

Evan Fieldston, Matthew Hall, Marion Sills, Anthony Slonim, Angela Myers, Courtney Cannon, Susmita Pati, Samir Shah.
Univ Pennsylvania SOM; Child Health Corp of America; Univ Colorado SOM; Univ Virginia SOM; Univ Missouri-Kansas City SOM; Harvard Medical School.

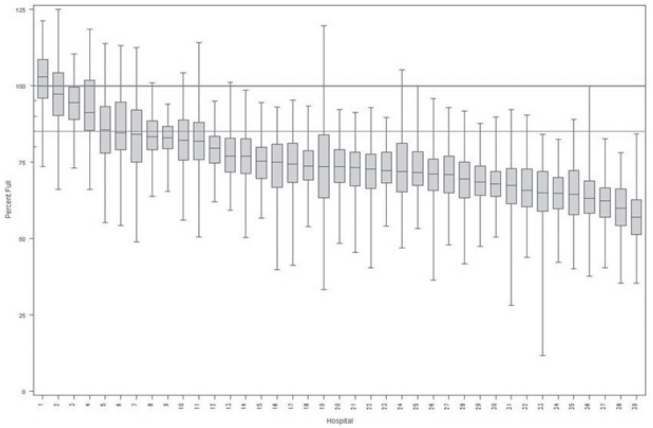
BACKGROUND: High hospital occupancy (HHO) adversely impacts patient care. Several steps, such as smoothing elective volume, can help manage census, but it is not known how children's hospitals (CH) respond to HHO.

OBJECTIVE: To quantify how CH respond to HHO.

DESIGN/METHODS: Midnight census data from 39 CH in the 2006 Pediatric Health Information System were used to construct cutoffs for 85, 90, 95% occupancy & for own-hospital %ile occupancy. Dependent variables were: # medical & surgical elective, <24-hour, low-severity admissions; # transfers in from & out to other hospitals; observed-to-expected length of stay for ambulatory-sensitive conditions (ASCs) & for non-ASCs. Generalized linear models quantified the association between occupancy & responses.

RESULTS: 510,616 admissions to CH frequently result in HHO at midnight: 7.8% at 85-89%, 4.9% at 90%-94%, 3.2% at 95-100%, and 5.5% at >100%. Annual, hospital-level data show inter-facility variation.

Figure 1: Annual hospital capacity by pediatric hospital (2006)
Each boxplot is a summary of occupied capacity at midnight, shown, from top, as maximum, 3rd quartile, median, 1st quartile, minimum for that hospital.



Analyses of occupancy by day & month show expected periodic variation in some hospitals but not others. Compared to normative standards of HHO or within-hospital %iles, few hospitals reacted to HHO with changes in the potential responses modeled.

Table 1: Pediatric hospital responses in relation to midnight census, 2006 (n=39)

		POTENTIAL HOSPITAL RESPONSES							
	Direction of potential change in census	Alter medical elective admissions	Alter surgical elective admissions	Alter short-stay admissions	Alter low-severity admissions from ED	Alter ratio O/E LOS for non-ASCs conditions	Alter ratio O/E LOS for ASCs conditions	Alter transfers in from other acute-care hospitals	Alter transfers out to other acute-care hospitals
Hospital response when >85%	Increased (%)	43.6	28.2	48.7	59.0	17.9	15.4	7.7	**12.8**
	Decreased (%)	**0.0**	**0.0**	**0.0**	**2.6**	**41.0**	**25.6**	**10.3**	0.0
	No change (%)	56.4	71.8	51.3	51.7	41.0	59.0	82.0	87.2
Hospital response when >95%	Increased (%)	20.6	11.8	29.4	55.9	20.6	23.5	2.9	**23.5**
	Decreased (%)	**0.0**	**0.0**	**2.9**	**0.0**	**29.4**	**20.6**	**0.0**	0.0
	No change (%)	79.4	88.2	67.6	44.1	50.0	55.9	97.1	76.5
Hospital response moving from own 90-95%ile to own 98-100%ile	Increased (%)	21.1	5.3	21.1	57.9	36.8	31.6	10.5	**15.8**
	Decreased (%)	**5.3**	**10.5**	**5.3**	**0.0**	**26.3**	**15.8**	**10.5**	0.0
	No change (%)	73.7	84.2	73.7	42.1	31.6	52.6	78.9	84.2
# hospitals with canonical correlation of response	2 of 39 hospitals had a negative correlation between today's canonical response to yesterday's census (i.e. responses overall decreased census today in response to high census yesterday) 26 of 39 hospitals had a positive correlation between today's canonical response to yesterday's census (i.e. responses overall increased census today in response to high census yesterday)								
	Expected direction for response to offset rising census is noted in bold ASC= Ambulatory Sensitive Condition O/E= Observed/Expected								

CONCLUSIONS: This first systematic study of children's hospitals showed planning for or response to HHO was rare & of small magnitude. Few are adjusting elective inflow relative to seasonal fluctuations in non-elective admissions. Hospitals should engage in local review of flow and elective scheduling to maximize safety and quality of care.

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Management of Congenital Preauricular Sinus: A Survey of Members of the American Society of Pediatric Otolaryngology

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BACKGROUND: Preauricular sinus (PAS) is a congenital malformation usually presenting as a small dell adjacent to the anterior margin of the external ear. PAS is generally regarded as an innocent defect, but in some cases, it can be associated with deafness and branchio-oto-renal (BOR) syndrome. Virginia Department of Health mandates that infants with PAS be screened for hearing loss twice a year for the first 3 years of life.

OBJECTIVE: To determine the current opinion on management of PAS among members of the American Society of Pediatric Otolaryngology (ASPO) and whether they agreed with the screening policy in Virginia.

DESIGN/METHODS: A 15-item questionnaire was emailed twice to 273 ASPO members in June and July of 2008 followed by a mailing of a hard copy with enclosed $2 bill to non-responders. A third email was sent to remaining non-responders. Returned responses were tabulated and analyzed.

RESULTS: First 2 emails yielded 39 responses (14%), mailing a hard copy with $2 bill yielded 116 responses (42%) and the third email yielded 11 responses (4%), making the overall response rate 60%. Respondents were from 39 states and 3 Canadian provinces; 62 responders (37%) were in private practice, and 84 (51%) were on staff at a teaching hospital. 138 (83%) had been in practice >10 years. Only 18 respondents (11%) agreed with the Virginia policy. 40 respondents (24%) said newborns with PAS should be initially evaluated with Brainstem Auditory Evoked Response (BAER) hearing test, and 32 (19%) said evaluation should include a renal ultrasound. 37 respondents (22%) said asymptomatic infants with PAS should be referred to a pediatric otolaryngologist, while 73% recommended referral after the first or second episode of infected PAS. 10 out of 165 (6%) would excise an asymptomatic sinus tract. This approach was more prevalent among responders with fewer years of practice (0-10 years). 31 (19%) would excise sinus tract after the first infection, and 100% after the second infection. 130 (79%) were not aware of their state/province policy on screening of infants with PAS.

CONCLUSIONS: 77% of respondents did not agree with Virginia policy on screening. While there was some discordance in opinion regarding surgery, all responders agreed that sinus tract should be excised after second infection. Combined with email, mailing a hard copy of survey with enclosed nominal incentive helps achieve good response rates.

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Who Will Pay When I Get Out? Insurance Status of Youth in Secure Detention Centers

Krishna White, Jennifer Maehr, Lawrence D'Angelo.

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BACKGROUND: Youth who are detained or committed in detention centers are in jeopardy of losing Medicaid (MA) benefits due to federal and state legislation and regulations. This poses a problem when they return to the community, as they may be forced to requalify for benefits.

OBJECTIVE: To determine the prevalence of Medicaid as a source of health insurance for youth in detention centers and to compare this with that of MA in the general population of youth. To identify factors associated with the prevalence of MA in youth in detention centers.

DESIGN/METHODS: This is a descriptive cross-sectional study of youth in MD's secure detention facilities. Demographic information, placement status, and length of stay (LOS) were obtained from the ASSIST database (2008) on all youth ages 13-18 (n= 434) identified from a 1 day population count (October 24, 2007). The Medicaid Management Information System (2008) was used to check for presence of Medicaid. Health insurance status of the general population was derived from the 2007 Current Population Survey. Rates of MA between study subjects and same aged youth in MD were compared. Comparisons were also made on the basis of placement status, LOS, gender, ethnicity, and utilizing the presence of a social security number as a surrogate marker, documented or undocumented immigrant status. Stratified analysis using χ^2 tests was used to assess associations between variables.

RESULTS: Youth in detention centers were more likely to have had MA health insurance than other state youth (69.6% vs. 12.7%, p <0.001). Youth who were adjudicated were more likely to have MA than pre-adjudicated youth (77.5% vs. 65.4%; P= 0.009). There were no demonstrable differences according to gender or LOS. African-Americans (72.7%) and Whites (61.4%) were more likely to have had MA than Latino youth (30.8%, P= 0.006). Not surprisingly, 94.9% of youth with no social security number also had no MA.

CONCLUSIONS: Medicaid is the most common source of health care financing for youth in detention centers in MD. These youth are at risk of losing MA benefits due to federal legislation that prohibits use of federal funding for "inmates of a public institution." Youth in the juvenile justice system have more health problems than their peers, making access to dental, mental, and somatic health care of critical importance. Policy changes are needed to ensure youth maintain health insurance coverage while in detention centers and have health insurance coverage upon release.

Adolescent Medicine Platform Session

Saturday, March 14, 2009
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Adolescent Interpersonal Violence Outcomes for Childhood Witnesses of Adult Violence in the Home

Christine M. Forke, Rachel K. Myers, Marina Catallozzi, Abdul Salam, Abbas Jawad, Donald F. Schwarz.

Craig-Dalsimer Division of Adolescent Medicine, The Children's Hospital of Philadelphia, Philadelphia, PA; Campus Violence Task Force, Institute for Safe Families, Philadelphia, PA; Department of Pediatrics, Mailman School of Public Health, Columbia University, New York, NY; CHOP-Westat Biostatistics and Data Management Core, The Children's Hospital of Philadelphia, Philadelphia, PA, United Kingdom; Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, PA; City of Philadelphia, Philadelphia, PA.

BACKGROUND: Witnessing adult violence as a child increases adolescent interpersonal violence (IPV) risk. It is unclear how the direction of adult violence witnessed (male-female [M-F], female-male [F-M], or bidirectional [BI]) impacts adolescent IPV outcomes.

OBJECTIVE: To compare adolescent IPV victimization and perpetration outcomes by gender and direction of adult violence witnessed.

DESIGN/METHODS: Cross-sectional survey of random classes at 3 urban colleges assessed childhood witnessing of adult violence at home; direction of the violence; and adolescent IPV victimization and perpetration. There were 4 unique categories of adolescent IPV (outcome): no IPV, victim only (victim), perpetrator only (perpetrator), and *both* victim and perpetrator. A multinomial forward stepwise regression model predicting IPV included current age, gender, direction of violence witnessed (M-F, F-M, BI), and a gender*direction interaction term. Adjusted odds ratios (OR) and 95% confidence intervals (CI) are reported.

RESULTS: Students were 17-22 years old; 57% were female and 59% were White. 503/906 (56%) adolescents experienced no IPV, 248 (27%) were victims, 24 (2.6%) were perpetrators, and 131 (15%) were both. Of 201 (23%) witnesses, 105 (58%) witnessed M-F violence, 13 (7%) witnessed F-M, 61 (34%) witnessed BI; 22 indeterminate cases were removed. Adolescent victimization was associated with being female (OR=3.2, CI: 2.3, 4.5) and witnessing BI (OR=2.4, CI: 1.3, 4.5). Adolescent perpetration was associated with witnessing M-F (OR=5.3, CI: 2.1, 13.4). Being *both* an adolescent victim and perpetrator was associated with witnessing F-M (OR=10.6; CI: 3.1, 37.1), witnessing BI (OR=4.1; CI: 2.0, 8.4), witnessing M-F (OR=2.8; CI: 1.6, 5.0), and being female (OR=2.2; CI: 1.4, 3.4). The interaction term was non-significant.

CONCLUSIONS: Girls were more likely than boys to be victims only or to be *both* victims and perpetrators of adolescent IPV. Compared to non-witnesses, children who witnessed male-to-female adult violence at home were more likely to be adolescent perpetrators; children who witnessed adult bidirectional violence were more likely to be adolescent victims. Regardless of direction, children who witnessed adult violence were more likely to be *both* victims and perpetrators. Early interventions addressing family violence may reduce subsequent IPV for childhood witnesses.

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Prevalence of *Trichomonas vaginalis* Genital Infection in a Clinical Sample of Sexually-Active Adolescent Females Using the APTIMA Trichomonas Assay (ATV)

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of Pathology, Montefiore Medical Center, Bronx, NY.
BACKGROUND: Trichomoniasis is a sexually transmitted infection (STI) that when untreated can lead to complications such as pelvic inflammatory disease, preterm birth, and increased susceptibility to HIV infection. Current diagnostic testing for trichomoniasis, including wet preparation (wet prep) and culture, while specific, lacks sensitivity and is inconvenient.
OBJECTIVE: We aimed to examine the utility of the ATV assay (Gen-Probe Inc.), a transcription mediated nucleic acid amplification test, to diagnose trichomoniasis in a clinical sample of sexually active minority adolescent females and to describe their symptoms.
DESIGN/METHODS: We recruited a consecutive clinical sample of 62 sexually active adolescent females (73 were approached; 11 refused), aged 13-21 years, from an inner-city, general adolescent clinic. Subjects provided two self- or provider-collected vaginal swabs and a urine sample. One swab was used for an immediate wet prep assay for motile trichomonads. The other swab and the urine each were tested for *Trichomonas vaginalis* using the ATV assay. Subjects also were tested for gonorrhea and chlamydia using the Gen-Probe APTIMA Combo 2 assay and answered a 25-item questionnaire assessing demographics, sexual history, and current symptoms.
RESULTS: Mean age was 18.2 (±1.5) yrs; 58% Hispanic, 38% black. 55% reported a prior STI and 27% prior pregnancy. 1/62 (1.6%) subjects had trichomonads identified on wet prep. 4/57 (7.0%) had a positive assay for *T. vaginalis* by ATV (including the subject identified by wet prep), each by both vaginal swab and urine testing. 4/53 (7.5%) were positive for chlamydia. None were positive for both chlamydia and *T. vaginalis.* None were positive for gonorrhea. None of the 4 subjects positive for *T. vaginalis* by ATV reported yellow/green vaginal discharge, only 1 reported odor.
CONCLUSIONS: In this small sample, we found four times as many cases of trichomoniasis using the ATV assay as we found using wet prep. We also found 100% concordance for ATV assay results by vaginal swab and urine testing. Most subjects with a positive ATV assay were asymptomatic. Incorporation of this convenient diagnostic test into clinical practice may identify many asymptomatic cases of trichomonaisis in adolescents and treatment may prevent associated complications of infection and reduce transmission. Funding was provided by Gen-Probe Inc.

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Transgender Adolescents: Understanding Their Psychosocial Challenges and Barriers to Health Care

Christine A. Lee, Iman Sharif, Natalie Langston-Davis.
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BACKGROUND: Transgender (TG) individuals are those who identify with the gender opposite from their genetic and anatomical sex on psychological, sexual, and social levels. Little data exists regarding the health and psychosocial risks and needs of TG individuals, particularly adolescents. We present data collected as part of an AAP CATCH grant to develop a medical home for TG adolescents in New York City (NYC).
OBJECTIVE: To determine the health and psychosocial challenges and barriers to healthcare access faced by TG adolescents living in NYC.
DESIGN/METHODS: We conducted a qualitative study, utilizing structured in-depth interviews. The Montefiore Medical Center institutional review board approved the study, and adolescents (ages 13 to 23) provided individual informed consent prior to participation. Self-identified TG adolescents were recruited from two community-based organizations providing services to the TG community. First, participants completed an anonymous self-administered survey to collect general information. Of 24 survey respondents, 11 consented to a 30-minute structured in-depth interview. Interviews were audio-taped and professionally transcribed. Three investigators independently coded each transcript for thematic content; differences in coding were resolved via consensus.
RESULTS: The 26 survey participants ranged in age from 16 to 22 years old; they primarily identified as African American/Hispanic (29%), Hispanic/Latino/a (25%), or multiracial (25%). Overall, 22 identified as male to female, and 2 as female to male. The interviews identified four major themes regarding psychosocial challenges: a lack of stable relationships, a discrepancy between self identity and legal identity, health concerns (including injection hormone access and abuse, risky sexual behaviors, and interpersonal violence), and discrimination preventing societal integration. Regarding barriers to health care, participants described lack of sensitivity among healthcare providers, negative interactions with healthcare professionals and staff, lack of insurance, and discrepancies in legal documentation.
CONCLUSIONS: TG adolescents in this study cited psychosocial challenges and systemic barriers to obtaining healthcare. This data provides new insight and builds upon the emerging body of research on TG adolescents. The findings will be disseminated to inform and further educate health care providers.

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Administration of Tdap Vaccine by Obstetrical Providers to Post-Partum Adolescent Mothers Aged 11-18 Years

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BACKGROUND: ACIP, AAP and CDC currently recommend Tdap vaccination of adolescents 11-18 years of age early in the post-partum period in an effort to decrease the transmission of pertussis. Recent data shows poor compliance with this recommendation.
OBJECTIVE: The aim of the study is to determine if education of obstetrical providers has an impact on Tdap vaccination rates of post-partum adolescent patients. The primary goal is to increase the adherence of the obstetrical providers to current guidelines recommending administraiton of Tdap vaccine to post-partum adolescents 11-18 years old. The secondary goal is to ascertain and compare current and post-intervention Tdap vaccination rates in the specified population.
DESIGN/METHODS: The study includes 4 sections. Part A is an 8 item preliminary survey to describe the obstetricians(OB) and midwives(M) current practices regarding Tdap vaccination. Part B is an educational intervention with OB and M focusing on Pertussis disease, Tdap vaccine, and the current recommendations regarding post-partum Tdap vaccination. Part C is a chart review of all adolescent mothers 11-18 years of age admitted to the post-partum unit during the post-intervention year, compared to the pre-intervention year. Part D is a follow-up survey to describe the OB and M adherence to the above mentioned guidelines.
RESULTS: 14 out of 16(88%) providers completed the preliminary survey (90% of OB and 80% of M). The pre-intervention OB and M adherence rate was 28.5% (0% M, 40% OB).179 charts were reviewed, 133(74.3%) from the pre-intervention year, and 46(25.7%) from the post-intervention year. Of 179 total patients, 59(33%) were admitted to the ante-partum unit and 120(67%) were admitted to the post-partum unit. Of 120 patients admitted to the post-partum unit 104(86.7%) needed Tdap vaccine, whereas 16(13.3%) had received Tdap. Of 104 patients admitted to the post-partum unit who required Tdap, only 24(23.1%) received it and 80(76.9%) didn't receive it. Within the group that received Tdap vacine in the post-partum unit, there was a significant difference between the pre-intervention year where 4(5.3%) of eligible patients received Tdap and the post-intervention year where 20(69%) of eligible patients received Tdap, p<.0001.
CONCLUSIONS: These data suggest that education of obstetrical providers can have a significant impact in increasing the rates of Tdap vaccination of post-partum adolescent patients.

119 Fellow in Training

5:15 PM

Follow-Up on Effects of Prenatal Cocaine Exposure on the Young Adult Brain

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BACKGROUND: We perform a follow-up study of long-term neuroanatomical effects of prenatal cocaine exposure (PCE). The cohort for the current investigation contains 33 individuals (mean age 18+/-0.13 years) with median 99 days of prenatal cocaine exposure (PCE) and 34 controls of similar age, sex, IQ and socioeconomic status. A prior, 2004 imaging analysis of this cohort, previously reported at PAS, revealed volumetric effects in dopaminergic areas and the posterior corpus callosum.
OBJECTIVE: We use current methodology and imaging conducted in 2008 to evaluate whether the 2004 findings, from a sub-cohort of 49 individuals, remain stable after four additional years of brain development.
DESIGN/METHODS: The 2008 T1 image acquisition uses the same protocol on the same 3T scanner as the 2004 data, with 160 contiguous slices of 1.0 mm thickness and 0.97 mm^2 in-plane resolution. We perform an automated analysis of voxel-wise brain volume via large deformation tensor-based morphometry (LDTBM), a well-evaluated methodology for brain mapping. LDTBM leverages the T1 anatomical MRI to map the full dataset to a cohort-specific average brain template space with a high-degree of accuracy. This common neuroanatomical space enables voxel-wise, non-parametric statistics that contrast the local volume of the PCE group brain structures (adjusted for head size) with that of the control group.
RESULTS: To date, 67 subjects have been imaged; of these, 30 (14 PCE, 16 controls) were also imaged in 2004. Results of the current study, at FDR corrected p-value < 0.05, largely confirm the previous findings. Again, PCE effects appear in the caudate nuclei, the putamen and the splenium of the corpus callosum. Additional effects are apparent in the fornix and the orbital frontal gyrus. Repeat analyses of the 30 individuals contained within the 2004 and 2008 datasets shows similar trends of difference at both times. Future work will elaborate on the relative strength and nature of these developmental changes, with particular effort focused on ruling out potential confounding factors in the analysis.
CONCLUSIONS: This follow-up structural image analysis provides evidence for enduring long-term developmental effects due to PCE.

120 Pediatric Resident

5:30 PM

Youth Attitudes towards Guns and Violence

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BACKGROUND: The US mortality rate from firearm injury for children younger than 14 years is higher than others industrialized nations. Knowing youth attitudes towards guns and violence (AGV) will help us to implement appropriate measures to reduce deaths due to violence, a Healthy people 2010 objective.
OBJECTIVE: To assess youth AGV in relation to aggressive responses to shame, excitement, comfort with aggression, and power/safety and whether ethnicity, gender, parenting, anger management group participation, and age have an effect on youth AGV.
DESIGN/METHODS: This is a descriptive, cross-sectional study. Youth from a community hospital were divided into 3 groups by age: from 10-12, 13-16 and 17-21 years. Subjects filled 2 questionnaires(Q): a demographic one, and a previously validated AGVQ. Six scores were obtained with AGVQ: a total score (T-score), a global measure of attitudes to violence and guns, inconsistent responding score (a validity indicator), and 4 subscales scores: shame, aggression, excitement, and power/safety, T-score of 50 is normal but not optimal; a T-score > 60 reflects mild elevation and possible need for intervention, and a T-score > 70 represents serious problems. The data were analyzed with SPSS using frequencies, means, SD, ANOVA , and Pearson Correlation coefficient.
RESULTS: A total of 108 subjects participated in the study. Age group 10-12 (17.7%), 13-16 (53.7%), and 17-21(28.5%) years. Females: 66.6%, Hispanic: 55.6%, Asians: 13%, Black: 7.4%, White: 1.8%, and others: 22.2%. T-score >50% was obtained by 30% of subjects; 60-70% by 7%;

and <50 in 63%. There was no difference in t-scores among the 3 groups, although there was a tendency for higher score in power/scale subscale (p=0.003). Thirty-eight percent would always talk to their parents about school, 48% would sometimes, 12% would hardly and 1.8% would never. Attitudes toward violence was positively correlated with the degree to which children talked to their parents (p-0.002). There was a significant score in the excitement subscale in children participating in anger management (p=0.008), by ethnicity (p=0.014) and in relationship with communication with parents (p=0.014).
CONCLUSIONS: The majority of children demonstrated acceptable level of ATGV, however there were children with higher risk than desired. Communication with their parents appeared to be a protective factor. Children who attended anger management programs are more likely to view violence as acceptable.

Pulmonary and Asthma Platform Session

Saturday, March 14, 2009
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4:15 PM
EMR Reminders Increase Influenza Immunization Rates among Asthmatic Children

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BACKGROUND: Hospitalizations account for the single largest portion of health expenditures for asthmatic children in the US. Universal flu vaccination for asthmatic children is a national recommendation because some studies show that asthmatic children immunized have a marked decrease in both hospitalization and ER visits. Until recently, a 20% flu vaccination rate in this population was considered superior. A nationwide effort led by the CDC began in 2001 to increase this rate, but by the 2004-2005 influenza season, only 29% of asthmatic children in the US between ages 2-17 received vaccines.
OBJECTIVE: Determine if a non-compulsory, omnipresent EMR reminder system could significantly improve the influenza vaccination success rate of pediatric asthmatic patients.
DESIGN/METHODS: The flu vaccination success rate of patients with an asthma diagnosis was monitored in an urban multi-provider pediatric outpatient clinic during six flu seasons between 2001 and 2008. Data was collected during the 2001-2002 and 2002-2003 seasons using billing data only. In the 2003-2004 season, an EMR was introduced including a prompt reminding practitioners during the flu season that a vaccination was indicated. Data between 2003 and 2008 was collected using billing and EMR data.
RESULTS: With traditional efforts, the success rate of influenza vaccinations in asthmatics increased from 19.4% in the 2001-2002 season to 27.7% in the 2003-4 season. Within a year of implementing EMR, the influenza vaccination success rate doubled to 53.5% in the 2004-2005 season. A success rate of 50.1% was maintained in the 2005-2006 season, and reached a peak in the 2006-2007 season at 55.4%. There was a statistically significant difference in the proportion of immunizations between 2001 and 2007. Data for 2007-2008 season will be available and included in analysis before the meeting.
CONCLUSIONS: Traditional efforts to improve influenza vaccination rates can be successful as seen in the 2003-2004 season. However, a strong electronic reminder system embedded into the medical record may lead to significant improvements even over what appears to be a high success rate. The amount of reminders can be adjusted to further increase the success rate.

122 House Officer
4:30 PM
Gastroesophageal Reflux in Obese Children with Asthma

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BACKGROUND: Gastroesophageal reflux (GER) has been found in 32-80% of children with asthma and is also highly prevalent in obese children. GER may be a trigger for asthma and the treatment for GER may result in asthma improvement. The relationship between GER symptoms and poorly controlled asthma has not been studied in obese children with asthma. The prevalence of both asthma (9.7% of children) and obesity (45% of children with BMI ≥85%ile) is high in our community; therefore we decided to examine the relationship between GER in obese children with asthma.
OBJECTIVE: To assess the prevalence of GER symptoms in obese children with asthma in an urban population compared with a control group (children without asthma) and assess the impact of GER symptoms on asthma control in obese children.
DESIGN/METHODS: A cross sectional survey containing the 1)"GERD Questionnaire, 2)"Asthma Control Test" and additional demographic information was distributed to all patients 7-18 years of age who were patients in the Pediatric Ambulatory Clinics of St Barnabas Hospital, an urban community hospital. Exclusion criteria included those children with an asthma exacerbation and who were already taking medications for GERD.
RESULTS: 188 subjects were invited and 186 subjects aged 7-18 years agreed to participate in the study; 2 subjects were ineligible. 72 subjects(39%) were children with asthma and 114 (61%) were non asthmatic controls. 37(56%) of the Asthma group and 61(57%) of the Non Asthma group had a BMI ≥85%ile. 34(18%) subjects had a GERD Score of ≥3 suggestive of the diagnosis of GERD, of which 21(62%) were in the Asthma group and 13(38%) in the non Asthmatic group. 43(60%) of the Asthma group had a Asthma Control Score(ACS) of >19 (well controlled) and 29(40%) had a ACS of ≤19 (not well controlled). 14(67%) of the subjects with positive GERD score had an ACS≤19. There was no significant relationship between BMI and ACS and BMI and GERD Score. Using logistic regression, we found a significant relation between GERD Score and ACS (p=.02, OR=8.406, 95% CI(1.5-46.4)) showing the higher the GERD score, the poorer the asthma control.
CONCLUSIONS: These data suggest that the prevalence of GERD is high in children with asthma and that there is a significant relationship between GERD and asthma control. The impact of obesity on these data was not significant. Children with poorly controlled asthma should be evaluated for possible symptoms related to GERD, which may have a significant impact on asthma control.

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Demonstration of Metered-Dose Inhaler and Spacer Administration Technique by Health Care Providers on Videotape

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BACKGROUND: Compelling data support the use of spacers (SP) with metered-dose inhalers (MDI) in patients with asthma of all ages, but many health care providers (HCPs) do not prescribe spacers, or teach MDI/SP administration technique incorrectly. Further, techniques vary between groups of HCPs, leading to patient confusion and decreased aerosolized medication delivery. Few studies exist comparing different groups of pediatric HCPs.
OBJECTIVE: To compare the videotaped demostration of MDI/SP administration technique by 4 groups of pediatric HCPs to a published, validated checklist on the correct use of these devices and the differences in demonstration technique between groups.
DESIGN/METHODS: 60 HCPs, 4 groups, n=15 each: house staff (HS), nursing staff (NS), respiratory therapists (RT), and attendings (ATT), who prescribe or teach the use of MDI/SP to pediatric patients, were videotaped while demonstrating the use of MDI/SP with mouthpiece (MDI/SP-mp) on themselves and MDI/SP with mask (MDI/SP-mk) on a doll, for a prescription of "Albuterol 2 puffs w/spacer". The films were analyzed by assigning 1 point for each correct step on the 10-step Inhaler-Use Checklist (IUC) to generate a demonstration score (DS). A modified 9-step IUC was used for the MDI/SP-mk in only 2 groups where full data were available (HS & NS). Differences in DS were assessed by ANOVA.
RESULTS: The mean DS for MDI/SP-mp & MDI/SP-mk were only 4.7±1.8 & 3.9±1.9. No HCP had a DS above 8 and the majority were able to show only 50% or less of steps on the IUC for either combination. For MDI/SP-mp, the mean DS for RT (5.2±1.4) and ATT (5.1±1.8) were significantly higher vs. HS (3.5±1.9) p=0.009 & p=0.025; there was no difference in the DS for the other pairs. For MDI/SP-mk, mean DS were significantly higher for NS (4.9±1.7) vs. HS (2.9±1.6) p=0.003.
CONCLUSIONS: A significant number of HCPs at our institution demonstrate incorrect use of MDI/SP to pediatric asthma patients. There is significant disparity in DS between groups who teach the use of MDI/SP. We propose establishing a formal education program to ensure the uniform teaching of these techniques to all HCPs who are responsible for this crucial component of asthma patient education.

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5:00 PM
Comorbidity Count and Adverse Asthma Outcomes in Children

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BACKGROUND: Comorbidity scoring systems are well established in adults with chronic conditions. However the relationship between comorbidity count and asthma outcomes in children has not been adequately examined.
OBJECTIVE: To determine the relationship between comorbidity count and asthma outcomes in children for pediatric asthma hospitalizations using a national representative sample.
DESIGN/METHODS: A weighted sample of 641,354 children aged 2-17 years from the National Hospital Discharge Survey for 2001-2005 was used to examine comorbidity count. The prevalence of adverse asthma outcome in that sample was 0.45%. International Classification of Diseases 9th Revision, Clinical Modification (ICD-9) codes of 493.0 to 493.9 were used to identify primary hospitalization for asthma. Adverse outcome (intubation/death) is the dependent variable. Comorbid condition included pneumonia, acute upper respiratory tract infection, sinusitis, bronchitis, and influenza. Adverse outcome and comorbidities were also operationalized using appropriate ICD-9 codes. Comorbidity count consisting of the number of comorbid conditions associated with each discharge ranged from 0-6. A logistic regression model was constructed to estimate the association between comorbidity count and adverse outcomes (age, race, gender, insurance and region were adjusted).
RESULTS: Most children (n=275,050, 43%) had no comorbities. The percentage of children with comorbidity count of ≥ 1 are as follows: 1 (n=194,100, 30%); 2 (n=95,812, 15%); 3 (n=39,295, 6%); 4 (n=16,554, 3%); 5 (n=7,750, 1%); and 6 (n=12,793, 2%). The frequency of adverse outcomes increased with an increase in the number of comorbid conditions present. The following data indicates the percentage of adverse outcomes in parenthesis for each comorbidity count:0 (0.05%); 1 (0.12%); 2 (0.35%); 3 (1.95%); 4 (1.5%); 5 (6.15), 6 (5.31%). Adjusted OddsRatios with 95% CI for each comorbidity count were significant (p<0.01) and are listed in table 1.

Table 1: Comorbidity Count Model Adjusted OR with 95% CI

Comorbidity Count	Adjusted OR with 95% CI
0	Reference
1	2.22 (1.80-2.75)
2	6.84 (5.61-8.34)
3	36.03 (29.94-43.37)
4	28.63 (23.15-35.41)
5	109.07 (89.51-132.89)
6	92.77 (76.76-112.12)

For all OR $p<0.01$ as compared with reference group. Reference group indicated.

CONCLUSIONS: The comorbidity count model is highly predictive of adverse asthma outcome, with odds increasing dramatically with increasing comorbidity count. Comorbidity count can be used as a proxy of asthma severity in children.

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An Effective Care Coordination Model To Address Health Disparities for Children with Asthma in the Inner-City

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BACKGROUND: Child asthma rates in Northern Manhattan are four times the national average. The complexity and fragmentation of local health care systems create significant challenges for this largely foreign-born, Latino community. These challenges often create gaps in culturally appropriate asthma care and related supports which increase health risks for children with asthma.

OBJECTIVE: To evaluate a program that addresses local health disparities by establishing a hospital-community care coordination model driven by culturally competent Patient Navigators, who serve as bilingual peer educators and offer family-focused asthma education, home visits to identify and address household triggers, and linkages to clinical and social services.

DESIGN/METHODS: Criteria for enrollment are children with asthma ages 0-18 with 1 or more asthma related hospitalization, 2 or more asthma related emergency department visits or 10 or more asthma-related school absences within the past 12 months. Referral sources include a large children's hospital , community pediatric practices, community based organizations (CBO), elementary schools, day cares and self-referrals. Once enrolled, children are assigned to a Patient Navigator based at a local CBO and are followed longitudinally for a period of one year. Families are interviewed using a standardized instrument at baseline, six months, and twelve months. Descriptive statistics were used to assess the impact of the program on asthma morbidity outcomes. Six month data were evaluated for this study.

RESULTS: At 6 month follow-up, among children who demonstrated asthma morbidity at baseline (n=51), 74% reduced their frequency of hospitalizations, 83% reduced their frequency of ED visits, 68% reduced their frequency of symptom-days, and 83% reduced their frequency of asthma related school absences.

CONCLUSIONS: Applying a hospital-community model with bilingual Patient Navigators at the center is an effective approach to address the existing health disparities in Latino, inner-city children with asthma. Specifically, this model impacts asthma-related morbidity by demonstrating a decrease in the frequency of hospitalizations, ED visits, school absences and symptom-days.

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Fellow in Training

5:30 PM

Comprehensive Use of Environmental Control Practices among Children with Asthma

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BACKGROUND: Asthma is one of the most common chronic diseases of childhood in the United States. Environmental triggers have been shown to play a significant role in asthma morbidity. Multiple randomized controlled trials have shown that multi-faceted environmental interventions reduce asthma symptoms as well as health care utilization. The guidelines set by the National Asthma Education and Prevention Program were revised in 2007 to recommend comprehensive use of environmental control practices (ECPs) in the homes of those with asthma. Little is known about why certain families use ECPs while others do not.

OBJECTIVE: To investigate the predictors of the comprehensive use of environmental control practices

DESIGN/METHODS: Data was gathered on 2003 children ages 0-17 years with asthma through the CDC's National Asthma Survey from 2003. Information was collected on ECP use, including use of an air filter, use of a dehumidifier, smoking avoidance, pet avoidance, use of mattress/pillow covers, washing sheets in hot water, and not having carpets. Univariate and multivariate analyses were performed to examine predictors of comprehensive ECP use, which was defined as practicing at least 6 out of 8 of the listed ECPs.

RESULTS: Only 9.9% of homes of children with asthma had comprehensive ECP use. Comprehensive ECP use was positively associated with having received physician advice (OR=3.0, $p<0.005$), higher number of routine care physician visits for asthma (OR=5.8, $p<0.005$), and having others in the house with a diagnosis of asthma (OR=1.4, $p<0.05$) in a multiple logistic regression model adjusted for age, race, gender, metropolitan statistical area, asthma severity, income, and insurance status.

CONCLUSIONS: Although it is known that control of environmental triggers is crucial in the management of asthma, only the minority of patients in this national sample implemented a comprehensive approach to ECP use in the home. Receiving routine asthma care and education by pediatricians are two factors that appear to enhance ECP use, suggesting that universal access to health care and improved physician reimbursement for routine asthma care may ultimately improve asthma morbidity in children.

Developmental Biology I
Platform Session

Saturday, March 14, 2009
4:15 PM-5:45 PM

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4:15 PM

Differential ErbB Pathway Activation in Murine Fetal Lung Cell Populations

Sandy Murray, Kristina Hoeing, Lucia D. Pham, Christiane E.L. Dammann, Heber C. Nielsen.

Newborn Medicine, Tufts Medical Center, Boston, MA; Pediatrics, Hanover Medical School, Hanover, Germany.

BACKGROUND: Fibroblast-Type II (T2) cell communication in fetal lung development involves the EGF and ErbB4 receptors. EGF activates fibroblast EGFR inducing synthesis and secretion of neuregulin (NRG) which binds ErbB4 on T2 cells to stimulate surfactant synthesis. We showed that NRG release from fibroblasts is dependent on TACE, a membrane metalloprotease, and that TACE expression in fetal mouse lung is cell-specific. ErbB4 may signal via multiple pathways including PI3K/Akt and direct nuclear translocation. We reported that both TACE and γ-secretase proteolytic activity are necessary for ErbB4 cleavage for nuclear translocation in T2 cells. PTEN, a phosphatase active in tumor suppression, negatively regulates the PI3K/Akt pathway. PTEN controls both lung morphogenesis and onset of lung adenocarcinomas in mice.

OBJECTIVE: We hypothesized that ErbB signaling in late gestation lung fibroblasts involves TACE and γ-secretase and that PTEN levels are low until term.

DESIGN/METHODS: NIH/3T3 fibroblasts and MLE12 epithelial cells were exposed to EGF, TGFα, NRG, PMA (TACE activator) or IC-3 (TACE inhibitor) and analyzed with a BioRad Bio-Plex system for phosphorylated and total Akt, ERK and BCR-Abl. Male (M) and female (F) mouse lung fibroblasts (gestational ages e16-e18) were treated for 18 hrs with EGF, NRG or TGFα and analyzed by immunoblotting for Presenilin1 (PSEN1, the catalytically active subunit of the γ-secretase complex), TACE and PTEN.

RESULTS: EGF, TGFα or PMA stimulated ERK phosphorylation (MAPK pathway) but not the Akt or BCR-Abl pathways in 3T3 cells. In contrast, PMA and NRG phosphorylated Akt but only minimally affected ERK in MLE12 cells. PSEN1 levels in F fibroblasts were similar on e16 and e17 then decreased, whereas in M fibroblasts PSEN1 was high on e16 and decreased thereafter. F and M TACE levels were high on e16 then decreased. PTEN levels increased slightly in F and more significantly in M on e18.

CONCLUSIONS: EGF, TGFα and PMA activated ERK in 3T3 cells whereas PMA and NRG induced the Akt pathway in MLE12 cells, suggesting differential TACE regulation in these cell types. PSEN1 and TACE protein levels decreased rapidly in F and more slowly in M primary fibroblasts by e18, suggesting differential regulation. Increased PTEN levels just before birth suggest that ErbB signaling is regulated at multiple levels during the active late lung developmental period. (Supported by HL37930, Peabody and Gerber Foundations).

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Does TACE Activation Promote Type II Cell Maturation in Fetal ErbB4$^{-/-heart}$ Mouse Lungs?

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BACKGROUND: TACE is a member of the ADAM (A Disintegrin And Metalloproteinase) family of sheddase proteins. In fetal lung fibroblasts it cleaves and releases membrane-bound neuregulin (NRG) which then induces ErbB4 receptor nuclear transport in type II (T2) cells to stimulate surfactant synthesis. ErbB4 knockout animals are embryonic lethal due to heart and neural defects. In cardiac rescued ErbB4$^{-/-heart}$ fetuses, ErbB4 deletion produced altered alveolar structure and decreased surfactant synthesis. TACE is also present in fetal T2 cells, participating in ErbB4 signaling, but its importance for fetal T2 cell surfactant production in the absence of ErbB4 is unknown.

OBJECTIVE: We hypothesized that TACE activation fails to induce surfactant production in fetal T2 cells of ErbB4$^{-/-heart}$ mice.

DESIGN/METHODS: D18 fetal T2 cell primary cultures from ErbB4$^{-/-heart}$ and wild type (WT) mice were used. Fibroblast conditioned media from WT d18 was prepared after no treatment (FCM) or treatment with either PMA 100ng/ml to stimulate TACE (FCM-PMA), IC-3 50μM to inhibit TACE (FCM-IC3), or PMA+IC-3 (FCM-PMA+IC3). T2 cells at 80% confluence were serum starved for 3 hours, then given no treatment (control), NRG (33nM), PMA (100ng/ml), IC3 (50μM), PMA+IC3, FCM-PMA, FCM-IC3, FCM-PMA+IC3, or FCM from d17 ErbB4$^{-/-heart}$ or d18 WT fibroblasts for 24hrs. Surfactant production was measured as ^{3}H-choline incorporation into DSPC and expression of mRNA of SP-B and SP-C.

RESULTS: DSPC synthesis in WT T2 cells was stimulated by NRG, PMA and FCM-PMA and reduced by blocking TACE (PM+IC3 and FCM-PM+IC3). This was significantly reduced ($p<0.05$) in ErbB4$^{-/-heart}$ T2 cells treated with PMA (69% of D18 WT cells), IC-3 (47%), PMA+IC-3 (68%) and FCM-PMA (66%). mRNA levels for SP-B and SP-C were also reduced in ErbB4$^{-/-heart}$ T2 cells by these treatments. As we previously showed, NRG, FCM from WT d18 fibroblasts and FCM from d17 ErbB4$^{-/-heart}$ fibroblasts also did not stimulate DSPC synthesis or surfactant protein mRNA in the ErbB4$^{-/-heart}$ T2 cells.
CONCLUSIONS: Treatments to induce TACE stimulated surfactant production in WT fetal T2 cells. However, absence of ErbB4 in the T2 cell significantly reduced this effect, and neither FCM or FCM-PMA could overcome the lack of T2 cell ErbB4. We conclude that TACE activity in T2 cells is important for ErbB4-mediated control of fetal surfactant production. (Support: NIH HL37930, Peabody and Gerber Foundations, Susan B Saltonstall Funds).

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Expression of Carcinoembryonic Cell Adhesion Molecule 6 (CEACAM6) in Fetal and Transformed Human Lung Cells

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BACKGROUND: CEACAM6 is a glycosylated, GPI-anchored protein of epithelial cells in various human tissues. It binds gram-negative bacteria and is over-expressed in gastrointestinal cancers where it is anti-apoptotic and promotes both tumorigenesis and metastases. CEACAM6 is expressed in human lung epithelium but regulatory mechanisms are not known.
OBJECTIVE: To evaluate regulated expression of CEACAM6 in human fetal lung cells and adenocarcinoma cell lines.
DESIGN/METHODS: We cultured primary human fetal lung epithelial cells as well as H441 and A549 adenoacarcinoma cell lines and examined responses to differentiation-promoting hormones (dexamethasone 10 nM and cAMP 0.1 mM), adenovirus expressing thyroid transcription factor (TTF-1), and silencing of TTF-1 using small inhibitory RNA. CEACAM6 promoter fragments linked to firefly luciferase were studied after transient transfection of A549 cells with plasmids using Lipofectamine.
RESULTS: In fetal lung cells, glucocorticoid and cAMP had additive stimulatory effects on CEACAM6 content, increasing the rate of transcription 13-fold and protein content 10-fold at 48 h. Induction of CEACAM6 was delayed ~24 h, relative to increased TTF-1, after combined hormone treatment. Knockdown of TTF-1 (90% by siRNA) reduced hormone induction of CEACAM6 by 80%. Expression of rTTF1 by adenovirus transduction caused a linear increase in CEACAM6 content to levels greater than obtained with hormone treatment. In studies with H441 cells, which express TTF-1, and A549 cells (TTF-1 negative), hormone treatment increased and decreased CEACAM6, respectively. Basal content of CEACAM6 in H441 cells was not affected on reduction of TTF-1 by >90% using siRNA. In studies of CEACAM6 promoter in A549 cells, reporter expression was detected with 4 different deletion constructs ranging from 0.3 to 3.0 kb with highest expression at 0.3 kb. Reporter expression was decreased ~50% by 8-Br-cAMP+isobu tylmethylxanthine treatment and was unaffected by exposure to dexamethasone.
CONCLUSIONS: We conclude that CEACAM6 in fetal lung epithelial cells is a target protein for TTF-1. CEACAM6 expression in adenocarcinoma cell lines is not dependent on TTF-1 and displays different responses to hormones that may be mediated via proximal promoter elements. Dysregulated CEACAM6 may contribute to tumorigenesis of lung epithelial cells.

130 Post-Baccalaureate
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NFkB1 (p50) Modulates Key Circadian Genes in the Mouse Lung

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BACKGROUND: The p50 protein is a subunit of NFkB, a family of transcription factors that regulate genes involved in inflammation, apoptosis, and oxidative stress. Previously, we observed that neonatal p50 null mutant (KO) mice displayed significantly impaired alveolar development and were more susceptible to hyperoxia-induced lung injury. To understand what mediated the susceptibility of these mice to oxidative injury, C57BL6 p50 heterozygote mice were bred to generate WT and KO litter mates and a gene array (Affymetrix Gene Chip 430A) comparing post-natal day 1, p50 Wild-type (WT) and KO littermates was performed.
OBJECTIVE: Since Rev-ERB is a key clock-controlled gene and modulator of lipid metabolism, we hypothesized that p50 participates in circadian regulated lung lipid metabolism via Rev-ERB.
DESIGN/METHODS: The lungs of p50 KO and WT mice were dissected at post-natal day 8 and assayed for protein levels of Rev-ERB as well as GSK3b, and phosphorylated GSK3b. The latter is important because GSK3b phosphorylates and stabilizes Rev-ERB; thus, allowing Rev-ERB nuclear translocation and, subsequent, transcriptional repression. Lung p50 and Rev-ERB mRNA was determined by real-time PCR.
RESULTS: Analysis of steady-state mRNA revealed that p50 KO mice displayed a nearly 10-fold decrease (n=4) in both Rev-ERB and GSK3b mRNA steady state levels compared to their WT littermates.
CONCLUSIONS: Given that p50 KO mice display significantly decreased expression of Rev-ERB and GSK3b mRNA, and recent studies that suggest Rev-ERB regulates triglyceride accumulation and lipoprotein lipase activity, we speculate that disruption of p50 alters mouse lung lipid metabolism. This work was funded by NIH grant: RO1 HL058752 (PAD).

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5:15 PM

Moderate Oxygen Exposure Differentially Affects Human Fetal Lung Fibroblast Expression of Key Hox Transcription Factor Proteins

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Pediatrics and Newborn Medicine, Tufts Medical Center, Boston, MA; Hospital Infantil de Mexico Federico Gomez, Mexico City, Mexico.

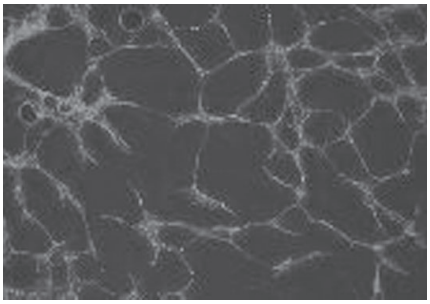
BACKGROUND: The Hox proteins HoxB5 and HoxA5 have unique expression and regulation in developing and adult lung and exhibit pivotal roles in lung mesenchymal and epithelial cell fate during human and mouse lung morphogenesis. Studies suggest that even moderate oxygen exposure (0.40 FIO_2) after preterm birth affects airway and alveolar formation through changes in mesenchymal-epithelial cell communication but the role of HoxB5 and HoxA5 mesenchymal regulation in this O_2-induced lung injury is unkown.
OBJECTIVE: We hypothesize that moderate oxygen exposure (0.40 FIO_2) alters the balance of HoxB5 and HoxA5 expression in human fetal lung fibroblasts.
DESIGN/METHODS: Human fetal lung fibroblasts (HLF cells) (CCL186, ATCC) were cultured in 0.21 FIO_2 (RA) for 48 or 72 h, 0.40 FIO_2 for 48 h or 72 h, or 48 h 0.40 FIO_2 followed by 24 h RA with daily monitoring of O_2 levels and cell confluency. At the end of the culture period, HLF cells were prepared for Western blot analysis (with densitometry) to compare HoxB5, HoxA5, and proliferating cell nuclear antigen (PCNA) protein levels in the RA and O_2-exposed cultures.
RESULTS: O_2 levels were consistently maintained throughout experiments. Cell confluency was decreased in O_2-exposed cultures, being most evident at 72 h. Western blot analysis with densitometry showed that 72 h O_2 exposure significantly decreased HoxB5 protein levels to 53% of 72 h RA control cultures. HoxA5 protein levels were also decreased after 72 h O_2 exposure (70% of RA 72 h controls) but to a lesser degree than HoxB5 protein levels. PCNA levels were significantly decreased after 72 h O_2 to 43% of RA 72 h cultures. No appreciable change was seen in HoxB5, HoxA5 or PCNA protein levels after 48 h O_2 or with 48 h O_2 + 24 h RA cultures.
CONCLUSIONS: Moderate O_2 exposure progressively affects human fetal lung fibroblast HoxB5 and HoxA5 protein expression. However, lung fibroblast expression of HoxA5 is less severely impacted compared to effects seen for HoxB5. We speculate that O_2-induced changes in fibroblast cell proliferation may differentially affect HoxB5-positive cells leading to altered distribution of specific mesenchymal cell precursor populations in developing lung.

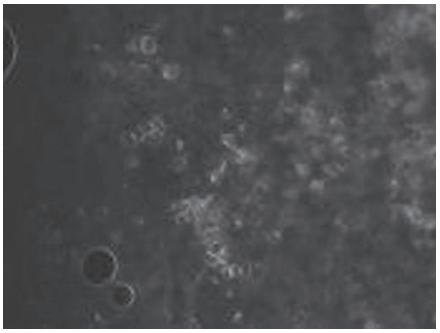
132 Fellow in Training
5:30 PM

Caffeine and Vascular Development: Implications for Retinopathy of Prematurity

Bina G. Patel, Karen Hendricks-Munoz, Curatola Anna Maria, Jie Xu.
Neonatology, New York University, New York, NY.

BACKGROUND: Caffeine is a cyclic Adenosine Monophosphate phosphodiesterase inhibitor. Through this activity it has been shown to inhibit cell proliferation and angiogenesis in vitro and in vivo. It is unknown whether administration of caffeine exacerbates the toxic effects of oxygen on blood vessel growth and contributes to retinopathy of prematurity.
OBJECTIVE: To determine if caffeine affects vasculature growth by affecting 1.) differentiation of endothelial (EC) and smooth muscle cells (SMC) from their progenitors and 2.) ability of these differentiated cells to form normal blood vessels
DESIGN/METHODS: Mouse embryonic bodies (EB), a model of angiogenesis, were treated with increasing doses of caffeine (0-2mM). EC differentiation was determined by expression of specific EC markers. Tube formation and vascular density were assessed by immunofluorescence staining and mRNA analysis.
RESULTS: Caffeine did not effect EC differentiation shown by expression of EC markers. EB treated with caffeine failed to form vascular tubes. Instead PECAM-1and SMC staining revealed the presence of endothelial and smooth muscle cell clusters. Abnormal vascular anatomy with poor vessel branching and lack of angiogenic sprouting was noted with caffeine exposure (fig.2) as compared to the control (fig.1).





CONCLUSIONS: Caffeine does not inhibit differentiation of mesenchymal cells into endothelial and smooth muscle cells in an embryonic stem cell model. However, cells differentiated under caffeine exposure engaged poorly in vascular network formation which may play a role in the development of retinopathy of prematurity.

Poster Session II
Poster Session

Saturday, March 14, 2009
6:00 PM-7:30 PM

133 Fellow in Training

Pulmonary Changes in Sprague Dawley Rats Exposed to Antenatal Magnesium Sulphate

Swati Aleti-Jacobs, Joseph Hudak, Erin Kileen, Janet Larson, Craig J Cohen, Shanthy Sridhar.
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BACKGROUND: Magnesium is been used to treat maternal hypertension.Clinical observation and published data have shown fetal exposure of cumulative doses of magnesium has been correlated with pulmonary interstitial emphysema, poor neurodevelopmental in neonates exposed to antenatal magnesium.No studies have examined the effects of pulmonary function and structural changes in the developing lung after antenatal exposure to magnesium. Given that magnesium is a potent competitive inhibitor of calcium and has been shown to decrease lung compliance, effects on the developing lung are possible.

OBJECTIVE: Does antenatal magnesium interfere with calcium dependent stretch induced lung growth and development?

DESIGN/METHODS: Timed-pregnant Sprague Dawley rats were administered two (0.04 mg and 0.4mg)different doses of magnesium into amniotic sac at gestational age e16. This corresponds to human gestation of 22-24 weeks. Animals were allowed to deliver normally. Respiratory function testing (airway compliance, airway resistance, tissue damping and hysteresivity) were performed on day 9, 10 and 11 at positive end expiratory pressures (PEEP) of 0, 3, and 6 cm H_20. Statistical analysis was performed using GraphPad software. Unpaired T test was used to compare the data.

RESULTS: Administration of 0.4mg of magnesium was uniformly fatal in fetal period while a dose 0.04mg of magnesium resulted in survival of pups. Evaluation of respiratory function showed marked increase in airway resistance and tissue dampening . There was no statistically significant differences in Static Compliance or Eta(histerisity). The increase in airway ressistance was noted in all levels of PEEP(0,3,and 6) with a p<0.001. Elastance increased at a PEEP(0,3)with a P<0.001 and p<0.05 at PEEP of 6. Tissue dampening increased in all level of PEEP (0,3 and 6) P\p<0.001 at PEEP 0 and 3 which correlates with decrease in compliance. These changes are consistent with greater lung maturity as shown in previous studies of normal, neonatal rat lung development.

CONCLUSIONS: We conclude that rat pups exposed to antenatal magnesium at a dose of 0.04mg show more mature lung state compared to the controls. Thus, magnesium did not act as a calcium antagonism and disrupt stretch induced lung development. It appears that magnesium actually facilitated muscle contractions necessary for normal lung development perhaps by stabilizing ATP necessary for epithelial mesenchymal communication.

134 Medical Student

Simulated Medical Transport Increases Interleukin 6 and 8 Expression and Down Regulates Toll-Like Receptors 2 and 4 in the Lungs of Sprague-Dawley Rats

Farihah Anwar, Erin Killeen, Craig Cohen, Shetal I. Shah.
Pediatrics, State University of New York at Stony Brook, Stony Brook, NY; Manhasset Hills, NY; Manhasset Hills, NY.

BACKGROUND: Neonatal transport results in significantly decreased lung function, decreased airway compliance, surfactant protein production and increasing airway resistance in animal model.These decreases in function are proportional to gestational age. Epidemiologic data suggests transport increases the rate of infections in neonates.

OBJECTIVE: To determine expression of cytokines after simulated transport in an animal model consistent with 32 weeks gestational age and assess the levels of Toll Like Receptors 2 and 4 (TLR2,TLR4) in the lungs.

DESIGN/METHODS: Two groups of Sprague-Dawley rat pups underwent simulated medical transport on post-natal day of life 12 at an average impulse of 27.4 m-sec2-minute(previously determined) for 60 minutes.Control animals did not experience the intervention.Post-intervention, lungs harvested and immuno-histochemistry performed with antibodies for IL 6, IL-8,IL-1B,IL-10, Heat Shock Protein 27(HSP27), Tumor Necrosis Factor-Alpha(TNF-alpha),Thyroid Transcription Factor 1(TTF-1) and TLRs 2 and 4.Pixel counts of 48 microscopic images per antibody were analyzed using Student's T-testing compared to control.Real time polymerase chain reaction performed to quantify mRNA expression of TTF1, IL-1B, TNF-alpha, IL-8, and TLR4.

RESULTS: IL-6 and IL-8 increased significantly with transport (p<.0018), (p<.0038) respectively by pixel count.Levels of TLR2 were also decreased (p<0.05).Levels of IL-1B, IL-10, TNF-alpha, HSP27, TTF-1 and TLR4 were not significantly different with transport.RT-PCR showed a significant decrease in mRNA expression of IL-8 to 13% of control. ILR4 levels were decreased to 0.9% of control.Levels of TTF-1,IL-1B, and TNF-alpha were not significantly altered.

CONCLUSIONS: Transported neonatal rats experienced increased levels of inflammatory cytokines in the lungs in a manner not associated with increased mRNA production. Decreased levels of TLR4 mRNA may decrease innate immunity,rendering the infant more susceptible to infection.We speculate that transport-induced lung disease may result from a shift of the lung to a pro-inflammatory state via release of endogenous stores,resulting in structural and functional changes in respiratory performance.Further investigation into the cytokine alterations of transport-induced lung disease is warranted to understand the mechanism involved in lung injury.

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Methemoglobin Levels and Response to Inhaled Nitric Oxide (NO) in Persistent Pulmonary Hypertension of the Newborn (PPHN)

Sujir Pritha Nayak, Maria Janina U. Pabalan, Rita M. Ryan, Satyan Lakshminrusimha.
Pediatrics, SUNY, Buffalo, NY.

BACKGROUND: Approximately 1/3 of infants with PPHN do not respond to inhaled NO. In patients with PPHN secondary to parenchymal lung disease, failure of NO delivery to resistance-level pulmonary vessels due to poor lung inflation may result in treatment failure. Inhaled NO reacts with hemoglobin to form methemoglobin (MHb). If NO is not delivered to the pulmonary vasculature due to airway/alveolar disease, it cannot interact with hemoglobin in the RBCs of the pulmonary capillaries to form MHb. MHb levels correlate with dose and duration of exposure to inhaled NO [Salguero KL et al. Pulm Pharm Ther 2002].

OBJECTIVE: We hypothesized that neonates with PPHN secondary to parenchymal lung disease who do not respond to NO (PaO_2 /FIO_2 ratio<10 change), compared with responders (>10 change), will have a lower MHb/cumulative NO exposure (ppm x hours) ratio (MHb/∑NO) after NO treatment.

DESIGN/METHODS: A retrospective chart review of all neonates admitted to the Women and Children's Hospital of Buffalo with a diagnosis of PPHN secondary to parenchymal lung disease between July 2000 and June 2008 was conducted. Idiopathic PPHN, CDH and lung hypoplasia were excluded.

RESULTS: Baseline characteristics and respiratory status before and after starting NO among non-responders (n=15) and responders (n=34) are shown in the table.

Characteristics of non-responders and responders to inhaled NO (mean SD)

	Non-responders(n=15)	Responders(n=34)
Gestational age(wk)	34.6±5.9	34.7±5.3
Birth weight(g)	2753±1238	2502±1016
Respiratory status before NO		
PaO_2/F_{to2} ratio	77±45	72±48
OI	28±13	32±21
Respiratory status after NO		
PaO_2/F_{to2} ratio	69±41	151±64*†
OI	33±20	14.5±15*†
First MHb level(%)after NO started	0.93±0.21	0.98±0.38
NO dose(ppm)at time of first MHb	15.9±5.7	16.3±5.7
Hours of NO at first MHb	2.7±1.4	2.2±2.6
MHb/∑NO=MHb / (NO dose X hours)	0.026±0.012	0.071±0.053*

* p < 0.005 compared to non-responders, † p < 0.05 compared to before NO

The MHb/∑NO ratio was low among non-responders compared to responders suggesting inadequate delivery of NO to pulmonary vasculature among non-responders.

CONCLUSIONS: We conclude that inadequate oxygenation response to NO is associated with lower MHb/∑NO. Enhancing NO delivery to pulmonary vasculature using lung recruitment strategies may improve NO delivery and oxygenation in PPHN secondary to parenchymal lung disease.

136 Fellow in Training

Plasticizer, Di(2-Ethylhexyl) Phthalate (DEHP) Exposure in Neonatal ECMO vs. Near-Miss ECMO Patients

Matthew Eig, Khodayar Rais-Bahrami, Naomi Luban, Stephen Soldin, Billie L. Short.
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BACKGROUND: Plastic tubing used in medical devices is composed primarily of polyvinyl chloride. These tubes are made flexible by adding plasticizers. The most commonly used plasticizer is di(2-ethylhexyl) phthalate (DEHP). Human exposure to DEHP begins at conception via the placenta. The general population is exposed daily to DEHP and its metabolite, MEHP, primarily through food. Exposure rises dramatically in premature or ill neonates, who are exposed daily via blood, TPN and IV bags and tubing, masks, and feeding tubes. The rate of leaching of DEHP depends on many factors, including method of storage, temperature, contact with lipophilic solutions, and percentage of DEHP in the product. Highly lipophilic substances readily extract plasticizers from bags and tubes.

OBJECTIVE: To determine the concentration of DEHP and MEHP in the urine of ECMO and

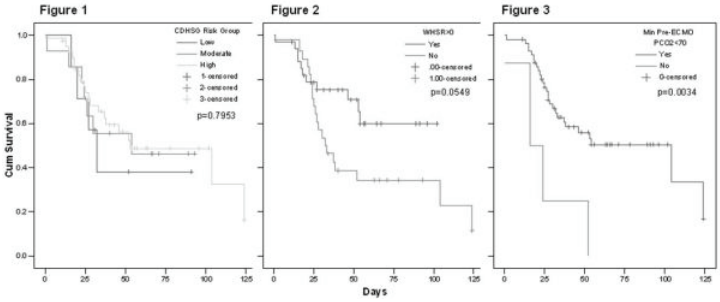
near-miss ECMO patients using an *in vivo* prospective comparative clinical study. To determine if ECMO results in an increased concentration of DEHP and MEHP in the urine.
DESIGN/METHODS: Using an *in vivo* prospective comparative clinical study, we studied 12 term or near-term neonates requiring ECMO. Our control population included 17 neonates with similar underlying diagnoses, referred to our neonatal intensive care unit for ECMO but who ultimately respond to maximal therapy without ECMO. Two baseline urine samples were collected for DEHP and MEHP analysis on admission to our NICU for both the ECMO and near-miss populations. Daily urine samples were collected for five days in both populations. Urine samples were collected prior to discharge/transfer for both populations. DEHP and MEHP analysis was performed via mass spectroscopy. Demographic data were collected for each patient including gestational age, gender, birth weight, postnatal age at time of study entry, Apgar scores, types of central access, blood products administered, 24-hour fluid intake and urine output, and amount of intralipid infusion.
RESULTS: The estimated mean DEHP for the ECMO group is 38.0 (95% CI = 29.6, 47.5) compared to 33.0 (95% CI=26.6, 40.1) in the near-miss group. The estimated mean MEHP for the ECMO group is 29.8 (95% CI=22.4, 38.2) compared to 26.1 (95% CI=20.6, 32.3) for the near-miss group.
CONCLUSIONS: Even though the levels are consistently higher for DEHP and MEHP in the ECMO group compared to the near-miss group, these differences are not statistically significant.

137 House Officer

Survival in Congenital Diaphragmatic Hernia: Use of Predictive Equations in the ECMO Population

Suma Bhat, An Nguyen-Massaro, Cynthia Gingalewski, Billie Lou Short.
Pediatrics, Childrens National Medical Center, Washigton, DC; Neonatology, Childrens National Medical Center, Washington, DC; Surgery, Childrens National Medical Center, Washington, DC.

BACKGROUND: Equations have been proposed by the Wilford Hall/Santa Rosa (WHSR) and CDH Study Groups for predicting survival in patients with CDH. These models have not been applied specifically to the CDH ECMO population, a group at highest mortality risk.
OBJECTIVE: To evaluate the WHSR and the CDHSG predictive equations when applied to a population of patients with CDH requiring ECMO life support.
DESIGN/METHODS: A single-center retrospective chart review was conducted on infants with CDH treated with ECMO between 1993-2007. Predicted outcome was calculated using a modified WHSR formula (pre-ECMO highest pO2-highest pCO2) and the CDHSG survival equation (1 – 1/(1+e-x); x = -5.024 + 0.9165*(BW) + 0.4512*5min Apgar). Predicted and actual outcomes were compared using Receiver Operating Curve (ROC) analysis. Kaplan Meier was used to compare survival of patients categorized by risk according to each prediction model (CDHSG high/ moderate/ low risk groups, and WHSR >0 to predict survival). Minimum pre-ECMO pCO2 was also evaluated as a predictor of survival.
RESULTS: Overall survival was 50% in 62 CDH patients treated with ECMO during the study period. The CDHSG equation did not discriminate between survivors and non-survivors (AUC 0.55, p=0.499). Likewise, CDHSG risk categorization did not show significantly different survival between groups (Figure 1). The modified WHSR formula showed better discrimination of survival (AUC 0.71, p=0.004) and patients with WHSR>0 trended to have improved survival (Figure 2). Lowest acheivable pre-ECMO pCO2 had the highest AUC (0.723, p=0.003). Patients with minimum pre-ECMO PCO2 <60 had 48% survival, >60 had 27% survival and >70 had 0% survival (Figure 3).



CONCLUSIONS: Equations validated to predict survival in CDH patients may not discriminate survivors from non-survivors in the ECMO population. In this highest risk group, factors such as BW and Apgar score appear to be less critical in determining mortality risk than parameters that reflect degree of pulmonary hypoplasia.

138 Fellow in Training

Exhaled Nitric Oxide Levels in Infants with RSV Versus Non-RSV Viral Lower Respiratory Illness

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BACKGROUND: Introduction: The fraction of exhaled nitric oxide (feNO) in expired air is a reliable measure of airway inflammation and has been used as a marker in asthma and other respiratory disorders. Bench research has demonstrated stimulation of nitric oxide production in respiratory epithelial cells infected with RSV. However, there is a paucity of clinical data regarding levels of feNO in viral lower respiratory tract illness (LRTI). We report a prospective, pilot study on feNO levels in children 0-4 years of age who are admitted with viral LRTI.
OBJECTIVE: To determine if feNO is elevated in hospitalized pediatric patients with viral LRTI when compared with age matched controls and to determine if there is a difference in feNO level between RSV and non-RSV infection in pediatric patients with viral LRTI.
DESIGN/METHODS: Five exhaled breaths were collected via facemask and Mylar bag after ≥10 NO-free breaths to facilitate lung NO washout. All subjects were tested for RSV (EIA & DFA) and by DFA for influenza A & B, parainfluenza, human metapneumovirus and adenovirus. Method of feNO measurements utilized the offline options for preschool children & infants described in the 2005 Joint Statement of the ATS & ERS on tidal breathing techniques with uncontrolled flow rate.
RESULTS: 26 patients with viral LRTI were recruited. 22 patients tested RSV+ (mean age = 5months). A total of 36 measurements in the RSV group yielded an average exhaled nitric oxide level of 4.89 ppm. In contrast, 7 measurements of 4 subjects (mean age = 17 months) with non-RSV viral infection (1 Metapneumovirus, 1 Influenza A, 1 Adenovirus and 1 negative viral DFA) yielded mean feNO of 17.7ppm.
CONCLUSIONS: Normative feNO values for infants are sparse in the literature. Franklin et al report a mean feNO level of 13.8 ppb (10.4 – 18.3) in sedated children (mean age 40.1 wks ± 21.2). The values in this study reflect lower feNO levels for RSV+ children. Although, a very small number, the non-RSV viral infections trend toward a higher feNO level. The study is ongoing to recruit age matched controls and patients with non-RSV viral infections to strengthen the findings.

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Combined Pediatric and Adult Cystic Fibrosis Treatment Programs Offer Smooth Transition Process

Lisa K. Tuchman, Ioanna D. Kalogiros, Kimberly M. Ganster, Ronald C. Rubenstein.
Craig-Dalsimer Division of Adolescent Medicine, The Children's Hospital of Philadelphia, Philadelphia, PA; Divison of Pediatric Pulmonology, The Children's Hospital of Philadelphia, Philadelphia, PA.

BACKGROUND: The need for adult cystic fibrosis (CF) care programs has increased as 40% of people with CF are over the age of 18. The CF Foundation has made a significant commitment to facilitating transfer between pediatric and adult CF care by investing in training adult CF providers and by accrediting adult CF programs; however, there remain significant challenges in implementing a systematic transition process.
OBJECTIVE: To describe the challenges and successes of transferring patients from pediatric to adult CF care from the perspective of CF program directors.
DESIGN/METHODS: As part of a larger study to define models of transition, an online survey was administered via email to all 305 US based CF program directors representing 261 care centers, between September 8, 2008 and October 28, 2008. The study team met weekly to organize and describe themes that emerged from responses to an open-ended question regarding experiences, successes, and challenges of the transition process.
RESULTS: Of the 305 invited to participate, 109 program directors (36% response rate) from 40 states, answered the open-ended question. Respondents represented pediatric programs (n=29) staffed by pediatric pulmonologists, adult programs (n=23) staffed by adult pulmonologists, and combined pediatric and adult programs (n=57) with varying involvement from both types of providers. During qualitative analysis, the following common themes were identified as important in facilitating or hindering transition: communication, trust, and having an adult care destination. Approximately one third of pediatric program directors (9 of 29) reported having insufficient access to adult providers willing to accept adult CF patients. Adult program directors reported a lack of standardization of transition practices (10 of 23) and that transferred patients were not well-prepared for the adult-oriented medical system (6 of 23). Among combined adult and pediatric programs that reported sharing the same location and/or treatment team, directors (25 of 57) reported a smooth transfer of care.
CONCLUSIONS: The majority of directors of combined programs identified primarily positive transition related content while pediatric and adult program directors expressed concerns about current transition practices. As a step to improve the continuum of CF care, further research is needed to examine the relationship between the types of transition programs and health status outcomes.

140 Fellow in Training

Is a Small Platelet Mass Associated with Intraventricular Hemorrhage in Very Low Birth Weight Neonates?

Jody L. Kohut, Amy Mackley, Robert Christensen, David A. Paul.
Neonatology and Pediatrics, Christiana Care Health Services, Newark, DE; Department of Women and Newborns, Intermountain Healthcare, Salt Lake City, UT; Pediatrics, Thomas Jefferson Univ., Phila., PA.

BACKGROUND: Thrombocytopenia is common in the neonatal intensive care unit (NICU). The clinical impact of neonatal thrombocytopenia and its roll in intraventricular hemorrhage (IVH) is controversial. Bleeding in preterm infants is dependant on many factors including platelet plug fomation, which is influenced by platelet mass, the product of platelet number and mean platelet volume.
OBJECTIVE: To determine if platelet mass is associated with the incidence and/or severity of IVH, and if perinatal factors influence platelet mass in very low birth weight (VLBW) neonates.
DESIGN/METHODS: Retrospective cohort study of VLBW infants admitted to a level 3 NICU from June, 2003 to July, 2006, n=408. Platelet mass was calculated from the product of mean platelet volume and platelet number on CBCs drawn at the time of admission. All infants had a screening cranial sonogram on day 4 of life. Severe IVH was considered grade 3-4. Placental pathology was reviewed for the presence of histologic chorioamnionitis; preeclampsia was diagnosed by the attending obstetrician. Statistical analysis included ANOVA and Mann Whitney U test. Data are presented as mean ± sd.
RESULTS: Race, birth weight, and gender were not associated with platelet mass. Infants born to mothers with preeclampsia had a smaller platelet mass (1921 fl/nl ± 603 vs 2297 fl/nl ± 747; p<.01)

compared to those without preeclampsia. Infants born to mothers with histiologic chorioamniontits had a larger platelet mass (2400 fl/nl ± 749 vs 2036 fl/nl ± 674; p <.01) compared to those without histologic chorioamnionitis. Platelet mass did not differ in infants with or without IVH, severe IVH, or death and/or severe IVH.

Platelet Mass (fl/nl) and IVH

	Present	Absent	P
IVH (n=97)	2148 ± 736	2190 ± 724	.64
Severe IVH (n=43)	2060 ± 782	2194 ± 719	.28
IVH & Death (n=93)	2056 ± 871	2213 ± 679	.09

There were no differences in the occurence of severe IVH in infants with platelet mass < 10th percentile (16% vs 10%; p=.22) or platelet count <100k/ul (12% vs 10%; p=.69) respectively.

CONCLUSIONS: In VLBW infants, perinatal factors associated with platelet mass, include maternal preeclampsia, associated with a lower platelet mass, and histologic chorioamnionitis, associated with a larger platelet mass. Platelet mass at birth, and thrombocytopenia were not associated with IVH. Our data suggest that platelet plug does not play an important role in the pathophysiology of IVH in VLBW infants.

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The Determination of Neonatal Brain Oxygenation Status by Near Infrared Technology

M. Roger Kim, Harry Graber, Randall Barbour, Nidhi Rawal, Pradeep Siwach, Devaraj Sambalingam.

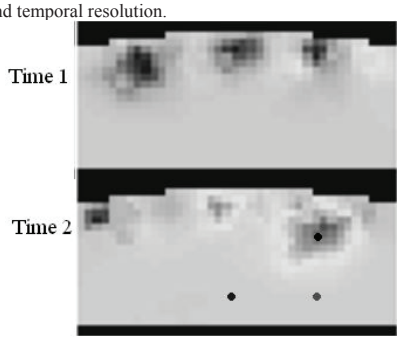
Pediatrics, Brookdale University Hospital and Medical Center, Brooklyn, NY; Pathology, SUNY Downstate Medical Center, Brooklyn, NY.

BACKGROUND: Persistent tissue hypoxemia or hyperoxemia frequently lead to multi-organ injuries. Specific brain activity is also associated with amplitude variations of oxy and deoxy hemoglobin (Hb). Diffuse optical tomography (DOT) using near infrared light at 760 and 830 nm can functionally explore the brain microcirculation.

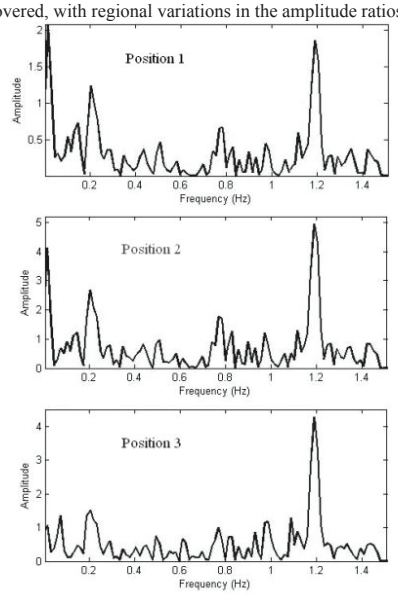
OBJECTIVE: The objective of our project is to measure variations in oxygen status in neonatal brain tissue with DOT.

DESIGN/METHODS: The imaging device has 30 optodes embedded in a silicone flap that is secured to the infant's head. Such measurements, combined with the image reconstruction, allows us to explore the dynamics of blood delivery and O_2 extraction, and the influence of disease states. We monitor variations of oxy, deoxy and total Hb of the brain tissue under different conditions: awake/asleep, or +/- visual or auditory stimulation, on infants in the NICU.

RESULTS: We performed a total of 12 DOT sessions on 9 infants who were stable or needed minimal O_2 supplemention. Image sections show that the deoxyHb concentration is recovered with significant regional and temporal resolution.



Graphs show that the respiratory (1.2 Hz) and vasomotor rhythms (0.2, 0.02 Hz) of the Hb concentration are recovered, with regional variations in the amplitude ratios.



CONCLUSIONS: DOT for bedside measurement of neonatal brain oxygen status is useful for preventing the exposure of infants to extreme oxygen swings. Our future aim is to determine whether tissue oxygen extraction is proceeding normally, without extreme swings in the Hb concentrations.

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Fellow in Training

Visual Light Spectrography (VLS) for Detecting Alterations in Tissue Oxygenation with PRBC Transfusion in Very Low Birth Weight (VLBW) Neonates

V. Bronshtein, J. Garcia Hoffman, J.M. Curry, E.F. LaGamma, B. Parvez.

Department of Pediatrics-Division of Neonatology, Westchester Medical Center - Maria Fareri Children's Hosp., Valhalla, NY.

BACKGROUND: PRBC are given to improve O_2 delivery by increasing RBC mass and/or cardiac output, however, a clear consensus of Hb trigger is not firmly established, while clinical signs and blood tests are late markers of tissue O_2 deficit. VLS is noninvasive method of assessment of tissue oxygenation (StO_2).

OBJECTIVE: To investigate the effect of booster PRBC on StO_2 in preterm neonates with anemia.

DESIGN/METHODS: VLBW, hemodynamically stable neonates with anemia were studied. **S**everity of illness was classified by NTISS score. Heart rate, pulse oximeter saturations (SpO_2) and StO_2 were recorded continuously and mean values were compared at: 1 h before, the beginning, every hour during and 1 h after blood transfusion. Difference in SpO_2 and StO_2 was calculated: $\Delta P = SpO_2 - StO_2$. Large ΔP may indicate poor perfusion.

RESULTS: 5 infants were studied: 2 with asymptomatic anemia and mild NITSS, 2 with symptomatic anemia and moderate NTISS, and 1 with asymptomatic anemia but severe NTISS.[table1]We observed significant decline in StO_2 and increase ΔP, from the second hour to the end of transfusion in all patients regardless of severity of illness, presence of symptoms or degree of anemia. This could not be explained by hypoxemia as SpO_2 did not change.

Demographic and Clinical Data

	NTISS score	GA (wks)	BW (g)	Hct before	Hct after	Reason for transfusion
	6	30	1270	22	35	Asymptomatic anemia
	8	30	1365	27	36	TEF, transfusion before surgery
	10	26	820	27	34	Anemia+apnea
	11	24	670	25	36	Anemia+apnea-
	28	33	1670	38	44	HLHS, replacement RBC
Avg	13	29	1159	28	37	
SD	9	4	409	6	4	
Median	10	30	1270	27	36	

HR remained stable 154 ± 17 at the beginning and 149 ± 18 at the end of transfusion.

CONCLUSIONS: The worsening of tissue oxygenation during blood transfusion was an unexpected event that may arise from storage, viscosity, immunologic or embolic phenomena. VLS may help identify patients at risk for transfusion related injury.

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House Officer

Antenatal Smoking Does Not Increase the Risk of Postnatal Infections in Premature Infants

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BACKGROUND: Antenatal exposure to cigarette smoke is associated with increased frequency of perinatal complications. A recent study in a small group of preterm infants found a significant association between antenatal smoking and postnatal infections (Jeppesen, Neonatology 2008;94:75-78).

OBJECTIVE: To study the effect of antenatal smoking on the incidence of postnatal infections in premature infants.

DESIGN/METHODS: Preterm infants with gestational age (GA) ≤34 weeks born between January 1997 and September 2007 were included in this study. Relevant clinical data were collected from the infants' medical records. Premature infants who were exposed to cigarette smoke during pregnancy (study group) were compared with those not exposed to smoke (control). Every third infant born to a mother without prenatal exposure to smoke during the study period was included in the control group.

RESULTS: 1800 infants (GA ≤34 w) were born and admitted during the study period; 284 infants (BW 1619±591g, GA 30.7±3.0 w) were exposed to smoke. Out of 1,515 infants who were not exposed to smoke, 505 infants (BW 1541±614 g, GA 30.5±3.2 w) were included in the control group. There were no significant differences in the baseline demographics and clinical characteristics (BW, GA, race, sex, prenatal steroid use, prolonged rupture of membrane, apgar scores, duration of central lines and ventilator days) between the two groups. There was no significant difference in the incidence of culture proven or clinical sepsis between the smoking and control groups. There was also no significant difference in the number of infants with early or late sepsis or infants with more than one episode of sepsis between the two groups.

	Exposed to Smoke (n=284)	Control (n=505)	P
Culture proven sepsis (%)	50 (17.6)	107 (21.2)	0.3
Culture proven Early Sepsis (%)	1 (0.3)	9 (1.8)	0.2
Culture Proven late sepsis (%)	49 (17.2)	98 (19.4)	0.5
> 1 episode of sepsis	10 (3.5)	23 (4.5)	0.6
Clinical Sepsis	81 (28.5)	142 (28.1)	1.0
Early clinical sepsis	73 (25.7)	128 (25.3)	1.0
Late clinical sepsis	23 (8.1)	31(6.1)	0.4

CONCLUSIONS: Prenatal exposure to cigarette smoking was not associated with an increased incidence of culture proven or clinical sepsis in premature infants.

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Umbilical Artery Access: Historical Perspectives

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BACKGROUND: The use of the umbilical artery (UA) for blood sampling, blood pressure monitoring and fluid administration is a common procedure in the modern NICU. Since it became standard practice, accessing the UA has been essential in the management of critically ill newborns.

OBJECTIVE: To review the history and medical literature regarding the use of the UA in newborns, including the beginnings of the catheterization technique and first individuals and publications describing the use of UA catheters.

DESIGN/METHODS: Medical literature review using PubMed (keywords: neonatology, umbilical artery, history) and web sites with historical references (www.neonatology.org, www.pubmedcentral.nih.gov).

RESULTS: The first reported use of the UA for hemodynamic measurements was published in 1879 by Ribemont in France, who directly obtained mean blood pressure from the UA via needle puncture. In 1938 Woodbury in Augusta,GA (USA) and then Nyberg in Sweden in 1958, recorded pulse pressure wave amplitude by direct needle UA access. Accounts differ on when catheterization of the UA was first reported. Some mentioned L. Stanley James as the first one describing the use of UA catheterization for blood sampling in the late 1950's. However, another report states that Virginia Apgar was the first to do so. The latter is most likely the truth, given a statement by Dr James himself in his 1975 eulogy to Virginia Apgar : "she was the first person to catheterize the umbilical artery". The first major publications regarding UA catheterization in a cohort of patients appeared in 1968 by Cochran in Boston, MA (USA) and Gupta in London (UK), which also described the use of UA for medication and fluid administration. In 1969, Kitterman, Phibbs and Tooley from the UCSF at San Francisco (USA), published a landmark paper on aortic BP measurements from indwelling umbilical catheters. In 1970, the UCSF group also published one of the first descriptions of the procedure technique in the Pediatrics Clinics of North America. In 1976, Hall and Rhodes published their experience with parenteral nutrition administration via the UA, a practice that continues today with some controversy.

CONCLUSIONS: The use of the UA for hemodynamic measurements has been practiced for more than 100 years, but became standard of care on the late 1960's when indwelling catheters were placed and also used for blood sampling and intravascular infusions. While earlier publications mention L. Stanley James as the first person to place an UA catheter, he later gives full credit to Virginia Apgar.

145

Quality Initiative To Reduce Central Line Device Utilization Rates in a Level IV Neonatal Intensive Care Unit

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BACKGROUND: In the US, an estimated 200,000 central venous line (CVL)associated bloodstream infections (CLABSI) occur each year. For infants in a neonatal ICU (NICU), CLABSI are serious infections, resulting in prolonged hospital stay, increased medical cost, and an elevated risk of mortality. One major risk factor for CLABSI is the presence of a CVL. Reducing line usage will result in a reduction in CLABSI.

OBJECTIVE: Our goal was to determine if staff education and practice changes in the insertion and care of CVLs would result in decreased CVL utilization rates in our 29 bed level IV NICU.

DESIGN/METHODS: Data was collected January 1, 2007 through December 31, 2008. In 2007, we had 529 admissions, with a CVL device utilization rate of 22.9%. Our data prompted us to develop a neonatal CLABSI team to improve CVL practices. Phase1 - 2007: implemented CVL insertion, access, & maintenance bundle. Phase 2 - 2008: continued use of the bundle in 2008. A specialized CLABSI team, including a neonatologist, nursing staff, and an infection control specialist met monthly to provide surveillance for bundle compliance & the occurrence of CLABSI in our NICU. The team increased awareness of CLABSI, provided education, and implemented change when indicated.

RESULTS:

Central Line Utilization Rate*

Birth weight	Phase 1 - 2007 (NHSN % **)	Phase 2 - 2008 (NHSN % **)	NHSN 50% median
≤750 g	0.37 (35%)	0.28 (25%)	0.41
751-1000 g	0.30 (52%)	0.28 (50%)	0.28
1001-1500 g	0.28 (50%)	0.16 (18%)	0.28
1501-2500 g	0.14 (50%)	0.11 (40%)	0.14
>2500 g	0.19 (55%)	0.12 (38%)	0.17

* # of central line days/# of patient days; ** Estimated National Healthcare Safety Network (NHSN) percentile

CLAB and Device Utilization Rate Quality Initiative

	Phase 1 - 2007	Phase 2 - 2008	P-value
Central Line	131	85	
CLABSI *	6	4	
No CLABSI	125	81	
CLABSI Rate **	3.8	3.1	1.0
Device Utilization Rate ***	22.9%	16.5%	<0.0001

* central line-associated bloodstream infection; ** # of CLABSI/# of central line days x 1000; *** # of central line days/# of patient days

CONCLUSIONS: A multidisciplinary evidence-based quality initiative reduced our CVL device utilization from 22.9% to 16.5% (a 28% reduction, p<0.0001) in our NICU.

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Fellow in Training

Adherence to Infection Control Protocols Can Be Improved by Re-Education Sessions and Input from Staff

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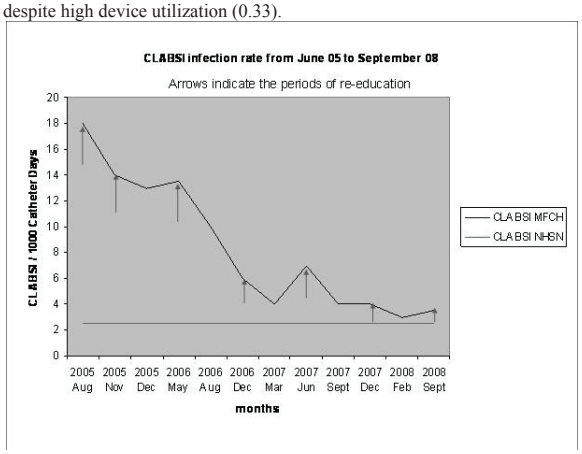
BACKGROUND: Central Line-associated bloodstream infections (CLABSI) increase morbidity, mortality, length of stay and healthcare costs. Quality improvement initiatives and educational programs to promote best practices for infection control have been shown to reduce incidence of hospital acquired infections, but adherence to protocols has been observed to decline over time. We hypothesized that additionally to the need for re-education, our CL hub care protocol may contain cumbersome steps contributing to decline in adherence.

OBJECTIVE: To assess current adherence to CL hub care protocol, effectiveness of re-education on compliance and to obtain input from staff about the easiness of application of the protocol.

DESIGN/METHODS: Nursing Staff adherence to 9 distinct steps of CL hub care protocol was recorded using Observer Check List before and after re-education. Adherence to each step was marked given a score of 1 for yes or 0 for No.Overall total adherence score before and after education were analyzed using Wilcoxson test for each protocol step and paired t-test for the total score (p<0.05).

RESULTS: 24 nurses were observed before and after education. Post education total adherence score improved significantly in the present study from 11 $\pm$ 9 to 18 $\pm$ 8 ($Mean\pm SD$)(p<0.05) but remained lower (P<0.05) then the April 2007 observation [pre 14$\pm$7 vs post 23$\pm$3 ($Mean\pm SD$)(p<0.05)]. Post education 100 % adherence was noted in 6 steps, but adherence remained < 20% in the remaining 3 steps. The feed back from nurses identified these 3 steps as very cumbersome. CLABSI rate continued to decline reaching current rate of 3.5/1000 (56% decrease) despite high device utilization (0.33).



CONCLUSIONS: Annual re-education sessions were insufficient to maintain optimal adherence to the CL hub care protocol. The feed back from nursing staff was essential in identifying factors contributing to poor compliance. Modification of the 3 cumbersome steps may be possible in the light of stable CLABSI rate.

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Fellow in Training

Rapid Detection of Early and Late Neonatal Sepsis Utilizing an Automated Blood Culture System

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BACKGROUND: Implementation of rapid detection automated blood culture systems has led to shorter incubation times and decreased length of stay in the NICU. It is recommended that cultures are accessioned in the laboratory within 1 hour of being drawn. Bellevue Hospital switched to a 48 hour antibiotic protocol with the use of a multidisciplinary automated detection system in 2005. Previous data demonstrated that all early sepsis positive culture results returned within 48 hours.

OBJECTIVE: To review infants with any blood cultures; number of patients with positive cultures, identity of bacteria in positive cultures, rapidity in reporting positive cultures. To analyze NICU LOS of patients with negative cultures in early sepsis evaluation. To determine the potential for shortening antibiotic exposure in infants undergoing early sepsis evaluations for maternal indications.

DESIGN/METHODS: Retrospective chart review: June 1, 2004 through May 31, 2008, neonates who underwent sepsis evaluations at Bellevue Hospital RPC. Statistical analysis: Student t-test.

RESULTS: 857 patients had blood culture analyses and 50 patients had positive cultures. 39/50 were inborn infants, 11 of whom had early sepsis, and 28 with late sepsis. In all cases of early sepsis, the positive blood culture result was reported by 30 hours (with an average time of 17 hours 57 minutes). The organisms identified were Staphylococcus (36%), Streptococcus (27%), E. Coli (19%), Citrobacter (9%), and Listeria (9%). The late sepsis evaluation differed in that time to positivity reached an average of 24 hours 59 minutes with the longest time to positivity of 60 hours. The organisms identified in the late sepsis group were Staphylococcus (58%), Enterococcus (25%), Streptococcus (5%), Klebsiella (5%), E. Coli (5%), and Enterobacter (2%) with increasing variation at >30 days of life. There was a disparity in incubation time to reach positivity among organisms between the early and late sepsis cohorts.

CONCLUSIONS: All blood cultures in early sepsis were reported positive by 36 hours from time of accession. Late sepsis cultures, on average, had longer incubation times than early cultures to reach positivity. The incubation time for positive blood cultures differed by organism type. The average time between drawing a culture and its accession exceeds recommendations for the rapid detection system. There is potential to further decrease antibiotic coverage in early sepsis workups.

148 Fellow in Training

Extended-Interval Gentamicin Administration in Preterm Neonates ≤ 34 Weeks Gestational Age

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BACKGROUND: Gentamicin is an aminoglycoside antibiotic with bactericidal activity against gram-negative bacteria. The drug's pharmacodynamics are optimal when a ratio of maximum serum concentration (Cmax) to minimum inhibitory concentration of 8:1 to 10:1 or an Area-Under-The-Curve (AUC) of 80 to 100 mg/hr/L and a drug-free period for the post antibiotic effect are achieved. Extended-interval gentamicin administration (EIGA) has been adopted to optimize these properties; however, dosing remains complex and non-uniform. This study had two cohorts of neonates. We previously presented data from GA >35 wks. Herein, we present the data on GA ≤34 weeks.

OBJECTIVE: Our hypothesis is that a uniform dose of gentamicin will reduce the number of elevated trough gentamicin concentrations from 50% using traditional dosing to 10% using an EIGA regimen. Aims are to improve gentamicin's pharmacodynamics and safety and simplify the dosage.

DESIGN/METHODS: This prospective, randomized, controlled study compared traditional dosing (control group) to EIGA (study group) in neonates ≤34 weeks GA. Sample size of 46 neonates is needed. Traditional dosing includes a loading dose and maintenance doses every 12 to 24 hours while EIGA is 5 mg/kg/dose every 36 hours. Inclusion criteria: Neonates ≤34 weeks and <6 months postnatal age. Exclusion criteria: neonates previously enrolled or endocarditis. Hearing screens and renal function were followed.

RESULTS: 45 neonates were enrolled to date; 22 in EIGA group, 23 in traditional group. Elevated trough levels were found in 13% *vs* 4.5% in the traditional and EIGA groups, respectively. Although 3 neonates (two in traditional, one in EIGA) had positive blood cultures, none had gram-negative infections. Cmax and AUC were 9.1±1.7 mg/L *vs* 7.4±1.2 mg/L and 128±34 mg/hr/L *vs* 155±38.5 mg/hr/L in the traditional and EIGA groups, respectively. Dosage changes were necessary in 52% *vs* 27% of neonates in the traditional and EIGA groups, respectively to maintain therapeutic peak and trough concentrations. One child in the traditional group failed the hearing screen. One child in the EIGA had transient elevation in serum creatinine levels. None of the findings were statistically significant.

CONCLUSIONS: Although the primary hypothesis was not proven, we achieved improved Cmax levels and reduced the number of dosage changes in the EIGA group. There were no differences in adverse effects. This dosage regimen is simple and uniform.

149 House Officer

Changing Incidence of Fungal Infections in a Level III NICU in US: 1990-2008

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BACKGROUND: Fungal infections are relatively common in neonatal intensive care units with incidence varying from 0.4 to 2/1000 live births. These infections are more common in extreme premature babies complicating and prolonging their stay in the intensive care units. Studying the epidemiology of these infections over a period of time including the changes with routine practices involved in the intensive care units would help prevent these nosocomial infections.

OBJECTIVE: The objective of our study was to document the incidence of fungal infections in a Level III NICU over a period of two decades and study the change in the spectrum of fungal infections.

DESIGN/METHODS: Retrospective analysis of microbiological records and medical records was performed to isolate the newborns with positive fungal cultures. The study period was from 1990-2008. Risk factors, infection preventing measures and antibiotic practices were analysed during the study period.

RESULTS: There has been a significant decrease in the incidence of fungal infections over the period with the new infection control measures and prophylactic antifungal medications.

Changes in the incidence of infections

	1990-94	1995-99	2000-04	2004-08
C.albicans	48	26	18	8
C.parapsilosis	53	27	16	11
C.tropicalis	0	9	1	1
C.lusitaneae	7	0	2	0
C.glabrata	0	1	1	0
C.stellatoidea	1	0	0	0
Verticillum sp	0	0	0	1
Total	109	63	38	21
No of admissions to NICU	5066	3788	3189	2381
Incidence/100 admissions	2.1	1.6	1.2	0.9

CONCLUSIONS: Candida parapsilosis has been the predominant organism in our study population in the given period. Incidence of fungal infections has significantly reduced over the past decade with better infection control precautions and prophylactic antifungal medications.

150 House Officer

The Effectiveness of Twice Weekly Dosing of Fluconazole on Prevention of Invasive Candidiasis in Extremely Low Birth Weight Infants

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BACKGROUND: Fluconazole prophylaxis is effective in preventing invasive candidiasis in extremely low birth weight (ELBW) infants. We reported an increased incidence of cholestasis with fluconazole prophylaxis in ELBW infants (Aghai, J Perinatol, 2006;26:550-555). In our unit, fluconazole prophylaxis was changed to a less frequent dosing schedule of twice a week.

OBJECTIVE: To evaluate the effectiveness and safety of less frequent dosing of fluconazole prophylaxis in preventing invasive candidiasis in ELBW infants.

DESIGN/METHODS: ELBW infants (BW ≤ 1000 grams) who received less frequent dose of fluconazole (twice a week for up to six weeks) were compared with infants who received more frequent doses (q72 h X 2 w, q48 h X 2 w and q 24 h X 2 w). Demographic and clinical data were collected from infants' medical records. The two groups were compared for baseline demographics, risk factors for candidiasis, the rate of invasive fungal infection and the incidence and severity of cholestasis.

RESULTS: 104 infants received twice weekly doses of fluconazole prophylaxis and 140 infants received more frequent doses. There were no significant differences in baseline demographics and risk factors (BW, GA, sex, race, prenatal steroids, apgar scores, duration of central lines, mechanical ventilation) between the two groups. There was no significant difference in the incidence of invasive candidiasis in infants who received the less frequent dose (2/104, 2%) compared to more frequent dose (0/140, 0%; p=0.4). The incidence and severity of cholestasis was lower with the less frequent dosing schedule.

	Frequent Dose (n=140)	Less Frequent Dose (n=104)	P
Invasive candidiasis (%)	0 (0)	2 (2)	0.4
Mortality (%)	36 (25.7)	32 (30.7)	0.4
Cholestasis (%)	60 (42.9)	32 (30.7)	0.03
DB at 6 weeks (med, range)	2.9 (0.1-16.5)	0.9 (0.1-15.8)	0.002
DB > 5 (%)	27 (19.3)	9 (8.6)	0.03
DB> 10 (%)	14 (10)	4 (3.8)	0.1

DB = Direct Bilirubin

CONCLUSIONS: The twice weekly dosing of fluconazole prophylaxis is as effective as the more frequent dosing in preventing invasive fungal infection in ELBW infants. The incidence and severity of cholestasis is decreased with the less frequent dose.

151 Fellow in Training

Neurologic Manifestations Associated with Parvovirous B19 Infection

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BACKGROUND: An increasing number of neurologic manifestations in association with Parvovirus B19 (PVB19) infection is reported.

OBJECTIVE: Characterization of the neurologic manifestations and outcomes associated with Parvovirus B19 (PVB19) infection in immunocompetent patients and patients with altered immunity.

DESIGN/METHODS: Review of published reports of neurologic manifestations associated with PVB19 infection in the English and French literature using the Pub Med database from 1966-2008.

RESULTS: Eighty-one cases, including encephalitis, meningitis, stroke and peripheral neuropathy, were identified. Most patients were children and two thirds had central nervous system (CNS) manifestations. One third had altered immunity. Viral symptoms, rash and peripheral nervous system manifestations were more frequently reported in immunocompetent patients; (OR 5.7, p 0.002; OR 11.5, p <0.0001 and OR 12.1, p 0.004 respectively). Stroke was more frequent in patients with altered immunity (OR 7.9, p 0.006 respectively). In patients with CNS manifestations, PVB19 DNA was detected in the majority of CSF (80%) and serum (84%) samples, while specific antibodies were found in 33% of CSF samples. Brain MRI abnormalities were found in 58% of patients with CNS manifestations and were less common among immunocompetent patients (OR 0.1, p 0.04). Neurologic sequelae or some improvement occurred in 22% and 15% of all patients respectively. In CNS disease, sequelae or some improvement was reported in 23% and 9% respectively. No differences in CNS sequealae were noted between immunocompetent patients (21%) compared to those with altered immunity (25%). Five patients died. Aseptic meningitis had an excellent prognosis in immunocompetent patients. Patients with sequelae were more likely to have increased protein in the CSF (OR 23.4, p 0.004). Approximately one third of patients with CNS manifestations (excluding meningitis and stroke) received IVIG and/or steroids. No differences in sequelae were reported between patients who received IVIG and/or steroids and those who did not.

CONCLUSIONS: Neurologic manifestations associated with PVB19 infection show important differences in epidemiologic, clinical, and radiographic characteristics but not in outcomes, in relationship to immune status.

152 Fellow in Training

The Immunomodulatory Effects of Opioids and Clonidine on Neonatal Immune Cells

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BACKGROUND: Opioids and α-agonists are used for sedation/analgesia and control of narcotic abstinence syndrome (NAS) in neonates. In adults, these drugs are suspected to decrease the cytokine production while in neonates the immunomodulatory effects are unknown.

OBJECTIVE: We explored the opioid receptor(OPR) gene expression profile and whether opioids modulate cytokine production by neonatal immune cells.

DESIGN/METHODS: Diluted cord blood obtained from full-term infants (mean GA=39.2±1wk; n=13) was *in-vitro* exposed to morphine, fentanyl, methadone and clonidine (10^{-3} to 10^{-11}M) prior to activation with LPS(100ng/ml). After 18h in culture, we measured 1) cytokine levels (TNF-α, IL-1β, IL-6, IL-8, IL-10 and IL-12p70; ELISA) in supernatants and 2) μ-, δ-, κ-OPRs gene expression (qRT-PCR) and cAMP (EIA) in attached macrophages.

RESULTS: Neonatal macrophages expressed all 3 OPRs. κ-OPR gene expression decreased after exposure to opiods or clonidine at 10^{-9} and 10^{-5}M, while μ-OPR decreased only at 10^{-3}M. δ-OPR gene expression was unchanged. Only morphine (10^{-7} to10^{-5}M) increased the pro-inflammatory cytokines, TNF-α and IL-8 by 20 to 52%, respectively ($p<0.05$). In contrast, higher concentrations of morphine and methadone (10^{-3}M) decreased TNF-α, IL-1β, IL-10 and IL-6 without significantly affecting cellular viability (≥85%). Similarly, clonidine increased TNF-α and IL-1β levels at 10^{-7} and 10^{-5}M while decreased TNF-α at 10^{-3}M. Unlike opioids, clonidine significantly increased the immunomodulatory cytokine, IL-6 and did not change the anti-inflammatory, IL-10. Only fentanyl was free on immunomodulatory effects. Confirming the function of the OPRs, cAMP was decreased after exposure to 10^{-5}M, while increased at 10^{-3}M ($p<0.05$).

CONCLUSIONS: Morphine and methadone modulate the production of cytokines by neonatal immune cells while fentanyl is free of such immunomodulatory effects. Whether this translates to changes in clinical outcomes is still to be determined. We suspect that the mechanisms explaining these effects are linked to the counterbalance between μ- and κ-OPR expression in neonatal macrophages. Similarly clonidine modulates OPR expression and cytokine profile, which suggest a direct or indirect effect of this drug on these receptors.

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Effect of Massage on Methadone Exposed Infants

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BACKGROUND: Infant massage has been shown to improve weight gain and behavior for preterm infants, cocaine-exposed infants and infants of depressed mothers. There has not been a study on the effects of massage for infants with withdrawal symptoms from methadone exposure.

OBJECTIVE: the objective of this study is to see the utility of massage for neonates withdrawing from maternal methadone use.

DESIGN/METHODS: Infants born at 35 weeks or later are enrolled as PT(35-6 wks) or FT(37-42wks). When they reach the captured dose of morphine, loading of phenobarbital 10 mg/kg twice are given, and they are randomized either to massage+ SC(M) or standard care of developmental intervention(SC) alone. Maintenance Phenobarbital dose is 2.5 mg/kg twice a day keeping the level of 20-30 mcg/ml. Data are analyzed on LOS, peak daily total NAS scores, total amount of morphine to treat NAS and NICU Network Neurobehavioral Scale(NNNS) summary scores on regulation, quality of movements, excitability, arousal, hypertonicity and stress/abstinence. NNNS was done before morphine, after phenobarbital loading, and day 3, 5, 7, 10, 15, 21, 28 and/or before discharge. Demographics are compared for 2 groups of interventions. Statistical methods are general linear modeling, survival analysis and hierarchical linear modeling depending on data.

RESULTS: N=52. Demographics:No difference in numbers of male, GA, BW, head circumference, Apgars, 2 NAS scores before morphine, maternal age, parity, methadone dose(93.70 mg±32.67 for M and 104.48mg±53.58 for SC), education level, smoking and use of other drugs. 1. Overall LOS was related to methadone dose($P<0.008$). M had shorter LOS than SC.($P<0.055$) with covariates of maternal methadone dose and total morphine doses. It was due to significantly shorter LOS among PT on massage. 2. The rate of decrease on morphine dose was significantly faster for massage group($P<0.056$) for FTand PT combined. 3. There was no significant difference on peak daily total NAS scores. 4. There was no significant difference between M and SC for FT and PT for NNNS summary scores on all subscores with covariates on sites.There was the site differnces on habituation, arousal, excitability and stress/abstinence.

CONCLUSIONS: The rate of decrease on morphine was more rapid for M in all infants. Massage shortened LOS for PT only. Higher the maternal methadone dose, longer the LOS was seen unlike some recent studies. Effects of massage was not different from SC on NNNS scores.

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Can Infant and Childhood Excessive Weight Gain and Obesity Be Prevented by Infant Control of Feeding?

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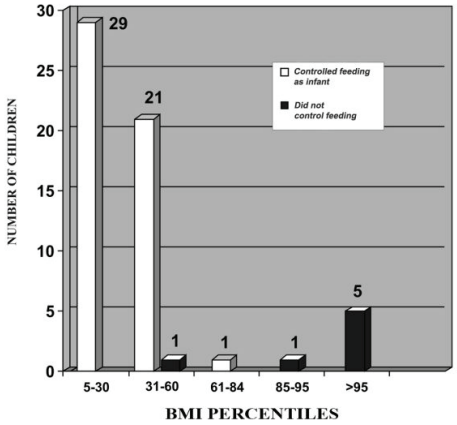
BACKGROUND: In previous studies of 9-13 year old children, those who were thin (mean BMI 15.7) were, as infants, fed on demand more often and started on self-feeding earlier than those who were heavy (mean BMI 22.4), indicating that thin children had been given, as infants, more control of feedings. Thin children at 9-13 years of age could not eat beyond fullness and often would not finish all the food on their plate, i.e. thin children had stronger fullness (satiety) signals. These results suggested the hypothesis that control of feeding by infants results in strong satiety signals that promote optimal weight.

OBJECTIVE: To determine whether infant control of feeding will prevent excessive weight gain and obesity.

DESIGN/METHODS: The present investigation is a prospective cohort study. Newborn infants in the author's pediatric practice are, with parental permission, enrolled in the present study which began July, 2002 and remains in progress. To assure accurate demand feeding, parents are given instructions on the recognition of infant hunger. Self-feeding is started at 8 months with a goal of total self-feeding by 15 months with emphasis on safe feeding and delay of self-feedimg if necessary.

RESULTS: An interim analysis was carried out in July, 2008. 58 children were 3-6 years of age. The protocol was followed in 51. All were thin with BMI perecentiles of 5-65. The protocol was not followed in the remaining 7. The infants were pressured to eat and/or not started on self-feeding before two years of age. Six of these 7 were heavy with BMI percentiles of 85to>95. The protocol was not followed by uncooperative surrogate feeders in 3 cases; in 2 cases the infants were fed when asleep (this will be explained); in the 6th case the infant developed a moderately severe illness at 15 months, following which the mother continued to feed the child until 4 years of age.



CONCLUSIONS: The study remains in progress. At present, none of the 51 children, 3-6 years old, who were demand-fed and started on early self-feeding has had excessive weight gain or become obese.

155 House Officer

Perceptions about Exercise among Inner-City Adolescent Girls

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BACKGROUND: 74% of U.S. adolescent girls do not regularly exercise. We present needs assessment data collected as part of an AAP CATCH-funded project to develop an exercise program for adolescent girls at an inner-city high school.

OBJECTIVE: To understand the perceptions of adolescent girls regarding 1)their involvement in exercise, 2)benefits of exercise, 3)barriers to exercise, and 4)factors that would motivate them to participate in an exercise program.

DESIGN/METHODS: We recruited female high school students to participate in one of three 60-minute focus groups of 10-11 students each. Focus groups were audio-taped and professionally transcribed. Three investigators independently coded each transcript for thematic content. Differences in coding were resolved via consensus.

RESULTS: **Involvement in exercise:** Participants cited involvement in organized sports, as well as daily routines such as walking to the subway, going up and down stairs, and dancing at parties. **Benefits:** Emotional and physical benefits of exercise were discussed. Emotional benefits included feeling less stressed and depressed, having better self-esteem, and feeling more energized. Physical benefits included getting in shape, losing weight, and feeling healthier. **Barriers:** Participants who were interested in exercise reported cost, safety, and inadequate community resources as barriers. They also cited stress as a common barrier to exercise. Many described distractions such as household chores, homework, boyfriends, and tv. Others described exercise as simply not fun, disliking feeling sore, tired, and sweaty. Interestingly, several commented that girls were lazy and therefore did not exercise. **Motivating factors:** Participants described goal-setting, peer and family influence, fun, and competition as motivating factors for exercise. They were interested in an organized, after-school exercise program for 45 min-1 hour, 2-3x/week. Activity interests varied among groups but dance was consistently popular.

CONCLUSIONS: Adolescent girls in this study recognized important psychological benefits of exercise and offered critical information on barriers and motivating factors. By understanding the perceptions of the target population, we can better address the needs of this group and have utilized this data to create an exercise program for these adolescents.

156 House Officer

Depression in Adolescents – Feasibility of Effective Screening

Sujatha Buddhe, Myron Sokal, Sherry Sakowitz.
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BACKGROUND: Depression is a common and serious medical condition seen in adolescents. Although many treatment options are currently available, only 30% of adolescent patients are being treated because of under-diagnosis and under-referral. These problems can be addressed by using a formal standardized tool for screening depression in pediatric practice.

OBJECTIVE: The purpose of our study was to assess the feasibility and acceptability among physicians of using a simple, evidence-based tool to screen for depression.

DESIGN/METHODS: A retrospective analysis of 100 charts was done to assess the effectiveness of the history in detecting the presence of depression in adolescents aged 12-18 years at Brookdale University Hospital and Medical Center. The analysis showed that the history identified only 3% of patients as depressed and these were previously diagnosed cases, while no new cases were screened positive. As the regular history taking was ineffective, we implemented a simple and standardized screening tool, the Beck Depression Inventory (BDI) in the same inpatient setting of our hospital to screen for adolescent depression. It is known that the BDI scale has a high internal consistency (α=.91), high one week test retest reliability(r=0.93) and good validity compared to other scales. The residents provided survey responses regarding the effectiveness and feasibility of the BDI after using it for 6 months.

RESULTS: Thirty nine of 42 residents (92 %) responded to the survey. Eighty-four percent (84%) felt that they spent less than five minutes in giving the questionnaire to patients. Eighty-nine percent (89%) felt that it did not consume much of their practice time. Ninety percent (90%) felt that few of the patients expressed dissatisfaction while other patients were happy to do the questionnaire. Eighty-six percent (86%) of the residents reported that they felt more comfortable in screening adolescent suicide and depression with the BDI Scale and 82% felt that the BDI was more effective than informal questioning. Fifty-three percent (53%) stated that they would use the BDI in private practice, while 30% were unsure. In addition, during these 6 months, 40 new cases were screened positive for depression and referred for appropriate evaluation.

CONCLUSIONS: Standardized screening tools are effective in screening depression and are well accepted by physicians and patients.

157 Fellow in Training

The Effectiveness of Screening for Depression in Urban Adolescents

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General Pediatrics, Columbia University, New York, NY; Psychiatry, Columbia University, New York, NY; Mailman School of Public Health, Columbia University, New York, NY.

BACKGROUND: The lifetime prevalence of adolescent major depression is 15% to 20%. Yet, despite the availability of effective treatments, less than a third of adolescents with depression are in treatment, due in part to lack of effective recognition.

OBJECTIVE: To identify provider attitudes towards screening for adolescent depression at an academic health center (AHC) and subsequently examine the effectiveness of routine screening for depression in an inner city clinic setting.

DESIGN/METHODS: At the beginning of the study, we conducted a self-administered cross-sectional survey of medical providers at three pediatric practices at an AHC to assess attitudes and beliefs toward mental health screening and barriers to treatment. Then, over a four month period, patients aged 13 to 20 were approached by practice staff and asked to fill out the Columbia Depression Scale (CDS) prior to their scheduled or acute care visit. The form was then scored by providers who decided whether or not to refer. Access to mental health care was similar at all sites. Chi-square analysis was done to see if CDS score was associated with whether a referral was made.

RESULTS: Most of the 34 providers surveyed (80%) strongly agreed that it was their duty to identify mental health problems in adolescents and 60% agreed that they were confident they could recognize depression. However, 70% didn't think they had time to screen and over 80% felt it was difficult to refer depressed adolescents. Of 608 adolescents approached, 546 agreed to complete surveys; 11 were subsequently excluded due to young age. Among respondents identified as being likely or highly likely to have depression, 56% were referred; the rest either refused referral or the provider, upon further questioning, did not feel mental health referral was necessary at that time. Among those with a score indicating a moderate likelihood of depression, 22% were referred. Overall, 11% of participants were referred for mental health care with 3 requiring emergent treatment. As expected, CDS scores were significantly associated with whether a referral was made ($p<.01$).

CONCLUSIONS: In our urban inner city clinics the CDS appeared to be a fairly effective screening tool leading to the referral of a large number of potentially depressed adolescents for mental health treatment. Further research is needed to assess whether the screen is reaching all at-risk adolescents and whether mental health referral leads to appropriate care and improved outcomes.

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Respiratory Depression in Intoxicated Adolescents and Young Adults

Melissa L. Langhan.
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BACKGROUND: Acute ethanol (ETOH) intoxication is a common occurrence amongst adolescents and young adults. Inebriation leads to altered mental status secondary to central nervous system depression as well as respiratory depression. It has been previously shown that ETOH inhibits both the hypoxic and hypercapnic ventilatory drives, and respiratory acidosis is found in up to 31.7% of intoxicated adults. Capnography is a noninvasive monitoring device used to assess ventilatory status. There have been no studies thus far to study the use of capnography in adolescent patients with acute ETOH intoxication.

OBJECTIVE: To determine the frequency of hypoventilation among adolescents and young adults who are acutely intoxicated with ethanol. To determine if end-tidal carbon dioxide ($ETCO_2$) correlates with ETOH levels.

DESIGN/METHODS: In this ongoing study, we enrolled subjects aged 16 to 21 years old presenting to an urban Pediatric Emergency Department (PED) with acute ETOH intoxication. For each patient a capnograph was attached via a nasal-oral cannula. ETOH levels were measured either via breathalyzer or serum sample. $ETCO_2$, oxygen saturation, heart rate, and respiratory rate were recorded hourly. Hypoventilation was defined as an $ETCO_2$ level below 30mmHg or above 50mmHg. ETOH levels were correlated with $ETCO_2$and respiratory rate using the Pearson correlation coefficient

RESULTS: To date 19 subjects were enrolled with a median age of 17 years. Mean ETOH level was 163mg/dL (range: 79-289mg/dl). Five (26%) subjects had $ETCO_2$ <30mmHg (range: 17-27), 4 of which were placed on oxygen via nasal cannula. There was no difference in the mean ETOH level (190mg/dL vs. 154mg/dL, p=.25) or respiratory rate (17.5 vs. 17.2, p=.85) of patients with hypoventilation and those without. Two subjects had oxygen saturations below 95%; both had low $ETCO_2$. There was a poor correlation between ETOH levels and $ETCO_2$ (r= -.367) or respiratory rate (r= -.138).

CONCLUSIONS: Subclinical hypopneic hypoventilation can occur in acute ETOH intoxication independent of respiratory rate or ETOH levels. Capnography represents a valuable way to monitor the ventilatory status of these individuals in the PED.

159 Medical Student

Birth Hyperoxia Alters Pro-Inflammatory Cytokine Expression and Downregulates Toll-Like Receptors (TLR) 2 and 4 in the Lungs of Sprague-Dawley Rats

Erin K. Stenson, Erin Killeen, J. Craig Cohen, Shetal I. Shah.
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BACKGROUND: Hyperoxia causes excessive oxidant stress, inflammation, lung destruction and leads to simplified alveolarization, apoptosis and disrupted vascularization, leading to chronic lung disease. In the short term, hyperoxia leads to release of pro-inflammatory cytokines interleukins 1-Beta (IL-1B), IL-8 within the lung.

OBJECTIVE: The purpose of this experiment was to determine the levels and mRNA expression of IL-1B, IL-8, Tumor Necrosis Factor Alpha (TNF-alpha), TLR2, TLR4 and Thyroid Transcription Factor 1 (TTF-1) in the lung after hyperoxic exposure at birth.

DESIGN/METHODS: Four litters of time-pregnant Sprague-Dawley rats were subjected to either 100% hyperoxia at birth or 21% control at birth. Lungs were harvested 3 days post-exposure or allowed to grow to 1 month post-weaning. Immuno-histochemistry was performed on frozen sections and pixel count was used for quantification. RNA extraction and Real-Time PCR was performed on homogenized lung tissue to assess mRNA levels. Pixel counts of 48 microscopic images per antibody were analyzed using Student's T-testing and GraphPad software.

RESULTS: IL-1B, IL-8 and TTF-1 levels were significantly increased compared with controls ($p<0.005$) immediately after hyperoxia. Levels of TLR 2, 4 and TNF-alpha were increased in the lung ($p<0.05$) immediately after hyperoxia. Real-Time PCR demonstrated mRNA levels of IL-1B, IL-8, TTF-1, TLR2, TLR4, and TNF-alpha were reduced to less than 50% of control levels after hyperoxic exposure. Long term, levels of IL-1B and TNF-alpha were reduced at 1 month post-weaning ($p<0.0006$, $p<0.0001$, respectively). Compared with the immediate post-hyperoxia group, long term levels of TLR2 and TLR4 levels were also reduced ($p<0.0001$, $p<0.03$, respectively).

CONCLUSIONS: Immediate exposure to hyperoxic conditions results in an increase of cytokines IL-1B, and IL-8, indicating a pro-inflammatory response with reduction of these mediators over time. In contrast, reductions TLR-2 and TLR-4 levels were persisted to 1 month post-weaning. We speculate that hyperoxia may decrease innate immunity in both the long and short term, rendering increased susceptibility to infection.

160 Medical Student

Long Term Respiratory Function after Birth Hyperoxia in Sprague-Dawley Rats with Equivalent Cumulative Oxygen Exposure

Erin K. Stenson, J. Craig Cohen, Shetal I. Shah.
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BACKGROUND: Hyperoxia is a risk factor for chronic lung disease. Inflammation mediated by reactive oxygen species has been implicated in hyperoxia-induced lung injury. Retrospective analysis has shown cumulative O2 exposure at 72 hours of life to predict obstructive lung disease at 1 year of age.

OBJECTIVE: The purpose of this experiment was to determine the effects of time-dependent hyperoxia on long-term pulmonary function in adult animals with equivalent cumulative oxygen exposure.

DESIGN/METHODS: 4 litters of time-pregnant Sprague-Dawley rats were subjected to hyperoxia at birth (47% for 3 days, 60% for 2 days, & 100% for 1 day). 1 month post weaning, animals were paralyzed & mechanically ventilated. Measurements of static compliance, airway resistance, tissue damping, elastance, hysteresivity & hysteresis were obtained at positive-end expiratory pressures (PEEPs) of 0, 3, and 6 cm H2O. Pressure-volume (PV) curves were generated. 2-day running averages were compared using 2-way ANOVA.

RESULTS: At PEEP of 0 cm H2O, statistically significant differences were seen in airway resistance in all three groups compared to control ($p <0.001$). Compliance was significantly lower in the 47% O2 group at all levels of PEEP ($p<0.001$). Tissue damping was significantly increased in the 47% O2 group at all levels of PEEP ($p<0.01$). Hysteresivity increased significantly in the 47% O2 group at PEEP of 0 cm H2O ($p<0.05$). At higher PEEPs, significant differences in compliance

between control and the 47% O2 group persisted (p <0.001). Differences in airway resistance lost significance at PEEPs of 3 and 6 cm H2O. Tissue damping was significantly higher at PEEPs of 3 and 6 cm H2O between control and the 47% O2 group. PV curves were statistically decreased with increased days of oxygen exposure at all PEEPs as shown below. Analysis demonstrated decreases in total area (hysteresis) with increased time of oxygen exposure (p<0.001).
CONCLUSIONS: Increased duration of oxygen exposure – independent of cumulative O2 exposure – resulted in decreased respiratory function as measured by compliance and airway resistance. Loss of statistical significance at higher PEEPs, coupled with the step-wise decrease in hysteresis with increased oxygen duration implicates altered surfactant homeostasis as a contributor to the decreased respiratory function. Further studies examining surfactant protein levels and total phospholipid content in these animals are required.

161 Fellow in Training

Effect of Nitric Oxide and Hyperoxia on the Differentiation of Type II Pneumocytes

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BACKGROUND: Inhaled Nitric Oxide (NO) is used as a therapy in neonates with pulmonary hypertension and hypoxic respiratory failure. Previous randomized clinical trials (Ballard, NEJM 2007) have shown benefit of NO in preterm infants with hypoxic respiratory failure and risk of chronic lung disease. However, the molecular and biochemical effects of NO on developing human fetal lungs remain unknown.
OBJECTIVE: To investigate the effects of hyperoxia and NO on the development of human fetal Type II Pneumocytes.
DESIGN/METHODS: We utilized a human fetal lung epithelial cell model (Gonzales, AJP Lung 2002) which has been used to study the differentiation of Type II Pneumocytes upon hormone stimulation. Cells were exposed to room air or hyperoxia (>95% oxygen), each with or without NO (20 ppm) for 5d. Type II cell phenotype was assessed using quantitative Western Blot analysis of Surfactant Protein B (SP-B) and Pepsinogen C (PGC) expression. SP-B and SP-C mRNA levels were measured using Real Time RT PCR. Protein levels were measured. NO exposure was evaluated by quantification of cGMP and NO metabolites.
RESULTS: Protein concentration was decreased in the cells exposed to hyperoxia and NO when compared to RA cells (p<0.05), with no differences noted between the other groups. Compared to RA controls, there was a 4-fold reduction in SP-B protein in cell treated with hyperoxia with or without NO (p<0.01). No difference in SP-B levels was measured in cells exposed to RA and NO when compared to RA controls. PGC levels in cells exposed to RA and NO increased by 4-fold, as compared to cells cultured in RA, or hyperoxia +/- NO (p<0.01). Levels of SP-B and SP-C mRNA were increased significantly in cells exposed to NO in RA, when compared to RA controls (p<0.05). Exposure to NO increased cGMP levels (p<0.05) and levels of NO metabolites in cell media (p<0.05).
CONCLUSIONS: An increase in PGC protein, and SP-B and SP-C mRNA levels after cells were exposed to NO in RA suggests that either an increased number of cells are differentiating to Type II phenotype, or that there are increased levels of these products in cells that have already differentiated. However, these effects did not persist when NO exposure is combined with hyperoxia. In contrast, no difference was detected in SP-B protein levels after NO exposure in RA, and NO did not mitigate the decline in levels of SP-B protein caused by hyperoxia. Further investigations are underway to evaluate these cellular responses to NO.

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CD8+ T-Lymphocytes in Infants with Bronchopulmonary Dysplasia (BPD)

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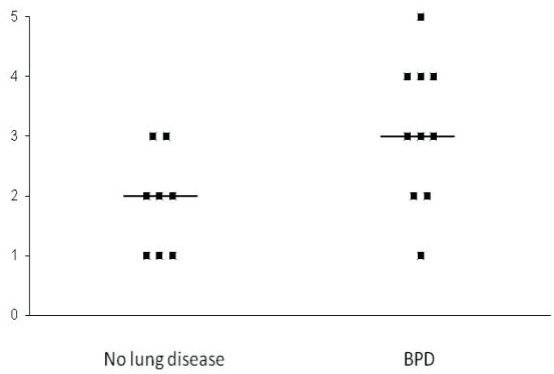
Pediatrics (Neonatology), University at Buffalo - Women & Children's Hospital of Buffalo, Buffalo, NY; Pediatrics (Neonatology), University of Rochester, Rochester, NY.

BACKGROUND: The role of the lymphocyte (Lc) has not been well-studied in BPD. We have shown that T Lcs (CD3+) are increased in babies with BPD compared to term infants with no lung disease.
OBJECTIVE: Our objective was to compare human infant autopsy lung samples from BPD babies and infants with no lung disease for the presence of CD8+ T Lcs.
DESIGN/METHODS: The right middle or lower lobe was preserved within 6h of death by inflation fixation with 10% buffered formalin at 20 cmH_20 for 20h and paraffin embedded. CD8 immunohistochemistry was performed on lung sections from 18 neonates categorized as no lung disease (NLD, n=8) or bronchopulmonary dysplasia (BPD, n=10) using a mouse anti-human CD8 monoclonal (4B11, Vector Labs). A semi-quantitative analysis was performed by investigators blinded to the diagnosis, scoring the entire section from 0-5.
RESULTS: Mean gestational age (GA) at birth and at death and age at death were 37wks, 38wks and 2.5 days for NLD babies and 27wks, 37wks and 63 days for BPD babies. The median score (IQR) for CD8 staining for each group was 2 (1, 2.25) for NLD and 3 (2.25, 4) for BPD (P=0.03, by Wilcoxon rank-sum test).



There was no difference in CD45 (general leukocyte marker) staining (data not shown).
CONCLUSIONS: We conclude that CD8+ T Lcs were found more frequently in the lung parenchyma of babies who died with BPD compared with those of similar corrected GA without lung disease. Further investigation into the role of lymphocyte subsets may provide important information about the pathogenesis of the chronic phase of BPD.

163 Fellow in Training

Altered Oxidative Stress: A Susceptibility Factor in Bronchopulmonary Dysplasia (BPD)

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Pediatrics, UMDNJ Robert Wood Johnson Medical School, New Brunswick, NJ; Cell Biology, UMDNJ School of Osteopathic Medicine, Stratford, NJ; School of Public Health, UMDNJ RWJMS, Piscataway, NJ.

BACKGROUND: BPD remains a significant cause of mortality and morbidity in very premature infants.
OBJECTIVE: To test the hypothesis that infants with a history of BPD have increased susceptibility to develop BPD due to altered oxidative stress pathways; the pathways of oxidative stress will be studied by determining the polymorphism of genes of critical enzymes and determine the degree of altered oxidative stress as demonstrated by increased urinary isoprostanes (inflammatory marker) in the subjects as compared to matched controlled ex-prematures who did not develop BPD. At this time only the urinary isoprostanes levels will be reported.
DESIGN/METHODS: Infants (GA≤30 wk at birth) from 3 months to 24 months postnatal age were enrolled: one group who developed BPD (oxygen dependent till 36 wk post conceptional age) and a control group who did not. All subjects were considered healthy at enrollment and needed no respiratory support or medications. Urine and blood samples were obtained from the subjects and urinary isoprostane levels were analyzed by gas chromatography mass spectrometry as reported.
RESULTS: Log transformation was applied to the right skewed isoprostane (ng/mg creatinine) values to make it normally distributed. Linear regression of log-transformed isoprostane/creatinine (log_iso_creat) adjusted for postnatal age for the BPD group was 1.15 (p=0.017) higher than that of controls (unadjusted, see table). The mean value for the log_iso_creat adjusted for postnatal age (months) was 4.74 (SE 0.37) for the BPD group and 3.59 (SE 0.30) for the controls. Postnatal age was not linearly associated with log_iso_creat (p=0.085).There was no difference in NEC, ROP, PDA or sepsis between the two groups.

Descriptive Statistics (mean ± SD) of postnatal age (months) and Log_iso_creat

	BPD(N=11)	Control(N=16)	P
Age	7.8±5.7	10.4±5.8	0.195
Unadjusted Log Isoprostane	4.87±1.33	3.50±1.29	0.013

CONCLUSIONS: Infants with a history of BPD appear to have altered oxidative stress pathways as demonstrated by increased urinary isoprostane levels which may explain the increased susceptibility to BPD. This may be due to genetic polymorphisms of oxidative stress related enzymes or severe persistent post natal inflammation that is under recognized in clinically well appearing infants. The subjects' and parents' DNA for genetic polymorphisms of inflammation are currently under study.

164 Fellow in Training

Change in Incidence of Diagnosis and Associated Hospitalization Characteristics for Neonatal Intensive Care among Patients with Bronchopulmonary Dysplasia: A National Evaluation, 1998-2005

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BACKGROUND: Without careful perinatal management, the combination of pulmonary immaturity and ventilator-associated barotrauma leads to significant morbidity and mortality in patients with bronchopulmonary dysplasia (BPD). Antenatal steroids gained universal use in women with preterm labor following a NIH consensus statement in 2000. Although the clinical

effectiveness of antenatal steroids at reducing mortality and morbidity of prematurity is well-documented, no study has correlated this intervention with the national incidence of BPD or length and cost of hospitalization for patients with BPD.
OBJECTIVE: To evaluate trends in the epidemiology and health services usage in the neonatal intensive care unit (NICU) for patients with BPD.
DESIGN/METHODS: We performed descriptive, bivariate, and multivariate analyses of data concatenated from the 1998-2005 Nationwide Inpatient Sample (NIS), a nationally representative sample of hospital admissions in the United States. We examined trends in patient demographics, associated diagnoses, aggregate hospital charges and costs, and length of stay (LOS) for patients diagnosed with BPD.
RESULTS: Between 1998 and 2005, mean NICU charges for patients diagnosed with BPD were $170,611 in 2005 dollars. Mean LOS was 46.5 days. All hospital and demographic variables examined were significant on bivariate analysis of charges and LOS, as was use of mechanical ventilation, non-invasive ventilation, chest tube, and ductus arteriosus ligation. Controlled for hospital and demographic factors, diagnosis of BPD decreased 3.9% (p=.056). Controlled for hospital and demographic factors as well as the above treatments, length of stay decreased 4.1% annually (p=.0004). Charges did not change significantly, however.
CONCLUSIONS: Incidence of BPD and related LOS decreased coincident with universalization of antenatal steroid treatment. Charges and costs for NICU hospitalization of patients with BPD were unchanged during the same period, however. Full inclusion of NIS data from 1993-2006 in analysis to be presented if accepted will permit more careful delineation of trends in BPD-related diagnosis, LOS, charges, and costs, as well as correlation with other interventions to reduce morbidity in patients with BPD. Despite the vagaries of diagnostic code analysis, the NIS represents the best available data set to examine the national impact of changes in NICU care.

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Single Nucleotide Polymorphisms of Fas, Fas Ligand, and the Caspases and Bronchopulmonary Dysplasia in ELBW Infants

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BACKGROUND: Apoptosis mediated by the Fas pathway, in which Fas and Fas ligand (FasL) are upstream mediators and caspases 8 and 3 are downstream mediators, is involved in normal lung development as well as the lung pathology involved in respiratory distress syndrome, the requisite antecedent to bronchopulmonary dysplaisa, BPD. The pathology of BPD results from interactions of lung immaturity and environmental stressors with genetic foundations. The hallmark hypoalveolarization of BPD may result from a dysregulation of apoptosis resulting from SNPs of genes in the Fas pathway.
OBJECTIVE: We tested the hypothesis that SNPs of Fas, FasL, caspases 8 and 3 contribute to the development of BPD in ELBW infants.
DESIGN/METHODS: This is a cohort study that has enrolled 104 infants from 2002 to present, weighing <1 kg at birth, without congenital or chromosomal anomalies. BPD is defined as need for O_2 at 28d. BPD severity is defined by oxygen need at 36 weeks postmenstrual age, PMA. Infants with mild BPD have no oxygen requirement at 36 weeks PMA. Infants with moderate BPD require FiO2 < 0.3 at 36 weeks PMA and infants with severe BPD require pressure and/or $FiO_2 \geq$ 0.3 at 36 weeks PMA. DNA was isolated from buccal mucosal swabs. Allelic discrimination was then performed using specific probes for Fas (-1377,-691,-670), FasL (-844,1174,2777), caspase 8 (IVS 12-19), and caspase 3 (-280,+567) with Real-time PCR. Gene expression was tested via the creation of Fas promoter constructs which were inserted into plasmid vectors upstream of the luciferase gene. Chi square analyses and ANOVA were performed with $P<0.05$ denoting statistical significance.
RESULTS: The Fas -1377 SNP was associated with BPD severity but did not show altered expression in in vitro experiments. Lower GA and birthweight were associated with BPD severity. Infants with more severe BPD were more likely to have received antenatal stereoids and postnatal surfactant. There was an association between a clinically significant PDA and culture-positive sepsis and BPD severity. There was an association between genotypes of FasL SNPs and PVL; and between genotypes of Fas -691 and FasL 1174 and severe ROP.
CONCLUSIONS: The Fas -1377 SNP is associated with BPD severity. All studied Fas ligand SNPs were associated with PVL. The Fas -691 and FasL 1174 SNPs are associated with severe ROP.

166 House Officer

Variability in Reported Practice Patterns for Weaning Oxygen Therapy in Former Premature Infants

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BACKGROUND: With improvements in neonatal intensive care, more premature infants are surviving, although many continue to have significant pulmonary morbidities. Over 4,000 premature infants each year are discharged from NICUs on home oxygen (O2) therapy. Data are lacking on the appropriate methods for weaning supplemental O2 in premature infants. No studies have described protocols used by pediatric pulmonologists to wean premature infants from supplemental O2 therapy.
OBJECTIVE: To examine current strategies used by pediatric pulmonologists to wean former premature infants from supplemental O2 therapy in the outpatient setting.
DESIGN/METHODS: We designed a cross-sectional, self-administered, anonymous survey assessing strategies for O2 weaning for premature infants. Surveys were sent to 250 pediatric pulmonologists at 20 pediatric pulmonary programs in the US as listed in the recent US News and World Report rankings of pediatric pulmonary training programs.
RESULTS: We had a 50% (10/20) institutional response rate and a 31% (78/250) survey response rate. 8% of pulmonologists report using a standardized protocol to wean premature infants off home O2 therapy. 78% report using nocturnal O2 saturations, either alone or as part of a sleep study as the primary indication for weaning. 46% wean diuretics prior to weaning O2 while 48% do not wean diuretics before weaning O2. The factors considered prior to initiating O2 weaning included growth (cited by 96% of respondents), vital signs (85%), hospitalizations (68%), and echocardiograms (59%). Fewer respondents (21%) reported using chest x-ray findings as part of a weaning strategy. The minimum room air saturation required to take a patient off O2 ranged from 90-95% with a mean of 93% (SD 1.74). There were no statistically significant differences in reported O2 weaning practices based on clinic size.
CONCLUSIONS: There is substantial variability regarding O2 weaning strategies for former premature infants on home O2 therapy and very few respondents report using a standardized protocol. The majority of providers use nocturnal O2 saturations as an indication for readiness to wean. Patient growth is an important factor for O2 weaning considered by almost all pulmonologists surveyed. Development of consensus guidelines and subsequent evaluation of such guidelines are needed to ensure the safety of the growing number of infants who require weaning from home O2 therapy.

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Tapering Outpatient Diuretic Therapy (ODT) in Patients with Stable BPD: How Long Is Too Long?

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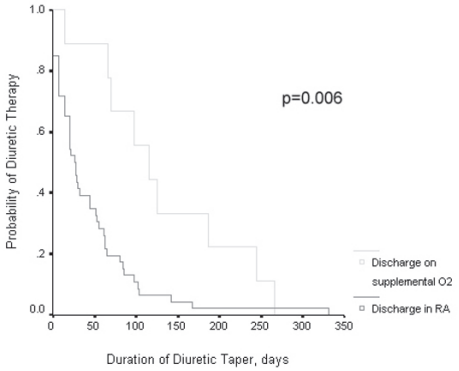
BACKGROUND: No data address optimal duration of ODT or duration of diuretic taper (DT) in infants with established BPD. Practitioners may actively decrease diuretic dose or allow patients to outgrow ODT passively. Infants with similarly severe lung disease may thus be exposed to varying duration and risks of ODT. Some patients may tolerate a more aggressive taper, thus reducing care burden and side effects.
OBJECTIVE: To determine usual ODT and DT in NICU graduates with established BPD, and to identify factors associated with prolonged DT.
DESIGN/METHODS: NICU graduates with BPD discharged 2000-2006 on ODT were identified and data abstracted from clinical databases and medical records. BPD was defined as oxygen dependence at 36 wks PMA. Infants with chromosomal abnormalities, congenital heart disease, or tracheostomy placement were excluded from the study. Descriptive, univariate, and multivariate analyses were performed.
RESULTS: Of 59 patients on ODT, 10 were also discharged on oxygen. Median (25th, 75th percentile) ODT was 94 (69, 115) days and 30 (14, 84) days for DT. ODT and DT were significantly longer in infants discharged on oxygen.



In Cox proportional hazards modeling, longer DT was associated with a higher dose of hydrochlorthiazide at discharge, shorter interval to first follow-up visit, need for rehospitalization, and African American race. Birth weight, gestational age, and various discharge therapies were not significantly associated with duration of DT after adjusting for these factors. In 58% of all patients, diuretics were tapered or discontinued at the first outpatient visit.
CONCLUSIONS: This study demonstrated great variability in duration of ODT and DT. Discharge on oxygen was associated with longer ODT and DT. Active taper is successful in the majority of patients and should be considered in patients with stable BPD

Sunday, March 15, 2009
9:45 AM-12:00 PM

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Fellow in Training

9:45 AM

Kinetics of CaM Kinase IV during Hyperoxia in Neuronal Nuclei of the Cerebral Cortex of Newborn Piglets

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BACKGROUND: We have shown that free radicals generated during hyperoxia result 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) 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.

OBJECTIVE: The present study tests the hypothesis that hyperoxia results in modification of the calmodulin binding site, the activator site, of CaM Kinase IV enzyme in neuronal nuclei of the cerebral cortex of newborn piglets.

DESIGN/METHODS: Piglets were divided into normoxic (Nx, n=4) and hyperoxic (Hyx, n=4) groups. Hyperoxia was induced with an FiO_2 of 1.0 for 60 min. PaO_2 in hyperoxic group was maintained at 400 mmHg. Cerebral energy metabolism was documented by ATP and phosphocreatine (PCr) levels. Neuronal nuclei were isolated and CaMK IV activity was determined by ^{33}P-incorporation into a substrate in a medium of 50 mM HEPES (pH 7.5), 2 mM DTT, 40 μM syntide 2, 0.2 mM ^{33}P-ATP, 10 mM Mg acetate, 5 μM PKI 5-24, 2 μM PKC 19-36 inhibitor peptides, 1 μM microcystine LR, 200 M SOV and either 1 mM EGTA or 0.8 mM $CaCl_2$ and varying concentrations of calmodulin (0.05 μM to 1 M). Vmax (maximum velocity) and Ka (activator constant) values were determined from the activity data.

RESULTS: ATP (μmoles/g brain) was 4.70± 0.36 in Nx and 4.90± 0.40 in Hyx (p=NS). PCr (μmoles/g brain) was 4.1± 0.3 in Nx and 4.0±0.4 in Hyx (p=NS). The data show that Vmax value of CaMK IV activity increased from 1425±75 in Nx to 2750±100 (pmoles/mg protein/min) in Hyx group (p<0.001). The activator constant value (Ka) for calmodulin decreased from 0.125±0.005 in Nx to 0.052±0.002 μM in Hyx group (p<0.029) demonstrating an increased affinity of the enzyme for its activator calmodulin.

CONCLUSIONS: We conclude that hyperoxia leads to modification of CaMK IV resulting in increased affinity of the enzyme for calmodulin. We speculate that modification of calmodulin site of the enzyme is the potential mechanism of hyperoxia-induced activation of CaMK IV in neuronal nuclei that leads to increased transcription of proapoptotic genes and results in programmed neuronal death. (Funded by NIH-HD 20337 and NIH-R56-HD 38079).

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Fellow in Training

10:00 AM

Effect of Src Kinase Inhibition on Phosphorylation of Cyclic AMP Response Element Binding (CREB) Protein Following Hypoxia in the Neuronal Nuclei of Newborn Piglets

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BACKGROUND: Previous studies have shown that cerebral hypoxia results in increased calcium/calmodulin kinase IV (CaM kinase IV) activity and increased phosphorylation of cyclic-AMP-response element binding (CREB) protein in the cerebral cortex of newborn piglets. We have also shown that hypoxia results in increased activation of Src kinase in the cerebral tissue. Since Src kinase mediated tyrosine phosphorylation results in altered function of the proteins, increased Src kinase activity during hypoxia may lead to CaM kinase IV activation resulting in increased CREB phosphorylation.

OBJECTIVE: The present study aims to investigate the mechanism of CREB phosphoryation during hypoxia in the cerebral cortex of newborn piglets and tests the hypothesis that the hypoxia-induced increased phosphorylation of CREB protein is mediated by Src kinase.

DESIGN/METHODS: Fourteen, 3-5 days old piglets were assigned to normoxic (Nx, n=5), hypoxic (Hx, n=5) and hypoxic pretreated with Src kinase inhibitor PP2 (Hx+Srci, 1 mg/kg i.v., n=4) groups. Hypoxia in piglets was achieved by decreasing the inspired oxygen from 21% to 7% (FiO2, 0.07; for 60 min). Cerebral tissue hypoxia was confirmed by ATP and phosphocreatine levels. Cortical neuronal nuclei were isolated, separated on SDS-PAGE, probed with anti-Ser^{133}-p-CREB antibody. The protein bands were detected by enhanced chemiluminescence, analyzed by imaging densitometry and expressed as absorbance ($ODxmm^2$).

RESULTS: Tissue ATP levels (μmoles/ g brain) were 4.35 ± 0.21 in Nx, 1.43 ± 0.28 in Hx and 1.73 ± 0.33 in Hx+Srci groups (p< 0.05 Nx vs. Hx and Hx+Srci). PCr levels (μmoles/ g brain) were 3.80± 0.26 in Nx, 0.96 ± 0.20 in Hx and 1.09±0.39 in Hx+Srci (p<0.05 Nx vs. Hx and Hx+Srci). Density (OD x mm^2) of Ser^{133} p-CREB protein was 56.6±2.2 in the Nx as compared to 102.6±2.6 in Hx (p<0.05 vs. Nx) and 71.3±4.7, (p< 0.05 vs. Hx) in the Hx+Srci group. The data show that Src kinase inhibition attenuates the hypoxia-induced increase in CREB protein phosphorylation in cortical nuclei of newborn piglets.

CONCLUSIONS: We conclude that the hypoxia-induced increase in CREB protein phosphorylation is mediated by Src kinase. We speculate that Src kinase-mediated increased activation of CaM kinase IV results in increased phosphorylation of CREB protein that triggers transcription of the proapoptotic genes. (Funded by NIH-R56-HD 38079 and NIH-HD 20337).

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Fellow in Training

10:15 AM

Long-Term Consequences of Germinal Matrix Hemorrhage in a Rabbit Pup Model

Caroline O. Chua, Halima Chahboune, Krishna Dummula, Furong Hu, Charles Edrick Chua, Fahmeed Hyder, Praveen Ballabh.
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BACKGROUND: Germinal matrix hemorrhage-intraventricular hemorrhage (GMH-IVH) is a common neurological problem of premature infants that is associated with the development of cerebral palsy, post-hemorrhagic hydrocephalus and cognitive deficits. Despite this, there is no standardized animal model of IVH depicting its long-term neurological consequences.

OBJECTIVE: To determine whether induction of IVH in premature rabbit pups would produce motor impairment, post-hemorrhagic hydrocephalus, reduced myelination and gliosis.

DESIGN/METHODS: We used our rabbit pup model of glycerol induced IVH. The premature rabbit pups were delivered by C-section at d29 gestational age (term=32d). They were sequentially assigned to receive either intraperitoneal glycerol or saline at 2h age. The development of IVH and its severity was diagnosed by head ultrasound at 24h age. Neuro-behavioral, histological evaluation and brain MRI with diffusion tensor imaging (DTI) were performed at 2-week age in pups with IVH and non-IVH controls (glycerol and saline-treated). Myelination was evaluated by double labeling of cryosections with myelin basic protein (MBP) and panaxonal filament antibodies and by taking the ratio of myelinated to unmyelinated fibers using Metamorph® software. Gliosis was assessed in GFAP labeled sections. Brain and ventricle size were measured at the level of midseptal nucleus and ventro-lateral thalamus in brain sections stained with cresyl violet. DTI was conducted on a 9.4-T Bruker Biospec system.

RESULTS: While 25% of pups with IVH developed motor impairment and 44% developed post-hemorrhagic hydrocephalus, non-IVH pups were unremarkable. Immunohistochemical analysis revealed reduced myelination in corona radiata, internal capsule and corpus callosum in pups with IVH compared to non-IVH controls (P<0.05). The reduction in myelin levels was also observed by Western blot analysis. In addition, there was evidence of gliosis in the pups with IVH unlike controls (P<0.05). MRI with DTI showed reduced fractional anisotropy in the white matter regions confirming white matter injury (P<0.05).

CONCLUSIONS: Preterm pups with IVH displayed post-hemorrhagic hydrocephalus, gliosis and reduced myelination as well as motor deficits. The study highlights an instructive animal model of the long-term consequences of IVH, which can be used to evaluate strategies in the prevention and treatment of post-hemorrhagic complications.

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Fellow in Training

10:30 AM

Early Postnatal Exposure to Hyperoxia Prolongs Time to Last Gasp in Response to a Lethal Anoxic Stimulus in Newborn Rat Pups

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BACKGROUND: Peripheral arterial chemoreceptors in the carotid body promote arousal from hypoxia during sleep. Hyperoxia during early postnatal development (PND) in newborn rats results in life-long ablation of hypoxic chemosensitivity. Furthermore, premature infants, who often are exposed to hyperoxia during early PND, show a higher risk for Sudden Infant Death Syndrome

OBJECTIVE: To determine the effect of hyperoxia on the time to last gasp in response to a single anoxic stimulus(SAS) & the adenosine (A_1R,$A_{2a}R$) and δ-opioid receptor (DOR) gene expression changes in brainstem & myocardium prior and in response to SAS at PND 9 & 10

DESIGN/METHODS: Time-dated Sprague-Dawley rats were exposed to hyperoxia($60\%O_2$) or room air($21\%O_2$) from 48h prior to delivery through PND 7. At PND 9 & 10, ventilatory physiological data from a subset of animals were obtained using a body plethysmograph in an age appropriate thermoneutral environment during exposure to lethal SAS ($95\%N_2/5\%CO_2$) while a second subset was not exposed to anoxia. Brain and heart were harvested to measure A_1R, $A_{2a}R$ and DOR mRNA changes by real-time RT-PCR

RESULTS: Hyperoxic animals took longer to expire in response to lethal SAS (n=5/group; p<0.05 vs. normoxia). Prior to SAS, A_1R and $A_{2a}R$ gene expression was significantly up-regulated over time (PND 10vs.9) in brainstem and myocardium from hyperoxic animals while DOR gene expression was down-regulated only in the myocardium (p<0.05, Mann-Whitney U vs normoxia). Independent PCR analysis at PND 9 and 10 demonstrated that prior to SAS, DOR expression was down-regulated in response to hyperoxia regardless of PND in both brainstem and myocardium while following lethal SAS, this gene was up-regulated in the brainstem though continue being down-regulated in the myocardium. Similar to DOR, A_1R and $A_{2a}R$ genes were significantly down-regulated in myocardium from hyperoxic animals regardless of SAS

CONCLUSIONS: Hyperoxic exposure prolongs the time to death from lethal SAS changing the adenosine and DOR gene expression in the brainstem and myocardium. We speculate that this "anoxic protection" may be similar to the protective responses that are induced by free radicals in paradigms of hypoxic preconditioning which changes these receptors

172 Fellow in Training

10:45 AM

Maturational Changes in Integrins in the Vasculature of Germinal Matrix, Cortex and White Matter

Krishna Dummula, Hongmin Xu, Caroline Chua, Govindaiah Vinukonda, Muhammad T. Zia, Praveen Ballabh.

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BACKGROUND: Several integrins, including α4β1, α5β1, αVβ1, αVβ3, αVβ5, and αVβ8, in collaboration with vascular endothelial growth factor (VEGF) orchestrate angiogenesis. Of these, α5β1 integrin plays a key role in vessel formation. An enhanced angiogenesis in the germinal matrix (GM) is associated with greater vulnerability of its vasculature to hemorrhage, and suppression of angiogenesis by VEGF inhibitors reduces both the severity and incidence of germinal matrix hemorrhage (GMH). While inhibition of VEGF-also a neurotropic factor-is attended by adverse neurological outcomes, suppression of integrins could be relatively safe and effective in attenuating GM angiogenesis for the prevention of GMH.

OBJECTIVE: To compare the expression of α4β1, α5β1, αVβ1, αVβ3, αVβ5, and αVβ8 integrins in the vasculature of GM, cortex and white matter for fetuses and premature infants of 16–40 wk gestational age; and to examine their maturational changes with the advancing gestational age.

DESIGN/METHODS: We measured protein and gene expression of these integrins in the GM, cortex and white matter of human fetuses (15-22 wks), premature (23-35 wks) and mature infants (36-40 wks). The protein expression was measured by immunohistochemistry and Western blot analysis; mRNA was assayed by real-time PCR. Only autopsy samples of <18h post-mortem interval were used for the study.

RESULTS: α5β1 protein expression was greater in the GM than in the cortex or white matter among fetuses ($P<0.05$), but not in premature and mature infants. α5β1 protein expression increased as a function of gestational age in the cortex and white matter, but not in the GM. Consistent with protein levels, gene expression for α5 (associates only with β1) was greater in the GM than in the other brain regions ($P<0.05$). Both gene and protein expression of αV were comparable among the 3 brain regions and did not change with advancing gestational age. Separate evaluation of αV integrin dimers, including αVβ3, αVβ5 and αVβ8, also showed that their protein expression was similar in the GM, cortex and white matter, and they did not change as a function of gestational age.

CONCLUSIONS: α5β1 integrin levels were higher in the GM than in the other brain regions of fetuses, but not of premature infants. The finding is consistent with reduction in GM angiogenesis in premature infants shortly after birth. We speculate that selective α5β1 inhibition may prevent GMH.

173 Fellow in Training

11:00 AM

White Matter Magnetic Resonance Spectroscopy (MRS) of Extremely Low Birth Weight (ELBW) Infants Is Similar to Term Infants

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BACKGROUND: White matter injury is prevalent in ELBW infants. MRS can be used to measure brain metabolites, quantify myelination and cell viability, but has not been extensively studied in ELBW infants.

OBJECTIVE: To compare white matter development of ELBW infants with term infants, and examine the effects of illness severity on white matter.

DESIGN/METHODS: After written consent, MRS was performed on infants enrolled in a prospective study of brain structure, motor development and learning in ELBW infants (<1 kg BW, recruited at 36 weeks postmenstrual age). A control group of term infants hospitalized for pneumonia or presumed sepsis was enrolled. Exclusion criteria in control group included: congenital anomalies, need for intubation, seizures, 5 minute Apgar <7, and hypoglycemia. MRS, using single voxel technique, was done on periventricular cortical white matter. Metabolites studied included: N-acetylaspartate (NAA), choline (Cho), and creatine (Cr). Score for neonatal acute physiology (SNAP) was used to quantify illness severity at birth. Statistical analysis included ANOVA, Pearson's correlation, and Mann-Whitney U test.

RESULTS: The preterm infants (n=10) were 25 ± 1.7 weeks gestation, BW 784 ±133 g. There were no differences in metabolite ratios between term infants and ELBW infants.

White Matter Metabolite Ratios (mean ± sd)

	Cho/Cr	NAA/Cr	NAA/Cho
Preterm Infants (n=10)	1.81 ± 0.3	0.96 ± 0.21	0.53 ± 0.1
Term Infants (n=3)	1.80 ± 0.3	0.96 ± 0.9	0.54 ± 0.03
p	0.95	0.98	0.92

In the preterm group, there were no correlations between Cho/Cr, NAA/Cr, and NAA/Cho with gestational age, birth weight or ventilator days. Ratios of these metabolites were similar in infants with (n=3) and without IVH. SNAP scores did not correlate with NAA/Cr or NAA/Cho, but had a strong inverse correlation with Cho/Cr ($r=-0.75$, $p=0.02$).

CONCLUSIONS: In our population, ELBW infants had similar white matter development as term infants based on MR spectroscopy metabolite levels. Gestation, birthweight, and IVH did not affect metabolite ratios. Our data are reassuring, suggesting similar rates of myelination in ELBW and term infants. Illness severity at birth, however, did negatively impact the Cho/Cr ratio, suggesting that increased illness may lead to a decrease in myelination in ELBW infants. (Funded by NIH HD051748)

174 Fellow in Training

11:15 AM

Effect of Hyperoxia on DNA Fragmentation in Neuronal Nuclei of the Cerebral Cortex of Newborn Piglets

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BACKGROUND: Previously we have shown that hyperoxia results in increased expression of proapototic proteins Bax and Bad in neuronal nuclei of the cerebral cortex of newborn piglets. We have also shown that hyperoxia induces increased activity of caspase-9 and caspase-3 in the cytosolic compartment. Studies have shown that increased caspase-3 activity may lead to increased fragmentation of nuclear DNA by activating caspase activated DNase (CAD).

OBJECTIVE: The present study tests the hypothesis that hyperoxia results in increased fragmentation of neuronal nuclear DNA in the cerebral cortex of newborn piglets.

DESIGN/METHODS: Nine newborn piglets were randomly assigned to normoxic [Nx, n=4] and hyperoxic groups [Hyx, n=5]. Normoxic piglets were exposed to an FiO_2 of 0.21 for 1 hr and hyperoxic exposed to FiO_2 of 1.0 for 1 hr. PaO_2 in the hyperoxic group was maintained at 400 mmHg while the Nx group was kept at 80 to 100 mmHg. Cerebral energy metabolism was documented by determining ATP and phosphocreatine (PCr) levels. Neuronal nuclei were isolated from the cerebral cortical tissue. DNA was isolated by phenol/chloroform/isoamyl-alcohol extraction method. Nuclear DNA was purified and its purity was checked at 260/280 nm to be > 1.8. DNA samples were separated by electrophoresis on 1% agarose gel and stained with ethidium bromide. Density of DNA bands was analyzed by imaging densitometry and expressed as absorbance (OD/mm^2).

RESULTS: ATP (μmoles/g brain) was 4.70± 0.36 in the normoxic and 4.90± 0.40 in the hyperoxic group (p=NS). PCr (μmoles/g brain) was 4.1± 0.3 in the normoxic and 4.0±0.4 in the hyperoxic group (p=NS). In the hyperoxic samples, multiple low-molecular-weight DNA fragments were present as a smear pattern ranging from 200 to 2,000 base pairs. Band density (OD/mm^2) of DNA fragments in Nx was 589±42 and increased to 1286±63 in Hyx ($p<0.05$ vs. Nx) group. The data show that during hyperoxia there is a significant increase in DNA fragmentation in the neuronal nuclei of newborn piglets.

CONCLUSIONS: We conclude that hyperoxia leads to increased DNA fragmentation in neuronal nuclei of the cerebral cortex of newborn piglets. Since hyperoxia results in increased activity of caspase-3, we propose that caspase-3 dependent activation of CAD leads to increased fragmentation of nuclear DNA during hyperoxia in the cerebral cortex of newborn piglets. (Funded by NIH-HD 20337 and NIH-R56-HD 38079).

175 Fellow in Training

11:30 AM

Astrocyte Phenotypic Changes Induced by Hyperoxia

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BACKGROUND: Prior studies have suggested that oxidative stress may injure the developing brain during neonatal exposure to hyperoxia. Studies have also suggested that astrocytes may play a role in these processes. Astrocytes provide structural scaffolding for neuronal networks and participate in neurogenesis, synaptogenesis, neurotransmitter consumption and release within the central nervous system (CNS). Exposure to various stimuli results in distinctive phenotypic changes referred to as astrogliosis. Astrogliosis is characterized by increased cell size, number and expression of glial fibrillary acidic protein (GFAP).

OBJECTIVE: Our objective is to determine if hyperoxia induces astrogliosis. Studies will also expand the definition of astrogliosis to include pathway-specific analysis of protein expression, secretion and elaboration of inflammatory mediators.

DESIGN/METHODS: Astrocyte cultures were prepared from newborn mouse brain (P1). Astrocytes were grown in culture until confluency was achieved. Cells were then exposed to hyperoxia (95% O_2, 5% CO_2) or room air (21% O_2, 5% CO_2) for 48 hours. Cells were harvested and analyzed for viability (n=6), protein expression (n=12) and cytokine secretion (n=22).

RESULTS: Astrocytes exposed to hyperoxia had significantly decreased viability compared to controls ($p<0.01$). Microscopic evaluation of the hyperoxia-exposed cells did not reveal significant morphologic differences compared to control cells. The levels of GFAP were not different between exposed and control cells. However, a significant increase in IL6 secretion was evident in the media of hyperoxia treated astrocytes ($p<0.05$).

CONCLUSIONS: Astrocytes ex vivo respond to the hyperoxic challenge by secretion of inflammatory mediators that may contribute to neonatal brain injury. Interventions aimed at decreasing inflammation may attenuate brain injury.

176 Fellow in Training

11:45 AM

Amplitude Electroencephalogram (aEEG) Findings in Infants with Broncho-Pulmonary Dysplasia (BPD)

Ross Sommers, Abbot Laptook.

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BACKGROUND: Infants with BPD are at risk for poor neurodevelopmental outcomes. Tests to determine which infants with BPD are at risk for poor outcome are needed.

OBJECTIVE: To determine if there are differences in the aEEG in infants with and without BPD.

DESIGN/METHODS: This is a cross sectional study of infants who were ≤ 27 gestational age (GA) at birth and did (n=10) or did not develop BPD (n=9). Infants with grade III/IV intra-ventricular hemorrhage, cystic peri-ventricular leukomalacia, and major anomalies were excluded. BPD was determined by a room air challenge test performed at 36^0-36^6 weeks. aEEG tracings were recorded at 36^0-36^6 weeks for 6 hours using the BrainZ BRM3. aEEG parameters from a cross cerebral channel were evaluated using offline software Analyze(BrainZ). Projected sample size is 15 infants per group. Demographic, perinatal, neonatal morbidities, and aEEG variables were compared between groups.

RESULTS: Infants with BPD had lower GA and birth weight, and a higher male predominance (25^0±0.9 weeks, 651±211 grams, 70%) compared to non-BPD infants (26^1±1.1 weeks, 833 ±165 grams, 25%, all p< 0.05). BPD infants had a longer duration of ventilation and more post-natal steroid use for blood pressure or ventilator dependence (45±22days, 70%) compared to non BPD (7±10 days, 0% all p< 0.01). There were no differences in race, culture positive sepsis, patent ductus arteriosus, necrotizing enterocolitis, or days to full feeds. At aEEG acquisition, BPD infants had lower weight, and a greater use of diuretics and caffeine (1680±474 grams, 40%, 60%) compared to non-BPD (2251±391 grams, 0%, 11%, all p<0.03) In between sleep wake cycles, BPD infants had a larger aEEG bandwidth (9.7±1.9 vs. 7.4±1.3 mcv, p< 0.01) and higher lower border voltage (8.8±0.9 vs. 7.8±0.7 mcv, p< 0.02) compared to non BPD infants. Increased inter-cycle bandwidth correlated with a higher lower border voltage, r^2=0.76, p<0.001. During sleep wake cycles BPD infants had larger bandwidth (15.4±2.7 vs. 12.2±2.1 mcv, p<0.01) but similar lower border voltage (6.2±0.9 vs. 6.0±1.1 mcv) compared to non BPD infants. There were no group differences for sleep wake cycles per hour or time with a discontinuous tracing.

CONCLUSIONS: Infants with BPD have differences in their aEEG tracings compared to infants without BPD at 36 weeks PMA. These differences may reflect altered brain maturation, gender effects, medication effects, or brain injury. Additional infants are needed to confirm these preliminary findings.

Pulmonary Development and Injury Platform Session

Sunday, March 15, 2009
9:45 AM-12:00 PM

177 Fellow in Training

9:45 AM

Impact of Gonadal Hormones on Surviving Klebsiella pneumoniae Infection after Ozone Exposure in Mice

Faryal Durrani, David S. Phelps, Judith Weisz, Joanna Floros.

Newborn Medicine, Penn State University, Hershey, PA; Pediatrics, Penn State University, Hershey, PA; Obstetrics and Gynecology, Penn State University, Hershey, PA.

BACKGROUND: Sex differences in disease susceptibility have been described in many pulmonary diseases from birth until adulthood. Many studies have shown an association between ozone (O_3), a strong oxidant, and lung injury. We have previously reported that preexposure to O_3 increases mortality after *Klebsiella pneumoniae (Kp)* infection in mice and this is more pronounced in female mice than male. We hypothesize that gonadal hormones are responsible for sex differences in susceptibility to infection and oxidative stress following O_3 exposure.

OBJECTIVE: 1) To determine whether gonadal hormones play a role in surviving Kp infection in mice following O_3 exposure, 2) To determine if differential survival between male and female mice can be reversed by hormone implants of 5a-dihydrotestosterone (5aDHT) in female and 17bEstradiol (E_2) in male mice.

DESIGN/METHODS: Normal female (NF) (n=100) and normal male (NM) (n=50) C57BL/6 mice (10wks old) were gonadectomized (GxF/GxM). The Gx mice are divided into 6 groups (n=25/group); (GxF + control pellets with FA/O_3, GxF + 5aDHT with FA/O_3, GxM + control pellets with FA/O_3). One wk after Gx control pellets or hormone pellets of the opposite sex (E_2 or 5αDHT) were implanted and 1 wk later mice were exposed to O_3 (2ppm; 3 hrs) or to filtered air (FA) and then infected intratracheally with *K p* (450CFU/mouse). Survival was monitored over 14 days; data analyzed by Kaplan-meier and Chi square tests.

RESULTS: 1) GxF mice show decreased survival pattern after Kp infection as compared to NF, when exposed to FA (p<0.02), but show improved survival after Kp infection when exposed to O_3 (p<0.02); (2) GxM mice show improved survival after O_3 exposure and infection as compared to NM (p<0.05); (3) GxF with 5aDHT implants have increased mortality as compared to untreated GxF after O_3 exposure and infection (p<0.05).

CONCLUSIONS: Gonadal hormones render mice more sensitive to oxidative stress caused by O_3 exposure and *Kp* infection. (1) E2 is protective towards infection alone but makes female mice more sensitive to *Kp* infection after O_3 exposure, (2) Male gonadal androgens increase sensitivity of mice to *Kp* infection and O_3 exposure, (3) GxF with 5αDHT have decreased survival pattern similar to NM after O_3 exposure. It would be interesting to determine whether gender has an effect on susceptibility to oxidative stress in the neonatal period. Supported by the NIEHS grant (1RO1 ES09882).

178 Fellow in Training

10:00 AM

The Effects of the Catalytic Antioxidant MnTBAP and Neonatal Hyperoxia on Airway Hyperresponsiveness (AHR) in Conscious Mice

Serguei Kishkurno, Robert C. Welliver, Sr, Karen H. Hintz, Huamei Wang, Rita M. Ryan, Vasanth H. Kumar.

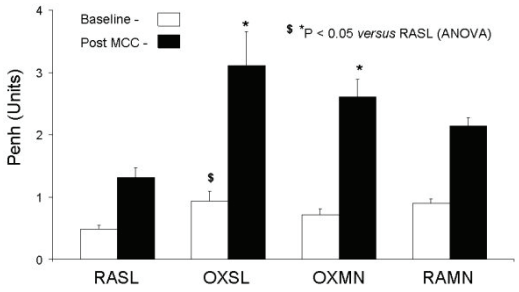
Department of Pediatrics, University at Buffalo, Buffalo, NY.

BACKGROUND: Prolonged exposure of newborn mice to O_2 leads to lung changes similar to infants with bronchopulmonary dysplasia (BPD). Many of these infants later have abnormalities of pulmonary function. Antioxidants such as MnTBAP have been found to be effective in various *in vivo* lung injury models in blocking oxidant stress.

OBJECTIVE: We hypothesized that early hyperoxia will increase later AHR and that treatment with MnTBAP during hyperoxia exposure will ameliorate AHR.

DESIGN/METHODS: On postnatal day 3 (P3), newborn mouse litters were randomized to 85% O_2 (OX) or room air (RA) for 12 days (P3-P14) during which litters were randomized to receive MnTBAP 10mg/kg/day (MN) or saline (SL) by daily intraperitoneal injection from P3 - P14. On P15 all animals were recovered in RA until 12wks of age. PFTs were then performed using whole body plethysmograph pre and post methacholine (MCC) challenge. Enhanced pause (Penh) was calculated as a measure of AHR. Results were analyzed by ANOVA.

RESULTS: At 12wks previously hyperoxia-exposed mice had higher AHR both at baseline and following methacholine challenge. MnTBAP did not ameliorate the effect of hyperoxia exposure on AHR at 12 weeks of age.



CONCLUSIONS: Exposure to hyperoxia in the newborn period predisposes to reactive airways in young adult mice. Infants with BPD are known to develop reactive airways disease and later onset asthma. Mechanisms leading to reactive airways disease following neonatal hyperoxia are not well understood.

179 House Officer

10:15 AM

Respiratory Function Parameters in the Peri-Surfactant Period Normalize Earlier with Increased Levels of Positive End Expiratory Pressure (PEEP) in the Sprague-Dawley Rat

Kristin J. McKenna, Joseph Hudak, Shetal Shah.

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BACKGROUND: While positive effects of exogenous surfactant on pulmonary compliance are well characterized, insight into functional respiratory changes occurring during the peri-surfactant period is not well known. This critical time, when rapid changes in lung function occur, can lead to both baro-& volu-traumatic effects. Previous studies showed increased airway resistance 5 min. after surfactant administration at PEEP 3 & 6cmH2O.

OBJECTIVE: The purpose of this study was to determine changes in pulmonary function during the post-surfactant period and determine the effect of increased PEEP on respiratory function.

DESIGN/METHODS: 40, paralyzed, Sprague-Dawley rat pups were administered surfactant or PBS control via surgical tracheostomy between post-natal age 10 & 12 days while mechanically ventilated. Measurements of resistance, compliance, tissue damping, elastance, eta (ratio of damping to elastance), were performed in triplicate at PEEP 3 & 6 at 1, 2, 5, 8, 12 & 15 min. 135 sets of pulmonary function tests were obtained. Pressure-volume curves were generated at each time point. Student's T-test was used for comparison at each interval.

RESULTS: At PEEP 3, statistical increases in compliance were observed within 8 min.(p<0.01). At PEEP 6, airway resistance remained elevated at 12 min.(p<0.01), but significantly lower by 8 min. at PEEP 3(p<0.05). Increased PEEP led to an earlier increase in tissue damping(2 min. vs. 8 min., p<0.01), earlier increase in elastance(5 min. vs. 8 min., p<0.05), & earlier alteration in eta (2 min. vs. 15 min., p<0.01). Time dependant PV loops demonstrated significant decreases in variability within 2 min. at PEEP 3(p<0.01) with normalization of curves at 5 min. At PEEP 6, variability in PV curves was decreased in the first 2 min. with normalization of curves by 2 min.

CONCLUSIONS: The peri-surfactant period is one of rapid, turbulent changes in respiratory function. Minute by minute changes occur in airway resistance, elastance, compliance, eta & tissue damping but normalize within 15 min. of surfactant administration. Administration of surfactant at higher PEEPs resulted in earlier normalization of respiratory parameters studied & decreased variability in observed PV curves.

180 Fellow in Training

10:30 AM

A Comparison of the Effects of Short Term CPAP or Mechanical Ventilation and Moderate Hyperoxia on Cultured Human Airway Epithelial Cells

Yan Zhu, Kevin Dysart, Thomas H. Shaffer, Aaron Chidekel.

Nemours Research Lung Center, Alfred I. duPont Hospital for Children, Wilmington, DE; Department of Pediatrics, Jefferson Medical College/Thomas Jefferson University, Philadelphia, PA; Departments of Physiology and Pediatrics, Temple University School of Medicine, Philadelphia, PA.

BACKGROUND: Continuous positive airway pressure (CPAP) is a lung protective ventilatory strategy employed in the treatment of critically ill neonates and children. Clinical studies show that CPAP is associated with lower mortality than intermittent mechanical ventilation (MV). Although CPAP can be lung protective, data regarding the mechanisms of protection such as inflammatory mediators and other outcomes are limited.

OBJECTIVE: To compare the effects of CPAP and MV on cultured human airway epithelial cell structure and function. We hypothesized that CPAP would induce less inflammation and cell injury in human airway epithelial cells compared to MV at equivalent levels of hyperoxia.

DESIGN/METHODS: Calu-3 monolayers were grown on transwell inserts at an air-liquid interface, establishing a baseline transepithelial resistance (TER) > 1000ohm-cm^2. Monolayers were placed in an air-tight chamber and exposed to CPAP (10 cmH_2O) or MV (20/5 cmH_2O, mean airway pressure=11 cmH_2O, RR= 40 br/m) and FiO_2=0.40. At 4 & 8hrs, TER measurements were repeated, apical washings (ASF) collected and cells harvested for histology (n=6/condition). ASF was assayed for total protein, IL-6 and IL-8 by ELISA. Data were analyzed across group and time (ANOVA).

RESULTS: TER decreased over time ($p<0.001$) in both CPAP and MV groups; at 4 hrs the TER for the MV group was greater than the CPAP group ($p<0.001$). There was no difference between groups at 8 hrs ($p>0.05$). Secretion of total protein increased over time in the MV group ($p<0.05$); there was no time effect for the CPAP group ($p>0.05$). At 4 and 8 hrs, the total protein for the MV group was greater than that of the CPAP group ($p<0.05$). IL-6 in the CPAP group was greater than the MV group at 8hrs ($p<0.05$), but there was no difference at 4 hrs. The secretion of IL-8 at 8 hrs for the MV group was greater than that of the CPAP group ($p<0.05$). Semi-quantitative assessment of morphology showed less evidence of injury for the CPAP group at 8 hrs ($p<0.05$); but both groups demonstrated increasing evidence of injury over time.

CONCLUSIONS: In this model of human airway epithelial cells, both CPAP and MV resulted in detrimental cell function and inflammatory indices. CPAP was less injurious as indicated by monolayer histology, TER and the secretion of total protein and the inflammatory mediators IL-6 and IL-8, thus supporting a mechanism for clinical outcomes. Supported By: NIH COBRE: 1 P20 RR020173-03.

181 Fellow in Training

10:45 AM

Nitric Oxide Inhibits NF-κB Activation in Human Neonatal Pulmonary Endothelial Cells Exposed to Hyperoxia

Clyde J. Wright, Tiangang Zhuang, Ping La, Guang Yang, Phyllis A. Dennery.

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BACKGROUND: Randomized trials have shown nitric oxide (NO) prevents bronchopulmonary dysplasia in some infants. The reason for this partial efficacy is unknown. The transcription factor NF-κB regulates the cellular response to inflammatory and oxidant stress, and NO inhibits NF-κB activation in adult pulmonary endothelial cells. The effect of NO and concomitant oxidant stress on NF-κB activity in the newborn lung remains unknown.

OBJECTIVE: Using neonatal human lung microvascular endothelial cells, we sought to evaluate the effect of NO plus hyperoxia on NF-κB activity, and measure the impact on cell proliferation and survival.

DESIGN/METHODS: Neonatal human lung microvascular cells were exposed to 4/8/24hrs hyperoxia(O2, >95%), nitric oxide(NO, 20 ppm), or NO and O2(NO/O2). Cytosolic IκBα and nuclear PCNA were determined by Western analysis. Nuclear protein NF-κB consensus sequence binding was evaluated by electrophoretic mobility shift assay (EMSA). QPCR for IκBα was performed after 8 hr exposure. Apoptosis was evaluated by measuring caspase-3 activity and cell death by trypan blue exclusion. Experiments were performed in duplicate and repeated 3 times.

RESULTS: Both O2 and NO/O2 exposed cells showed significantly decreased IκBα at 4 hrs exposure($p<.001$ vs control), whereas only NO/O2 exposed cells maintained 1.6 fold lower levels through 24 hrs($p<.001$ vs control and O2). There was no difference in IκBα mRNA between groups. With hyperoxia, nuclear NF-κB consensus sequence binding was significantly decreased at 4 hrs(vs control, $p<.001$) and returned to baseline by 8 hrs. In contrast, NO/O2 exposure resulted in significantly decreased binding by 4 hrs(vs control, $p<.05$), which remained significantly decreased through 24 hrs(vs O2 and control, $p<.001$). No difference in caspase-3 activity was seen between groups. Cells treated with NO/O2 had a 2-fold increase in trypan blue positive staining cells (vs control and O2). Nuclear levels of PCNA were significantly decreased in NO/O2 compared to hyperoxic exposure and controls($p<.05$).

CONCLUSIONS: Nitric oxide decreases NF-κB activity in neonatal pulmonary endothelial cells exposed to hyperoxia. This inactivation results in increased cell death and decreased markers of cellular proliferation. We hypothesize that through the formation of reactive oxygen and nitrogen species, nitric oxide and oxygen together inhibit NF-κB activity and may obviate the potential benefit of NO treatment.

182 Fellow in Training

11:00 AM

The Genetic Susceptibility to Respiratory Distress Syndrome (RDS)

Orly L. Levit, Yuan Jiang, Matthew Bizzarro, Naveed Hussain, Catalin Buhimschi, Jeffrey Gruen, Heping Zhang, Vineet Bhandari.

Pediatrics, Yale University School of Medicine, New Haven, CT; Epidemiology and Public Health, Yale University School of Medicine, New Haven, CT; Pediatrics, University of Connecticut School of Medicine, Farmington, CT; Obstetrics and Gynecology, Yale University School of Medicine, New Haven, CT.

BACKGROUND: Although RDS is primarily a disease of prematurity, characterized by surfactant deficiency, not all preterm neonates are affected. Previous studies attempting to identify a genetic component to RDS have shown conflicting results (heritability of 20 to 82%). We propose that using a larger sample size and being comprehensively inclusive of known environmental factors would identify a significant genetic contribution to RDS.

OBJECTIVE: To conduct a retrospective study of premature twins to evaluate and quantify the genetic contribution to RDS.

DESIGN/METHODS: Data from twins born at $\leq$ 32 weeks gestational age from 2 neonatal intensive care units in Connecticut were used. RDS was defined as the presence of respiratory distress with an oxygen requirement in the first six hours of life, accompanied by a characteristic chest radiograph. Zygosity was determined by placental histology and gender concordance. Mixed effect logisitic regression (MELR) was used to assess the influence of several independent covariates on the development of RDS. Zygosity analysis, including the effects of additive genetic and common and residual environmental factors (ACE model), was then performed to estimate the genetic contribution to RDS.

RESULTS: The 332 twin pairs (70 monozygotic and 262 dizygotic) had a mean gestational age of 29.5 weeks and birth weight of 1372 grams. MELR determined that male gender ($p=0.04$), birth weight ($p<0.001$), 5-minute Apgar score ($p<0.001$), and treating institution ($p=0.001$) were significant predictors for RDS. Using the ACE model to adjust for the significant non-genetic covariates revealed that 49.7% ($p=0.04$) of the variance in liability to RDS was the result of genetic factors alone.

CONCLUSIONS: There is a strong genetic susceptibility to the development of RDS in preterm infants.

183 Fellow in Training

11:15 AM

Incidence of Respiratory Distress Syndrome (RDS) among Term and Late Preterm (LPT) Neonates

Sean M. Bailey, Karen Hendricks-Munoz, Nicole Allen, Julie Ahn, Pradeep Mally.

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BACKGROUND: LPT neonates are at high risk for RDS (Bailey et al. E-PAS2008:4456.23). However, there is little information on this risk to term neonates. We hypothesize that there is a difference in the incidence of RDS between term neonates of different gestational age, and between term and LPT neonates.

OBJECTIVE: To determine the difference in the rates of RDS and necessary treatments between a)term neonates of varying gestational ages admitted to the NICU b)term neonates when compared to LPT neonates admitted to the NICU.

DESIGN/METHODS: Retrospective chart review of inborn term neonates admitted to the NICU at NYU during a 16 month period.Neonates with CHD, genetic disorders;birth asphyxia were excluded.Patient data was also compared to previously collected statistics on LPT neonates admitted during the same time period.Data were analyzed using chi square, one-way ANOVA; odds ratio analysis.P values< 0.05 were significant.

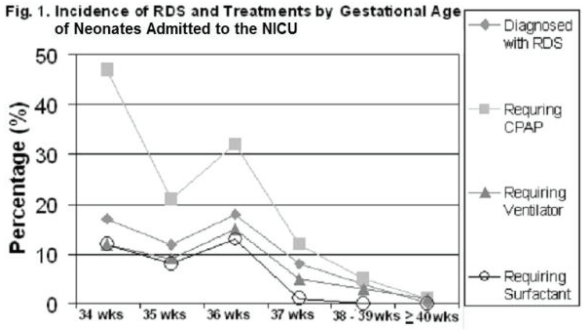
RESULTS:

Respiratory Diagnoses & Interventions in Term Neonates Admitted to the NICU

Diagnosis/ Intervention	37 0/7-37 6/7 Wks n=76	38 0/7-39 6/7 Wks n=133	> 40 0/7 Wks n=94	p value
RDS	8%	4%	0	**0.03**
TTN	21%	19%	6%	**0.03**
NC	34%	37%	19%	NS
CPAP	12%	5%	1%	**0.02**
Ventilator	5%	3%	1%	NS
Surfactant	1%	0	0	NS

Respiratory Diagnoses & Interventions in LPT v. Term Neonates Admitted to the NICU

Diagnosis/ Intervention	LPT	Term	OR (95% CI)
RDS	23.2%	3.6%	**8.0 (3.9-16.5)**
TTN	19.6%	15.5%	1.3 (0.8-2.2)
NC	35.5%	30.7%	1.2 (0.8-1.9)
CPAP	34.8%	5.6%	**9.0 (4.9-16.4)**
Ventilator	13.0%	3.0%	**4.9 (2.1-11.2)**
Surfactant	12.3%	0.3%	**42.2 (5.6-322.4)**



CONCLUSIONS: When admitted to the NICU,LPT neonates have higher rates of RDS and required treatments than term neonates.Those neonates considered just term (37ks GA) had higher rates of RDS and respiratory support than other term neonates.Perhaps neonates of 37 weeks GA should be considered LPT,and treated as such.Further studies are needed to validate this point.

184

11:30 AM

Effects of Oscillatory Amplitudes on Respiratory Mechanics of Preterm Infants during High Frequency Oscillatory Ventilation

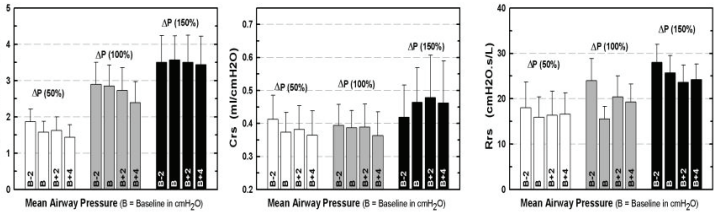
Rachana Singh, Sherry E. Courtney, Mike Weisner, Robert H. Habib.
Division of Newborn Medicine, Baystate Children's Hospital, Springfield, MA; Division of Neonatology, Stonybrook University Medical Center, Stonybrook, NY; Yvonne Viens, SGM , Research Institute, Saint Vincent Mercy Medical Center, Toledo, OH.

BACKGROUND: The mean airway pressure (Paw) during High Frequency Oscillatory Ventilation (HFOV) determines the underlying lung volume and consequently the respiratory mechanics. How the set pressure amplitudes (ΔP), which primarily define oscillatory tidal volumes (VT), modulate mechanical properties during HFOV is less clear.

OBJECTIVE: To derive, in very low birth weight (VLBW) infants, the effects of varying ΔP on respiratory system Resistance (Rrs) and Compliance (Crs) as determined using the impedance method.

DESIGN/METHODS: We studied 11 infants [0.41-1.26 kg; gestational age:24-29 wks; age (mean)=4.6 days] intubated with 2.5 mm TT with a tracheal pressure (Ptr) port. HFOV (Sensormedics 3100A) settings were Paw (6-12 cmH_2O), ΔP (10-26 cmH_2O), frequency (F=10-15 Hz); I:E ratio (1:2) and FiO_2 (0.21-0.5). Proximal TT Flow was measured continuously along with Ptr (500 Hz). Signals were high-pass filtered at F-5Hz. VT was computed by integration of flow. Measurements were repeated at four Paw settings: Baseline minus 2cmH_2O (B-2) followed by B, B+2 and B+4. At each Paw, ΔP was started at the infant's baseline value (100%ΔP; 5 min) than varied to 50%ΔP and 150%ΔP in random order (1-2 min).

RESULTS: Oscillatory VT [Fig (Left); P<0.001] increased systematically at higher ΔP settings with little Paw effects.



Compliance [Crs; Fig (middle)] and Resistance [Rrs; Fig (Right)] were not significantly influenced by Paw. Alternatively, Crs was increased for 150%ΔP compared to lower amplitudes (P<0.05). Also, a trend for higher Rrs values as ΔP was increased particularly for 150%ΔP [P<0.05 vs. 50%ΔP].

CONCLUSIONS: HFOV estimated respiratory mechanical properties vary appreciably with pressure amplitudes (or equivalently VT). The fact that a higher Crs (better) was coupled to a higher Rrs (worse) as ΔP was increased underscore the need to determine these mechanical properties when optimizing HFOV settings in infants - particularly in unstable VLBW infants with a significant disease process.

185

House Officer

11:45 AM

Predictors of Survival in Patients with Congenital Diaphragmatic Hernia (CDH) Requiring Extracorporeal Membrane Oxygenation (ECMO): CNMC 15 Year Experience

Suma Bhat, An Nguyen-Massaro, Cynthia Gingalewski, Billie Lou Short.
Pediatrics, Childrens National Medical Center, Washington, DC; Neonatology, Childrens National Medical Center, Washington, DC; Surgery, Childrens National Medical Center, Washington, DC.

BACKGROUND: Despite advances in technology, mortality remains high in patients with CDH requiring ECMO life support. Reliable predictors of survival in this high-risk population have not been well described.

OBJECTIVE: To review outcomes of patients with CDH requiring ECMO at a level IIIC NICU and to determine if pre-ECMO respiratory status can help predict mortality.

DESIGN/METHODS: A single-center retrospective chart review was conducted on all infants with CDH treated with ECMO in the past 15 years. Demographic and clinical information, including pre-ECMO ventilatory and blood gas data, were collected. Differences between survivors and non-survivors were evaluated using independent samplesT/ Mann-Whitney U and Fisher-Exact/ Chi-square tests for continuous and categorical data respectively. Cox Regression Analysis was performed to evaluate predictors of survival while controlling for covariates. Significant predictors were further explored with receiver operating curve (ROC) and Kaplan-Meier survival analysis.

RESULTS: Overall survival of the population of 62 patients treated with ECMO was 50%. Survivor and non-survivors were similar in birth weight, gestational age, gender, race, and Apgar scores. Approximately 80% of patients in both groups had a left sided defect. Less than 25% of patients were prenatally diagnosed in either group. More patients in the group that died had associated anomalies (42% vs 23% for survivors) but this was not statistically significant (p=0.303). Non-survivors were more likely to be put on ECMO earlier, stay on ECMO longer, and be repaired later. On pre-ECMO blood gas analyses, survivors had higher pH and PaO2, and lower oxygenation index and PaCO2 compared to non-survivors. After controlling for covariates, a lower minimum PaCO2 was the only independent predictor of survival (p=0.015). ROC curve for minimum pre-ECMO PaCO2 had a significant area under the curve (AUC =0.72, p=0.003). Survival was 27% in babies unable to achieve a pre-ECMO PaCO2 <60mmHg whereas no patients survived if their lowest pre-ECMO PaCO2 was >70mmHg.

CONCLUSIONS: Minimum achievable pre-ECMO PaCO2 is an independent predictor of survival in patients with CDH requiring ECMO life support. These data provide useful prognostic information for counseling families and may facilitate direction of care in extreme cases where the degree of pulmonary hypoplasia may be incompatible with life.

Developmental Biology II
Platform Session

Sunday, March 15, 2009
9:45 AM-12:00 PM

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9:45 AM

Noonan Syndrome-Causative *PTPN11* Mutations Induce Long-Term Memory Defects in Transgenic *Drosophila* Models

Mario R. Pagani, Kimihiko Oishi, Bruce D. Gelb, Yi Zhong.
Pediatrics, Mount Sinai School of Medicine, New York, NY; Cold Spring Harbor Laboratory, Cold Spring Harbor, NY.

BACKGROUND: Gain-of-function (GOF) mutations in *PTPN11*, encoding SHP-2, cause Noonan syndrome (NS), a genetic disorder with developmental delay. We previously generated transgenic fruit flies expressing GOF mutations in corkscrew (CSW), the *Drosophila* SHP-2 orthologue. *Drosophila* has different forms of memory including short-term, medium-term, anesthesia-resistant (ARM) and long-term (LTM). 24-h memory comprises ARM and LTM with the latter induced by spaced learning and requiring protein synthesis for its induction.

OBJECTIVE: To characterize the effects of GOF CSW mutants on *Drosophila* memory formation.

DESIGN/METHODS: Transgenic flies expressed wild type (WT) or GOF mutant *csw* driven by a mushroom body-specific driver, *OK107-GAL4*, or a heat shock-inducible driver, *hs-GAL4*. Flies were trained using odor and foot shock association learning procedures, and performance scores were obtained immediately after single-session training or 24 h after spaced training consisting of ten repetitions with 15-min rest intervals between trials. Immunoblots were performed with anti-phosphoERK antibody.

RESULTS: Expression of the GOF mutant *csw* transgenes in mushroom bodies did not affect immediate memory but significantly impaired 24-h memory formation (average performance scores of 30 vs. 40 for WT or WT transgenic flies; p<0.05). When the GOF transgenes were first expressed in adulthood through heat shock induction, comparable 24 h-memory defects were observed. Decay of training-elicited ERK activation was significantly slower in flies expressing GOF mutant alleles compared to WT or WT transgenic flies. 24-h memory in flies expressing GOF CSW was unchanged when protein synthesis was inhibited with cycloheximide and was comparable to WT flies after massed training, showing that the 24-h memory deficit was in LTM and not ARM. This LTM defect was rescued by inhibiting CSW pharmacologically (NSC-87877 50 μM) or by extending the rest intervals during spaced training from the normal 15 min to 30-40 min.

CONCLUSIONS: GOF *csw* mutations induce LTM defects, which are not fixed during early development. These effects on LTM formation appear to be mediated through prolonged activation of the Ras/MAPK pathway after training. Our results suggest that cognitive deficits in NS patients might be treatable, either through use of a SHP-2 inhibitor or implementation of novel educational interventions with longer spacing between repetitive lessons.

187 Fellow in Training

10:00 AM

Redundant Pathways for Aversive Memory Consolidation

Melissa Murray, Ming Ouyang, Steven Thomas.

Pediatrics, Children's Hospital of Philadelphia, Philadelphia, PA; Pharmacology, University of Pennsylvania School of Medicine, Philadelphia, PA.

BACKGROUND: Ex-preterm infants can have altered auditory recognition memory. Auditory memories formed during stress confer an advantage. In general, long-term memories form via consolidation of short-term memory, and neurotransmitters (NT) regulate this process. Studies suggest that consolidation of aversive auditory memory may occur in the basolateral nucleus of the amygdala (BLA) and norepinephrine/epinephrine (NE/E) may be required. However, mice genetically deficient in NE/E maintain aversive memory formation. In contrast, mice partially deficient in both NE and dopamine (DA) have moderate memory deficits.

OBJECTIVE: To determine if NE/E and DA act redundantly in the BLA during aversive auditory memory consolidation.

DESIGN/METHODS: Pavlovian fear-conditioning was used to examine memory consolidation of an auditory cue paired with foot-shock. To determine which NTs and receptors affect consolidation, receptor antagonist or saline was systemically injected after conditioning. To test where consolidation occurs, either saline or a combination of receptor antagonists was injected directly into the BLA. Mice were tested the following day by re-exposure to the cue in a novel environment. Memory was assessed by examining freezing behavior, a natural fear reaction in rodents.

RESULTS: Mice lacking NE/E froze significantly less when injected with a DA D_1/D_5 receptor antagonist versus saline. When given a D_1/D_5 antagonist, mice lacking the β_1-adrenergic receptor froze similarly to controls, but mice lacking the β_2-adrenergic receptor froze significantly less. When given a β_2 antagonist, mice lacking the D_5 receptor froze significantly less than controls, whereas mice lacking the D_1 receptor did not. Wild-type mice given both a β_2 and D_1/D_5 antagonist showed decreased freezing compared to those treated with saline or either antagonist alone. When both a β_2 and D_1/D_5 antagonist were injected into the BLA, wild-type mice froze significantly less than mice injected with saline or either antagonist alone.

CONCLUSIONS: DA and NE/E are both involved in the consolidation of aversive auditory memories. NE/E appear to signal through the β_2 receptor, while DA uses the D_5 receptor. In addition, NE/E or DA is sufficient for this type of memory consolidation, i.e. they act in a redundant manner. Moreover, this process appears to occur in the BLA. These results add to the basic mechanisms of memory formation that may be relevant in understanding memory disorders related to premature birth and post-traumatic stress disorder.

188 Fellow in Training

10:15 AM

Mechanism of Cyclic AMP Response Element Binding (CREB) Protein Phosphorylation during Hypoxia in the Cerebral Cortex of Newborn Piglets

Gabriela I. Mihalache, Qazi M. Ashraf, Om P. Mishra, Maria Delivoria-Papadopoulos.

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

BACKGROUND: Previously we showed that hypoxia results in increased neuronal nuclear Ca^{++}/calmodulin-dependent protein kinase IV (CaM KIV) activity and phosphorylation of CREB protein. Activation of CaM kinase IV by EGFR kinase during hypoxia may result in increased phosphorylation of CREB protein. We have also shown that the activity of epidermal growth factor receptor (EGFR) kinase is increased during hypoxia in the cerebral cortex of newborn piglets. Studies have shown that tyrosine phosphorylation by EGFR kinase results in alteration of protein functions.

OBJECTIVE: The present study tests the hypothesis that increased activation of CaM kinase IV during hypoxia is mediated by EGFR kinase. To test this hypothesis we administered a highly selective inhibitor of EGFR kinase to block the CaM kinase IV mediated CREB phosphorylation in the neuronal nuclei of the cerebral cortex of hypoxic newborn piglets.

DESIGN/METHODS: Piglets were divided in three groups: normoxic (Nx, FiO_2 0.21, n=5), hypoxic (Hx, FiO_2 0.07 for 60 min, n=5) and hypoxic-treated with EGFR kinase inhibitor (Hx+EGFR i, n=5). The Hx+EGFR i group received EGFR kinase inhibitor, 1mg/kg, I.V., 30 min prior to hypoxia. Tissue hypoxia was confirmed by levels of ATP and phosphocreatine (PCr). Neuronal nuclei were isolated from cortical tissue. Nuclear proteins were separated by 10% SDS-PAGE and probed with anti-p-Ser^{133}-CREB protein antibody. The band density was analyzed by densitometry and expressed as absorbance (ODxmm^2).

RESULTS: ATP levels (µmoles/g brain) were 4.35±0.2 in Nx, 1.43±0.3 in Hx and 1.73±0.33 in Hx+EGFR i groups ($p< 0.05$ Nx vs Hx and Hx+EGFR i). PCr levels (µmoles/g brain) were 3.8±0.3 in Nx, 0.96±0.2 in Hx and 1.09±0.4 in Hx+EGFR i ($p<0.05$ Nx vs Hx and Hx+EGFR i). Ser^{133} phosphorylated CREB protein (OD x mm^2) was 86.28± 3.5 in Nx, 152.25±19.3 in Hx ($p<0.05$ vs. Nx) and 97.54±5.7 in Hx+EGFRi group. The data show that administration of EGFR kinase inhibitor prevents the hypoxia-induced increase in CREB protein phosphorylation.

CONCLUSIONS: We conclude that the mechanism of hypoxia-induced increased phosphorylation of CREB is mediated by EGFR kinase. We speculate that EGFR kinase dependent activation of CaM kinase IV during hypoxia results in increased phosphorylation of CREB that triggers transcription of proapoptotic proteins. (Funded by NIH-R56-HD 38079 and NIH-HD 20337).

189 Fellow in Training

10:30 AM

Mechanism of Apaf-1 Expression Following Hyperoxia in the Cytosolic Fraction of the Cerebral Cortex of Newborn Piglets

Subhasri Sangam, Alan Zubrow, Om P. Mishra, Maria Delivoria-Papadopoulos.

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

BACKGROUND: Previous studies have shown that apoptotic protease activating factor-1 (Apaf-1) binds with procaspase-9 and results in its activation to caspase-9, an initiator of programmed cell death. We have previously shown that hyperoxia results in increased influx of nuclear Ca^{++} leading to increased calcium/calmodulin kinase IV (CaM kinase IV) activity that triggers transcription of proteins by phosphorylating cyclic-AMP response element binding (CREB) protein. We have also shown that hyperoxia results in increased expression of Apaf-1 in the cerebral cortex of newborn piglets.

OBJECTIVE: The present study tests the hypothesis that hyperoxia-induced increased expression of Apaf-1 is nuclear Ca^{++}-influx -dependent. To test this hypothesis we administered a specfic inhibitor of high affinity Ca^{++}-ATPase, Clonidine, to prevent the hyperoxia-induced increased expression of Apaf-1.

DESIGN/METHODS: Studies were conducted in 16 newborn piglets, 5 normoxic (Nx), 6 hyperoxic (Hyx FiO_2 of 1.0 for 1 hr) and 5 clonidine-treated hyperoxic (Hyx-Clo) piglets. PaO_2 in hyperoxic piglets was maintained at 400 mmHg while the normoxic group piglets were kept at 80 to 100 mmHg. Cytosolic fractions were isolated from the cerebral cortical tissue and cytosolic proteins separated by 12% SDS-PAGE. The proteins were transblotted and probed with a specific anti-Apaf-1 antibody. The protein bands were visualized with enhanced chemiluminescence, analyzed by imaging densitometry and band density expressed as absorbance (OD x mm^2).

RESULTS: The density of Apaf-1 protein in the cytosolic fraction was (OD x mm^2) 52.1 ± 4.8 in the normoxic group, 124.8 ± 25.4 in the hyperoxic group ($p< 0.05$ vs. Nx and Hyx+Clo) and 75.3 ± 6.3 in the Hyx+Clo group. The results show that pretreatment with clonidine prevents the hyperoxia-induced increased expression of Apaf-1 protein in the cytosolic fraction of the cerebral cortex of hyperoxic piglets.

CONCLUSIONS: Since administration of a high affinity Ca^{++}-ATPase prevented the hyperoxia induced increased expression of Apaf-1 protein, we conclude that the increased expression of Apaf-1 protein during hyperoxia is nuclear Ca^{++}-influx dependent. We speculate that increased Apaf-1 expression during hyperoxia leads to increased activation of caspase-9 in the cerebral tissue. (Funded by NIH-HD20337 and NIH-R56-HD38079).

190

10:45 AM

In Vivo Metabolic Flux Profiling in *C. elegans* Mitochondrial Mutants

Marni J. Falk, Meera Rao, Julian Ostrovsky, Evgueni Daikhin, Ilana Nissim, Itzhak Nissim, Marc Yudkoff.

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

BACKGROUND: Primary mitochondrial respiratory chain disease represents a heterogeneous group of disorders characterized by dysfunction of high energy tissues. Diagnosis is complicated by the absence of a biomarker that sufficiently divulges all cases.

OBJECTIVE: We hypothesized that primary mitochondrial disease causes secondary alterations in global metabolic flux. We sought to determine whether stable isotopic/mass spectrometric study of precursor-product relationships in a simple model animal, *C. elegans,* could discern *in vivo* metabolic flux differences among a variety of mitochondrial disorders.

DESIGN/METHODS: Classical C. *elegans* mutants studied harbor nuclear mutations in components of the mitochondrial respiratory chain (complex I, II, and III subunits), pyruvate metabolism (*pdha1*), the tricarboxylic acid cycle (*idh-1*), and branched-chain amino acid catabolism (*pcca-1*). Mutants are fed standard E. coli on agar plates containing 10 mM universally-labeled ^{13}C-glucose throughout their 3-day developmental period to assure sufficient isotopic incorporation into their ~959 cells. Whole worm aliquots of 2,000 young adults are then subject to perchloric acid extraction. Metabolite analysis is performed by HPLC for free amino acid quantitation, and GC/MS for organic acid isotopic profiling. Amino acid levels are normalized to total worm protein. Validation is performed by ^{13}C-pyruvate profiling of mitochondria isolated from each strain.

RESULTS: *In vivo* metabolic flux analysis demonstrates significant differences between primary respiratory chain and TCA cycle dysfunction. In comparison to wildtype (N2) animals, only the mitochondrial complex I mutant (*gas-1*) has a dramatic elevation in labeled alanine and decrease in labeled glutamate. In contrast, the TCA cycle mutant (*idh-1*) demonstrates modest elevations of both labeled alanine and glutamine, but normal levels of labeled glutamate. Additional mutant analyses are in progress.

CONCLUSIONS: We demonstrate that *C. elegans* is a robust system in which to assess *in vivo* metabolic consequences of primary mitochondrial disease. Importantly, stable isotopic/mass spectrometric analysis applied to this model offers a sensitive means of discriminating respiratory chain dysfunction from other mitochondrial enzyme deficiencies. This work suggests that metabolic flux analysis may offer a minimally-invasive means of diagnosing mitochondrial dysfunction in humans.

191 Ph.D. Student

11:00 AM

How Do Gestational Age and Gender Affect miRNA Expression Profiles in Developing Lung?

Sana Mujahid, MaryAnn V. Volpe, Heber C. Nielsen.

Cell, Molecular and Developmental Biology, Tufts University, Boston, MA; Newborn Medicine, Tufts Medical Center, Boston, MA.

BACKGROUND: MicroRNAs (miRNAs) play important roles in regulation of many biological processes, including organ morphogenesis and maturation with recent direct links between miRNAs, development and disease. Dicer, a key enzyme in miRNA processing is necessary for normal airway branching morphogenesis. However, little is known about the mechanistic role of miRNA regulation of lung development.

OBJECTIVE: Test the hypothesis that the miRNA expression profile during pseudoglandular to saccular stage fetal lung development is gestation- and gender-dependent.

DESIGN/METHODS: We used TLDA low density real time qRT-PCR arrays (Applied Biosystems) to profile the known mouse miRNA genome (376 miRNAs) in male and female fetal mouse lungs of gestational days E15-E18, an interval spanning the transition from late pseudoglandular to early saccular stage with the development of surfactant synthesis.

RESULTS: miRNA expression patterns were different in males and females. In males, most miRNA species increased between E15 and E16, then decreased on E17 to near E15 levels, followed by an increase on E18. The female expression profile was more heterogeneous compared to males. The majority were shifted one day earlier, i.e. decreased from E15 to E16, increased at E17, then decreased at E18. A subset followed the male pattern. Finally, select few miRNAs had unique profiles in males and females of continued increase or decrease in expression with advancing gestation. Evaluating these patterns could predict potential important molecular targets (TargetScan).

CONCLUSIONS: miRNAs are differentially regulated during development and between sexes. Differential miRNA expression by gender may regulate the gender differences in structural and functional development. Our data provide a valuable resource to further enhance the understanding of miRNA control of lung development and lung maturation.

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11:15 AM

Function of microRNAs in Human Fetal Lung Epithelial Cell Differentiation

Tiangang Zhuang, Linda Gonzales, Qing S. Lin.

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

BACKGROUND: Arrested lung development with incomplete pulmonary cell differentiation significantly contributes to the pathophysiology of BPD. Better understanding of pulmonary type II cell differentiation will provide insights for the mechanism of BPD pathogenesis and novel therapeutic strategy. Recent studies have indicated that microRNA (miRNA) plays critical roles in normal development and human diseases. We hypothesize that specific miRNAs are involved in the gene regulation network to control lung epithelial cell differentiation.

OBJECTIVE: To investigate the miRNA expression profile during human fetal lung (HFL) epithelial cell differentiation and conduct a forward genetic screen to identify miRNAs that promote or inhibit HFL cell differentiation.

DESIGN/METHODS: Lung epithelial cells were isolated from second trimester human fetal lung and cultured for 72hrs in serum-free medium alone or with dexamethasone/8-Br-cAMP/isobutylmethylxanthine (DCI) to induce Type II cell differentiation. Multiplex RT and TaqMan Human MicroRNA Array v1.0 (ABI) were used to study the miRNA expression profiles. Thirty lung-expression human miRNAs were over-expressed by a lenti-viral vector. HFL cells were isolated, infected with miRNA expressing lenti virus, treated with DCI- (or control) medium for 72 hrs, and harvested for type II cell marker gene expression analysis. We used type II cell specific surfactant protein B (SP-B) gene as our primary marker for type II cell differentiation.

RESULTS: 1. microRNA expression profile during human fetal lung differention. Among the 365 miRNAs in the array, 116 have detectable expression in HFL cells. We have also identified miRNAs with differential expression levels in DCI vs. control medium treated cells. 2. Forward genetic screen to identify microRNA functions during human fetal lung differentiation. We have identified several miRNAs that caused either up- or downward changes of SP-B induction. For example, in miR-20 infected cells, SP-B induction was reduced to 6.2 fold, compared to 87 fold induction with control vector, suggesting that miR-20 might inhibit type II cell differentiation.

CONCLUSIONS: microRNAs are differentially expressed and functional important during human fetal lung epithelial differentiation. Our pilot screen also demonstrated the feasibility of the over-expression screen to identify miRNAs either inhibit or promote HFL cell differentiation.

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11:30 AM

Characterization of the Lung Mesenchyme-Specific Dermo-1Cre Conditional PTHrP Knock out Phenotype

Ding Wei, Shi Wei, Virender K. Rehan, John S. Torday.

Department of Surgery, Children's Hospital of Los Angeles, Los Angeles, CA; Department of Pediatrics, Harbor-UCLA Medical Center, Torrance, CA.

BACKGROUND: Parathyroid Hormone-related Protein (PTHrP) is necessary for the epithelial-mesenchymal interactions that generate lung alveoli (Rubin et al 2004). Epithelially-derived PTHrP is necessary for the differentiation of adepithelial fibroblasts into lipofibroblasts; mesenchymally-derived PTHrP is also necessary, since the mesenchymally-specific knock out results in failed alveolarization, though this mechanism of action has not been determined.

OBJECTIVE: To determine the role of mesenchymally-derived PTHrP in lung development, specifically knocking it out in the mesenchyme by targetting Dermo-1.

DESIGN/METHODS: PTHrP was specifically knocked out in the mesenchymal compartment of the developing mouse lung using Dermo-1Cre. Gross effects on lung development were recorded. Cellular effects were determined by histology, immunohistology and quantitative morphometry. Expression of candidate genes was determined by RT-PCR. Statistical differences between wild-type and knock out lung were determined by one-way ANOVA and Neuman-Keuls post-hoc analysis .

RESULTS: Specifically knocking PTHrP out in the mesenchymal compartment of the developing mouse lung had no effect prenatally, but starting at postnatal (P) day 3 there was a 53% decrease in wet lung weight in association with decreased alveolar development and alveolar hyperinflation by gross inspection, and by light microscopy.These effects were associated with significant ($n=4$, $p \leq 0.05$) dysregulation of the lung parenchymal signaling mechanisms for the alveolar epithelial and vascular compartments. Analysis of cell-cell signaling, expressed as the ratio of knock out (KO)/wild type (wt) mRNA expression, led to decreased alpha SMA expression, consistent with failed alveolar formation (alpha SMA: P3, 0.88; P6, 0.55). Further analysis revealed dysregulation of epithelialization (CC-10: P3, 2.18; P6, 1.70; SPA: P3, 1.5; P6, 1.59; SPC: P3, 1.66; P6, 0.95; AQP5: P3, 1.51; P6, 0.63; Fox J1: P3, 1.29; P6, 1.55) and vascularization (PECAM: P3, 0.67; P6, 1.26;).

CONCLUSIONS: We will determine the nature of the mesenchymal PTHrP signaling mechanism at the cell, tissue and organ levels. Supported by NIH Grant HL-HL055268 (JST/VKR); HL075405 to VKR/JST; HL068597, Philip-Morris External Research Program Award (WS).

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11:45 AM

Leptin Stimulates Xenopus Tadpole Lung Development

John S. Torday, Kaori Ihida-Stansbury, Virender K. Rehan.

Pediatrics, Los Angeles Biomedical Research Institute at Harbor-UCLA, Torrance, CA; Institute for Medicine & Engineering, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Understanding the evolutionary principles surrounding vertebrate adaptation to land are fundamental to advancing the practice of Neonatology. Adipocytes, which evolved in response to oxygen, produce leptin, which is implicated in the evolution of vertebrate respiration (Torday and Rehan, 2002, 2004, 2007), endothermy (Mezentseva and Newman, 2008) and locomotion (Crespi and Denver, 2004), the key functional elements of vertebrate adaptation to land. Preterm newborns are both adipocyte- and leptin-deficient, recapitulating evolutionary, phylogenetic and developmental traits- Evo-Devo.

OBJECTIVE: To test the hypothesis that leptin stimulates *Xenopus laevis* tadpole lung development both structurally and functionally.

DESIGN/METHODS: Cultured tadpole lung (Stage 55-57) explants were incubated with frog leptin (10 ng/ml/48h). Electron microscopy of the lung tissue was morphometrically evaluated; surfactant protein mRNA expression was determined by RT-PCR; the rate of saturated phosphatidylcholine synthesis was determined using ^{3}H-choline incorporation. Statistical differences were determined by one-way ANOVA with Newman-Keuls posthoc test.

RESULTS: Leptin (10 ng/ml/48h) treatment significantly increased faveolar diameter (30%), decreased epithelial cell height (37%) and basement membrane thickness (22%). Leptin treatment also increased the size of lamellar bodies (50%), consistent with increases in surfactant phospholipid synthesis (50%) and expression of surfactant proteins B and C.

CONCLUSIONS: All of the observed leptin effects on lung morphogenesis-thinning of the blood-gas barrier and increased surfactant synthesis-are homologous processes that have occurred both phylogenetically and developmentally in vertebrate lung evolution from fish (swim bladder) to man. We show the integrating effects of the environmentally-sensitive, pleiotropic hormone leptin on the development of the *Xenopus laevis* tadpole lung in transition from water to land. It provides an evolutionary-developmental bridging mechanism for Gene Regulatory Networks both within the lung, and between organs, from cells to complex physiologic traits. This model is a cipher for understanding evolution from molecular oxygen to integrated physiology. Supported by NIH Grants (HL055268,JST) and (HL075405,VKR).

Neonatology IV - Clinical Studies Platform Session

Sunday, March 15, 2009
9:45 AM-12:00 PM

195 Fellow in Training

9:45 AM

The Illusion of the Best Interest Principle

Kirstie R. Marcello, Kim Lampron, John L. Stefano, Keith J. Barrington, Amy B. Mackley, Annie Janvier.

Pediatrics, Christiana Care Health System, Newark, DE; Neonatology, McGill University, Montreal, QC, Canada; Pediatrics, Universite de Montreal, Montreal, QC, Canada.

BACKGROUND: If the assesment that a particular approach (active intervention or comfort care) is in a child's best interest (Best Int), then acting otherwise is generally not acceptable.

OBJECTIVE: To determine if parental variables can affect estimates of Best Int and intervention decisions.

DESIGN/METHODS: Anonymous questionnaire given to healthcare providers and students in Montreal (Canada) and Delaware and Pensylvania (US). 3 scenarios of preterms with explicitly described outcomes at 22, 24 & 27 wks gestation, about to be born to 3 sets of parents: - Parents

A: Older woman, 5th attempt IVF paid by second mortgage - Parent B: Single 16y old with 2 previous abortions - Parents C: Young lawyer couple, first pregnancy Respondents were asked whether active intervention is in Best Int of baby, whether they would comply with family decision (intervention or comfort care); and whether they would seek legal action to go against parental wishes.
RESULTS: 473 questionnaires, 73% resp rate. 22 weeks Parent A: 72% answered it was not in Best Int, but 66% would agree to intervene and only 22% would seek court order to withhold intensive care. Parent B: 89% estimated not in Best Int ($p<0.001$ cf A) and 43% agreed to intervene ($p<0.001$) and twice as many (43%) would seek court order compared to A. Parent C: 73% answered it was not in Best Int ($p<0.001$ cf B), but 55% would agree to intervene ($p<0.06$ cf A), 28% would obtain a court order to forgo intervention ($p<0.001$ cf B). 24 weeks For all, between 71-75% would accept non-intervention. For A and C, 67% and 58% estimated intervention was in Best Int, and 89-92% would comply with it. These numbers were significantly lower for B, with 47% estimates of Best Int and 80% for intervention ($p< 001$). 27 weeks Despite 95% of respondents estimating intervention was in the Best Int of baby, 30% would accept comfort care, and only 48% would seek court order to intervene. These answers were similar in the US and Canada, and similar for the 3 parent scenarios.
CONCLUSIONS: Respondents are frequently ready to resusc against the Best Int of babies, or to let a baby die against his Best Int. Respondents seem to value the parents' Best Int, more than the child's, unless the parent is a young single mother. "Precious" babies born to infertile parents may have more estimates of best interests and receive more interventions against their best interests. We doubt this finding would hold for older patients and might be unique to neonates.

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10:00 AM

A Randomized Phase 1 Trial of Four Thyroid Hormone Supplementation Regimens for Transient Hypothyroxinemia in Neonates < 28 Weeks Gestation: The THOP 1 Trial

Edmund F. LaGamma, Aleid G. vanWassenaer, Susana Ares, Joke H. Kok, Jose Quero, Gabriella Morreale de Escobar, Sergio G. Golombek, Ting Hong, Mohammad H. Rabhar, Delbert A. Fisher, Nigel Paneth.
Div of Newborn Medicine, Pediatrics, Maria Fareri Childrens Hosp - NYMC, Valhalla, NY; Div of Newborn Medicine, Pediatrics, Emma Children's Hospital, Academic Medical Center, Amsterdam, Netherlands; Div of Newborn Medicine, Pediatrics, University Hospital La Paz, Autonomous U of Madrid, Madrid, Spain; Epidemiology, Pediatrics & Human Development, Michigan State University, East Lansing, MI; Center for Clinical and Translational Sciences, University of Texas Health Science Center, Houston, TX; Nichols Institute, Quest Diagnostics, San Juan Capistrano, CA.
BACKGROUND: Transiently low levels of thyroid hormones occur in ~50% of neonates born 24-28 wks gestation & are associated with higher rates of CP & cognitive impairment. Raising thyroid hormone levels shows promise for improving neurodevelopmental outcome; it is not clear what dose is necessary to achieve a neonatal euthyroid state.
OBJECTIVE: To determine whether any of 4 thyroid hormone supplementation regimens could raise T_4 and FT_4 without suppressing TSH (biochemical euthyroidism) vs placebo or iodine supplementation alone.
DESIGN/METHODS: Neonates between 24-28 wks gestation were enrolled within 24h of birth (Amsterdam, Madrid, NY) resulting in 168 subjects randomized to one of 6 treatment arms: placebo (D5W), potassium iodide (30 μg/kg/d) or continuous or bolus daily infusions of either 4 or 8 μg/kg/d of T_4 for 42 d + 1 μg/kg/d T_3 x 14d in T_4 Rx groups; hormones were infused with 1 mg/mL albumin to prevent adherence to plastic. FT_4 (equilibrium dialysis), TT_4, TSH, T_3, (RIA), TBG & cortisol were measured: 0, 3, 7, 14, 28, 42, & 56d.
RESULTS: TT_4 & FT_4 were elevated in the first 7d in all hormone treated subjects; only the continuous 8 μg/kg/d treatment arm showed a significant elevation in FT_4 in all treatment epochs ($p < 0.005$). After 14d, both 8 μg/kg/d arms & continuous 4 μg/kg/d arm sustained elevations of TT_4 >7 μg/dL (90 nM/L; $p < 0.002$). The least suppression of TSH was achieved in the 4 μg/kg/d T_4 continuous infusion arm. A safety analysis showed no significant differences for death, CLD, IVH, or length of hospital stay. While not pre-hypothesized, the duration of mechanical ventilation was significantly lower in the continuous 4 μg/kg/d T_4 arm and in the 8 μg/kg/d T_4 bolus arm ($p < 0.05$). ROP was significantly lower in the *combined* four thyroid hormone treatment arms than in the *combined* placebo+iodine arms ($p < 0.04$). NEC was higher in the *combined* 8 μg/kg/d arms ($p < 0.05$ vs. other arms).
CONCLUSIONS: Elevation of TT_4 with only modest suppression of TSH was associated with trends suggesting benefits in duration of mechanical ventilation and risk of ROP using a continuous low dose thyroid hormone (4μg/kg/d) x 42d. Future trials will be needed to assess the long-term neurodevelopmental effects of such supplementation. NINDS #45109

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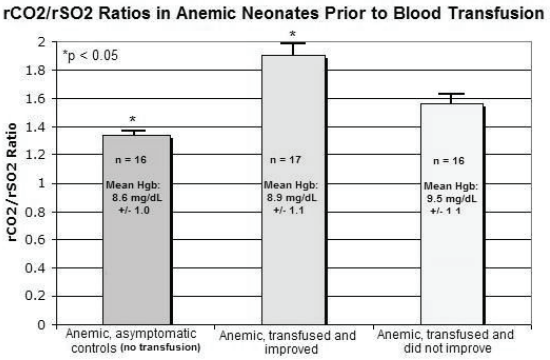
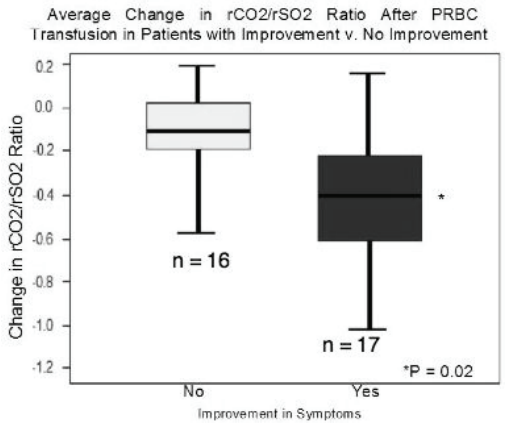
Fellow in Training

10:15 AM

Use of near Infrared Spectroscopy (NIRS) as a Tool To Determine the Need for Blood Transfusion in Preterm Neonates

Sean M. Bailey, Karen Hendricks-Munoz, John T. Wells, Pradeep Mally.
Pediatrics, New York University School of Medicine, New York, NY.
BACKGROUND: NIRS can be used to measure regional cerebral (rCO2) and splanchnic (rSO2) tissue oxygen levels. When tissue oxygen delivery is compromised,cerebral blood flow is maintained at the expense of other organ systems,including splanchnic circulation. The balance between oxygen supply and tissue demand can become compromised despite a relatively normal hemoglobin (Hgb) level. Likewise, there can be adequate oxygen supply despite low Hgb levels. We hypothesize that an rCO2/rSO2 ratio can be used to determine the need neonatal blood transfusion (NBT).
OBJECTIVE: 1. To determine if there is a difference in rCO2/rSO2 ratios in asymptomatic anemic neonates, symptomatic neonates that benefit from NBT, and those that do not. 2. To determine if the difference in pre and post NBT rCO2/rSO2 ratios correlate with symptom improvement.
DESIGN/METHODS: IRB approved prospective observational study.Preterm neonates receiving PRBCs(15cc/kg) at >5 days of life were monitored continuously by NIRS. Neonates with CHD, ≥grade 2 IVH, hydrocephalus; NEC excluded. Improvement after NBT defined by either a)>50% decrease in apnea,bradycardic, desaturation events b)>10% decrease in HR c)decreased respiratory support d)improvement in feeding.Data analyzed using oneway-ANOVA and student t-test.
RESULTS:





CONCLUSIONS: Symptomatic neonates who benefited from NBT had a significantly higher rCO2/rSO2 ratio than asymptomatic anemic infants. The degree of change in rCO2/rSO2 appears to correlate with benefit after NBT. An rCO2/rSO2 ratio may be a useful guide in transfusion management decisions.

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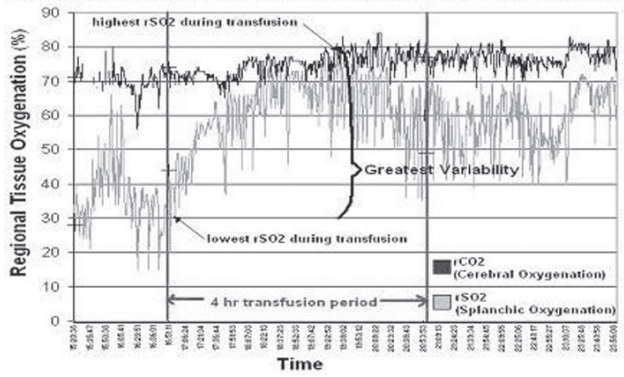
Fellow in Training

10:30 AM

Variability in Regional Cerebral and Splanchnic Tissue Oxygenation during Blood Transfusions in Preterm Neonates Using Near Infrared Spectroscopy (NIRS)

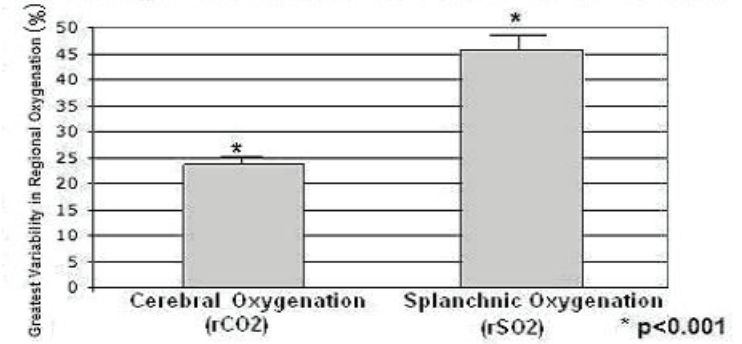
Sean M. Bailey, Karen Hendricks-Munoz, John T. Wells, Pradeep Mally.
Pediatrics, New York University School of Medicine, New York, NY.
BACKGROUND: The cerebral circulatory system is a high flow, auto regulated circuit. Splanchnic circulation has variable flow that is influenced by autonomic tone and intravascular volume. This variability, as seen during neonatal blood transfusion (NBT), has been associated with necrotizing enterocolitis (NEC).[Mally et al. AJP. 2006] NIRS measures regional cerebral (rCO2) and splanchnic (rSO2) tissue oxygen levels, which are indicators of blood flow to these organs. We hypothesize that during NBT, there is a greater variability in rSO2 than rCO2.
OBJECTIVE: To determine the average variability in both rCO2 and rSO2 that takes place during NBT.
DESIGN/METHODS: IRB approved prospective observational study.Preterm neonates receiving PRBCs (15cc/kg) at ≥5 days of life were monitored by NIRS.Neonates with CHD,grade 2 IVH ,hydrocephalus; NEC excluded.Throughout the transfusion, rCO2/rSO2 measurements were taken every 5 seconds and transformed into a graph(Fig 1.).The graph was evaluated to determine the difference between highest and lowest rCO2 and rSO2 measurements obtained during the transfusion.Data were analyzed using the student-t test.

Fig.1 Example of rCO2 and rSO2 Variability Recorded During PRBC Transfusion



RESULTS: 33 patients. At transfusion,mean corrected GA was 32.7+/-3.6 wks; wt 1399+/- 455 g. The average rCO2(%) variability during transfusion was 23.6+/- 1.4 and was 45.6 +/- 2.2 for rSO2(%) (Fig 2.).

Fig 2. Average Variability in rCO2 and rSO2 During PRBC Transfusion



CONCLUSIONS: During NBT, the variability in rSO2 was almost twice that of rCO2. This may reflect the vulnerability of splanchnic tissue to perfusion-reperfusion injury during PRBC transfusion.

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House Officer

10:45 AM

Utilization of Cerebral Magnetic Resonance Imaging (MRI) and Ultrasonography (US) in Diagnosis of Neonatal Neuropathology

Radha N. Ekbote, Rajeev Mehta, Anna Petrova.

Department of Radiology, Robert Wood Johnson Medical School - UMDNJ, New Brunswick, NJ; Department of Pediatrics, Robert Wood Johnson Medical School - UMDNJ, New Brunswick, NJ.

BACKGROUND: Intraventricular hemorrhage (IVH) and cystic periventricular leukomalacia (PVL) are major neonatal neuropathologic findings that cause long-term neurological disability. Although precise diagnosis of brain pathology is essential for appropriate medical management, which neuroimaging strategy is more accurate for detection of IVH/PVL, is debatable.

OBJECTIVE: To evaluate the level of agreement between neuroradiologic data obtained with ultrasonography (US) and magnetic resonance imaging (MRI) in neonates at risk for perinatal brain injury. This information will contribute to our understanding of the value of routine MRI in identification of neonatal neuropathology.

DESIGN/METHODS: We compared brain MRI and US findings in 99 infants admitted to our neonatal intensive care unit. The infants' US and MRI scans closest in time to each-other were used for the retrospective data collection. Agreement between US and MRI in diagnosis IVH or PVL was analyzed using kappa statistics and regression analysis. Gestational age, birth weight, postmenstrual age at time of US and MRI were included in the regression model to identify factors that impact the agreement between the neuroimaging findings.

RESULTS: Majority (60.1%) of studied infants were born at <33 weeks gestation and 16.2% at 33-36 weeks. Postmenstrual age at brain US and MRI testing was comparable. Based on the MRI and US reports, IVH or PVL was identified in 33 and 23 infants; and ventricular dilatation was recorded in 12 and 13 neonates, respectively. Disagreement between MRI and US in detection of IVH/PVL was found in 21.2% of infants (21/99). MRI showed IVH in 12 (57.1%) and no neuropathology in 4 (19.1%), which was inconsistent with the US findings. In 5 (23.8%) neonates the disagreement between MRI and US findings was in the severity of IVH. Kappa statistics showed moderate agreement between US and MRI findings (kappa coefficient 0.44 and 95% Confidence Interval of kappa between 0.25 and 0.64). Beside the discrepancy between US and MRI data, additional findings on MRI included subdural hemorrhage and infarction in 5.1% and 10.1% of the 99 infants. The disagreement between US and MRI reports regarding diagnosis of IVH/PVL was associated with the gestational age.

CONCLUSIONS: While MRI scans substantially augment the assessment of neonatal neuropathology, further studies are needed to validate routine use of MRI in diagnosis of neonatal neuropathology.

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11:00 AM

Increased Susceptibility of Neonates to Phthalate-Induced Inflammatory Toxicity

Anna M. Vetrano, Faith E. Archer, Kirin Syed, Nkiru Nwebube, Joshua P. Gray, Debra L. Laskin, Barry Weinberger.

Pediatrics/Neonatology, Robert Wood Johnson Med. School; Pharmacology/ Toxicology, Rutgers Univ., New Brunswick, NJ; Chemistry, US Coast Guard Academy, New London, CT.

BACKGROUND: Hospitalized infants are exposed to numerous polyvinyl chloride (PVC)-rich devices that contain the plasticizer di-(2-ethylhexyl) phthalate (DEHP). We have previously shown that metabolites of DEHP, including the active compound mono-(2-ethylhexyl) phthalate (MEHP), are markedly elevated in the urine of premature infants. It has recently been suggested that MEHP exerts biologic effects by binding PPAR-γ, a nuclear transcription factor that mediates the physiologic resolution of inflammation, a process that is impaired in neonates.

OBJECTIVE: We hypothesize that MEHP induces inflammatory activity in neutrophils, and that these effects are increased in neonates. These responses may be mediated by inhibition of PPAR-γ signaling.

DESIGN/METHODS: Neutrophils were treated with MEHP or medium control, in the presence or absence of troglitazone, a PPAR-γ agonist. Chemotaxis was measured using modified Boyden chambers, apoptosis by Annexin V binding, and H_2O_2 production by Amplex Red fluorescence. IL-1β and IL-8 were quantified by bead array analysis. Gene expression for superoxide dismutase, catalase, NADPH oxidase-1 (NOX-1) and GAPDH was measured by PCR.

RESULTS: MEHP induced inflammatory activity in neutrophils, as indicated by increased chemotaxis and decreased apoptosis, and these effects were markedly increased in neonatal, compared to adult cells. Similarly, MEHP induced H_2O_2 production and expression of NOX-1, which generates superoxide anion, in neonatal, but not adult, neutrophils. Antioxidant gene expression was not affected by MEHP. MEHP increased IL-8 production 4-fold in neonatal neutrophils, while adult cells were not affected. IL-1β production was increased 6-fold in neonatal cells, compared to 2-fold in adults. The effects of MEHP on respiratory burst activity and IL-1β production were reversed by troglitazone.

CONCLUSIONS: MEHP-induced respiratory burst activity and generation of inflammatory cytokines are increased in neonatal neutrophils, and this is associated with reduced apoptosis and chemotaxis. Thus, neonatal neutrophils are more susceptible to the pro-inflammatory and pro-oxidant effects of MEHP than adult cells. These responses are mediated, in part, by inhibition of the PPAR-γ signaling pathway and may increase the susceptibility of neonates to inflammatory disease.

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Fellow in Training

11:15 AM

Timing of Antenatal Steroid (AS) Administration Modulates Postnatal Blood Pressure (BP) and Inotrope Use in Premature Infants

Zachary H. Ibrahim, Joseph Schulman, Jeffrey M. Perlman.

Division of Neonatology, Department of Pediatrics, Stony Brook University School of Medicine, Stony Brook, NY; Department of Pediatrics, Weill Cornell Medical College, New York, NY.

BACKGROUND: Antenatal steroid administration is often associated with a more mature neonatal cardiovascular response and higher BP in the immediate perinatal period. We questioned whether the timing of AS administration, in relation to the infants subsequent delivery, influences this BP effect.

OBJECTIVE: To examine the effect of the timing of administration of AS on postnatal BP and the use of inotropes for hypotension during the immediate postnatal period.

DESIGN/METHODS: A retrospective chart analysis of infants born at 24 to 28 completed weeks of gestation between Jan. 2004 and Dec. 2007 was performed. In all, 73 eligible infants were exposed to 2 doses of antenatal betamethasone (BETA) and 20 eligible infants were exposed to one dose. The timing of AS administration relative to delivery was assessed, along with postnatal BP at 3, 6, 9, 12 hours; and inotrope use during this time. In general, the use of inotropes in our NICU is based on at least two mean BP's below a given gestational age. A multivariate analysis was performed to assess the impact of gestational age, timing of BETA doses, sex, parity, delivery mode, and the presence of histologic chorioamnionitis on BP and the use of inotropes.

RESULTS: For infants exposed to 2 doses of BETA, the mean time between the last dose and delivery was 8.5±9.3(SD) days. For infants exposed to one dose of BETA the mean time between the last dose and delivery was 0.45±0.39 days. In the 2 dose group, infants receiving inotropes by 12 hours of life had lower mean BP during those initial 12 hours (P<0.0001, 2-way ANOVA). A logistic regression model showed that decreasing gestational age at delivery (OR=0.4 per week, 95% CI=0.2-0.7, P=0.002) and increasing interval between AS administration and delivery (OR=1.11 per day, 95% CI=1.0-1.2, P=0.008) were predictors of inotrope use. None of the 26 infants exposed to 2 doses of BETA after 26 weeks gestation received inotropes. In contrast, 10 of 23 infants exposed to BETA prior to 26 weeks gestation and delivered after 26 weeks gestation received inotrope support (P=0.001). Birth weight, sex, parity, delivery mode and histologic chorioamnionitis were not predictors of inotrope use.

CONCLUSIONS: In very premature infants, longer duration between AS administration and delivery as well as lower gestational age at receipt of AS play key roles in postnatal cardiovascular status as reflected by lower BP and increased inotrope use.

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Fellow in Training

11:30 AM

Restricted Diffusion Changes (RDC) in the Splenium of Corpus Callosum (SCC) Are Common Findings and Associated with Unfavorable Outcomes in Term Neonates with Hypoxic-Ischemic Encephalopathy (HIE)

Toshiki Takenouchi, Linda A. Heier, Murray Engel, Jeffrey M. Perlman.
Pediatrics, Weill Cornell Medical College, New York, NY; Radiology, Weill Cornell Medical College, New York, NY.

BACKGROUND: Corpus Callosum (CC) abnormalities (ABN) have been identified by Magnetic Resonance Imaging (MRI) techniques in premature infants particularly with white matter (WM) injury, term infants with hypoglycemia and after neonatal seizures. Long term follow-up of term infants with neonatal HIE undergoing MRI at adolescence show an association between CC ABN and neuro-cognitive deficits. However CC ABN have not been previously described on an early MRI following HIE. The pathogenesis of injury to this axonal pathway remains unclear.

OBJECTIVE: To determine whether CC changes are observed during the acute/subacute phase of HIE.

DESIGN/METHODS: Between June 2007 and Nov 2008, 35 consecutive infants ≥ 36 weeks with HIE who met criteria for selective brain cooling are included in this report. 34/35 infants had a brain MRI performed on day of life 7.9 ± 1.9. The medical records were reviewed for clinical characteristics including BW), GA, cord arterial pH, base deficit (BD), amplitude EEG (aEEG) tracing and neurologic assessment at time of cooling initiation. All infants were monitored with continuous aEEG during cooling.

RESULTS: 8/34 (24%) infants demonstrated RDC within the SCC. Infants with SCC vs. no SCC changes were of comparable GA and BW , had similar cord arterial pH (6.85 vs. 6.89) but larger BD i.e. –26 vs. –17.5 (p=0.01), were more likely to have a suppressed aEEG tracing i.e. 5/8 vs. 4/26(p=0.02) and a Sarnat 3 examination i.e. 7/8 vs. 9/26 (p=0.01) at start of cooling. 6/8 infants were in status epilepticus on aEEG during cooling despite multiple antiepileptic drugs (AEDs). Three infants died and all had extensive supratentorial RDC. Three infants had bilateral basal ganglia and fronto- parieto occipital WM involvement and have severe developmental delay and disability at followup. Two infants with more focal restricted parieto occipital changes and SCC involvement are developing normally at short-term follow-up.

CONCLUSIONS: 1. This is the first description of SCC changes observed on MRI in infants with HIE. 2. SCC changes are relatively common noted in ~ 25% of this cohort. 3. SCC changes appear to a marker of poor outcome. 4. The pathogenesis of the SCC changes is unclear; potential predisposing factors include accompanying seizures, AEDs, inflammation, mitochondrial dysfunction and unrecognized hypoglycemia.

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11:45 AM

Diffuse Correlation Spectroscopy Reveals That Cerebrovascular Autoregulation Is Intact in Preterm Infants Undergoing a Postural Challenge

Noah Cook, Erin Buckley, Turgut Durduran, Meeri Kim, Chou Zhou, Chandra Sehgal, Peter Arger, Hallam Hurt, Arjun Yodh.
Neonatology, The Children's Hospital of Philadelphia, Philadelphia, PA; Physics, University of Pennsylvania, Philadelphia, PA; Radiology, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: The premature infant's vulnerability to brain injury has been attributed, in part, to a limited capacity for cerebral blood flow (CBF) autoregulation. Diffuse correlation spectroscopy (DCS) is a novel near-infrared optical imaging technique that uses a small scalp probe to continuously measure cortical capillary red blood cell motion. In this, the first study to apply DCS to the preterm population, CBF autoregulation was evaluated in the setting of a head-tilting (HT) challenge at different stages of maturation.

OBJECTIVE: We hypothesized that newborn preterm infants would be limited in their capacity to autoregulate CBF in the setting of a HT maneuver, and that such infants would demonstrate an improvement in autoregulatory capacity with advancing postnatal age.

DESIGN/METHODS: In this prospective cohort study of medically stable preterm infants born at < 32 weeks gestational age (GA), subjects underwent a HT maneuver, alternating between 0° and 15° head elevation at 5 minute intervals. Studies were performed within the first week of life and again at a corrected age of ≥32 weeks. Relative changes in CBF were measured by DCS. Additionally, middle cerebral artery (MCA) velocities were measured by Doppler ultrasound and vital signs were continuously recorded.

RESULTS: 19 infants underwent assessments at a mean (± SD) corrected age of 27.9 ± 1.7 weeks, 7 of whom underwent repeat analysis at 33.0 ± 1.3 weeks. In both analyses there were no significant changes in CBF by DCS (relative increase of 1.8 [95% CI -2.5, 6.1%], p = 0.32) or in MCA velocity (26.6 vs. 26.5 cm/s, p = 0.87). There were likewise no significant differences in heart rate, blood pressure, or oxygen saturation. However, infants of higher gestational age at birth did demonstrate a small drop in mean peak systolic MCA velocity (relative decrease of 3.8% [95% CI 0.5, 7.1%], p= 0.046) without a significant corresponding change in CBF (p= 0.15).

CONCLUSIONS: DCS is a safe and feasible method for conducting bedside cerebral blood flow measurements in preterm infants. Despite small fluctuations in large vessel (MCA) velocity that occurred with HT in some infants, no significant capillary CBF fluctuations were observed. These findings indicate that preterm infant CBF autoregulation is intact in the setting of a postural challenge.

General Pediatrics III
Platform Session

Sunday, March 15, 2009
9:45 AM-12:00 PM

204

Pediatric Resident

9:45 AM

Developmental Screening and Surveillance – Residents' Knowledge and Implementation of Current AAP Guidelines

Kapil Arya, Kanchana RoyChoudhury, Fernanda Kupferman, Susana Rapaport.
Pediatrics, Flushing Hospital Medical Center, Flushing, NY.

BACKGROUND: Despite publication of 2001 (revised in 2006) AAP policy statement detailing developmental surveillance and screening guidelines for children, few pediatricians screen patients for developmental problems.

OBJECTIVE: To assess pediatric residents' knowledge and implementation of 2006 AAP development screening and surveillance guidelines and whether these are affected by PG year level (PGY), being a U.S. medical graduate (USMG), type of residency program (PROGRAM), having done a rotation in development-behavior pediatrics (ROTATION) and having a full time development-behavior pediatrician as a faculty member (DBP).

DESIGN/METHODS: This is an observational, cross sectional study. Chief residents of U.S. categorical pediatric programs were requested via e-mail to ask residents within their programs to complete a 32 question web based survey on www.surveymonkey.com. Frequency tables were generated for responses to each question. Chi square analysis ($p <= 0.05$ significant) was done to see if residents' knowledge and implementation was related to their PGY level, being a USMG, PROGRAM, ROTATION and having a DBP.

RESULTS: Of 180 total respondents, 59.4% were familiar with the 2006 AAP policy (AWARENESS). 68% of respondents were PGY1, 20% PGY2 and 12% PGY3. 54% were USMG. 49% belonged to University (U), 27% to university affiliated (UA) and 24% to a community (C) PROGRAM. 23% had done the ROTATION and 92% had a DBP. If surveillance raised concerns in a child, 69% of respondents did a screening test, 63% referred child to an early intervention program (EIP), 97% to a DBP and 63% to a neurologist/ psychiatrist. AWARENESS was related to being a USMG ($p<0.001$), ROTATION ($p<0.001$) having a DBP ($p<0.001$). ROTATION was related to administration of screening test when indicated (p=0.004) and to appropriate referral to EIP (p=0.021). EIP referral was also related to PROGRAM ($p<0.001$) and U>UA>C residents tended to refer appropriately. Referral to a DBP was related to having a DBP (p=0.024). Referral to a neurologist/ psychiatrist was related to DBP (p=0.014) and PGY (p=0.018), where $3^{rd}>2^{nd}>1^{st}$Y residents tended to refer appropriately.

CONCLUSIONS: A large portion of residents lacked knowledge and did not implement the 2006 AAP guidelines. Both were seen to improve with higher PGY level, belonging to a university program, being a USMG, having done the speciality rotation and with having a full time DBP specialist on faculty.

205

Fellow in Training

10:00 AM

What Do Pediatric Residents Know about Medical Malpractice?

Amy Roy, Lei Chen, Karen Santucci.
Pediatrics, Yale University School of Medicine, New Haven, CT.

BACKGROUND: According to the AAP's 2004 – 2005 survey of graduating pediatric residents, only half report any training in medical malpractice and little literature describes either pediatric residents' understanding of medical malpractice or their experiences with malpractice education.

OBJECTIVE: To assess pediatric residents' attitudes towards and knowledge about medical malpractice before and after an educational intervention.

DESIGN/METHODS: All pediatric, internal medicine/pediatric and psychiatry/pediatric residents at our tertiary care center were invited to an educational workshop. Participants completed a questionnaire exploring their attitudes towards and knowledge of medical malpractice both before and 6 months after the intervention. The workshop consisted of a didactic lecture based on the AAP's Pediatric Graduate Medicolegal Education for the 21st Century and a small group discussion of documentation. Here, residents examined mock medical records and discussed key omissions.

RESULTS: Of 71 eligible residents, 46 (65%) participated. One resident (2%) was involved in a claim. Thirty-nine (85%) of the original participants completed the follow-up survey. At baseline, 86% of participants and 95% at follow-up thought medical malpractice was an important topic to learn in residency. At baseline, 43% felt that fear of a malpractice claim affected their practice. At follow-up, 27 participants (69%) reported fear of malpractice affected their practice (P = 0.01) and 18 of these (18%) indicated that fear of malpractice affected their documentation. Only 21% of the baseline group were familiar with the National Practitioner Database (NPDB)- a database of physicians with claims or judgments against them. This increased to 80% among the follow-up group. At baseline, 30% of participants correctly thought level of training was not a factor in determining if standard of care was provided. This increased to 56% at follow-up (P = 0.01). All follow-up participants thought the workshop should be included as a formal part of the residency curriculum.

CONCLUSIONS: Most pediatric residents are uncomfortable with their level of knowledge of medical malpractice and think it should be taught during residency. Unfamiliarity with the NPDB and confusion regarding resident responsibility to provide standard of care support the need for malpractice education in residency. A brief educational intervention is feasible and may increase resident awareness regarding malpractice and the importance of careful documentation.

206 House Officer

10:15 AM

Resident-Led Quality Improvement Effort Succeeds in Increasing Medication Ordering Compliance

Samantha Fish, Kathleen Donnelly.
Pediatrics, Inova Fairfax Hospital for Children, Falls Church, VA.

BACKGROUND: Following a medication error on the general pediatric ward, root cause analysis identified improper use of pediatric-specific medication order forms to be a contributing factor. A quality improvement project was initiated to decrease the number of medication errors reaching patients by enforcing proper use of medication order forms by all pediatric residents.

OBJECTIVE: To increase the compliance with the Inova Fairfax Hospital for Children (IFHC) medication order-writing policy. This policy requires a weight and weight-based dose to be included in designated locations on a preprinted order form. Given the poor compliance at baseline, this effort was completed in two phases.

DESIGN/METHODS: Initially, a PL-2 resident reviewed medication orders placed on patients on the general pediatric floors. The resident recorded the percentage of order forms correctly completed. Residents were then reinstructed on proper use of medication order forms and over a subsequent two week period the PL-2 resident again reviewed charts and documented correct medication form usage. During this time, feedback was given to each resident regarding the percentage of his/her orders correctly written. The percent correct was reviewed at two weeks and one month of re-enforcement and analyzed for improvement. In the second phase of the project, pharmacy began rejecting medication orders on forms incorrect or incomplete. The second year resident checked medication orders written over the inital one month period of pharmacy enforcement and again analyzed the percentage of correctly written medication orders.

RESULTS: Initial chart review found 42% of medication order forms properly filled out by residents. After re-enforcement and feedback this number increased to 78% and 84% at two and four weeks respectively. After the one month of pharmacy enforcement it was found that 99.6% of medications ordered complied with the order writing policy.

CONCLUSIONS: A multidisciplinary effort successfully increased compliance with the IFHC order writing policy. Educating residents alone was insufficient, but a feedback loop with individual compliance rates increased compliance significantly. At that time, the addition of a pharmacy rejection policy was implemented to reach 100% compliance without sacrificing patient safety due to the volume of orders rejected. Proper use of medication order forms requiring weight-based dosing allows for easier dose-checking by nurses and pharmacy.

207

10:30 AM

Measuring the Evolution of Parental Grief after Sudden Infant Death

Barbara M. Ostfeld, Joan Arnold, Michael Corwin, Sheila Coutant, Linda Esposito, Danita Hall, Evelyne Longchamp, Mary McClain, Linda Cushman, Thomas Hegyi.
Pediatrics, UMDNJ-Robert Wood Johnson Med. School, New Brunswick, NJ; NYC Satellite Office/Public Health Solutions, NYS Center for Sudden Infant Death, NY, NY; Boston U. School of Med., Boston, MA; CT SIDS Center, Hartford, CT; MA Centers for SIDS/Infant, Child Death Bereavement Prog., Boston, MA; Mailman School-Public Health, Columbia U., NY, NY.

BACKGROUND: Grief after the sudden death of a seemingly healthy infant is profound and enduring. Thus parents recurrently seek support after such life events as subsequent births. However, because memories evolve, even providers familiar with a family must learn anew their perceived emotional journey as determined by their current perspective on early grief versus present emotions.

OBJECTIVE: Can recalled and current perceptions of grief be reliably and validly measured?

DESIGN/METHODS: A committee of the Association for SIDS and Infant Mortality Programs developed a comprehensive grief questionnaire contrasting early (historical) and current perspectives on emotions, cognitions, behaviors and support services. For the pilot,17 families (11+/-3 months post-death) were enrolled from the NY, NJ and MA SIDS programs; 2 sites (n=12) retested in 7-14 days. Test-retest reliability was measured with kappas for items and intraclass correlation coefficients (ICC) for total scores on the subscales of Emotional and Physical Experiences (EPE) and Hopelessness. Coeffiicients of 0.41-0.6=moderate agreement, 0.61-0.8, substantial and >0.8, almost perfect. Construct validity was assessed by contrasted groups, and change over time by repeated measures ANOVAs.

RESULTS: Age at death ranged from 0.3 to 12 months. Test-retest reliability for recalled (early) and for current perceptions of relationships with partner, relatives and friends was substantial for all but recalled family relationships; for ability to communicate with partner, family and friends, reliability was moderate to almost perfect for all but current perspective on friends. The EPE ICCs showed substantial agreement on early recollections and moderate on current perceptions. The Hopelessness subscale had almost perfect agreement on early vs. substantial agreement on current recollections ($p<0.05$). Grief improved over time, $p=0.0001$, but those with a history of miscarriage vs. none and those reluctant vs. likely to discuss the death had worse scores at each time point, $p<0.05$. Age at death was not associated with grief intensity initially ($p=0.3$) or currently ($p=0.5$).

CONCLUSIONS: In a pilot test assessing perceived changes in grief over time, parents gave reliable and valid descriptions of both initial and current perceptions. This test may be useful in clinical settings or to assess the impact of interventions.

208

10:45 AM

Parental, Practice and Community Factors Affecting Return for Immunization Visits

Melissa S. Stockwell, Sally Findley, Raquel A. Martinez, Matilde Irigoyen.
Division of General Pediatrics, Columbia University, New York, NY; Dept of Population and Family Health, Mailman School of Public Health, New York, NY; Dept of Pediatrics, Albert Einstein Medical Center, Philadelphia, PA.

BACKGROUND: While risk factors for underimmunization are well described, little is known about factors affecting immunization appointment keeping, beyond access and cost. Identifying modifiable factors is key to practical, successful interventions.

OBJECTIVE: To assess the parental, practice, provider and community factors that influence immunization appointment keeping among parents of children ≤ 36 months.

DESIGN/METHODS: Parents of children ≤36 months (n= 705) were surveyed about immunization experiences. Families were interviewed at community health centers, hospital based clinics, private practices and community based organizations in New York City. Practice information was collected from sites where each child received primary care. The primary outcome was missed immunization appointment, by parental report. Key proposed factors were the medical home, determined using a previously presented seven domain scale, and community views, constructed from two questions on the importance of immunizations to family and friends. Factors showing a bivariate association of <0.15 with our primary outcome were included in hierarchical logistical regression analyses.

RESULTS: 94% of children had a regular doctor; 59% were Latino, 32% black; 76% had Medicaid, 20% private insurance. The final model had a predictive value of 84.4%, R^2 .60 and a satisfactory Hosmer-Lemeshow Chi square statistic (.39). Parental factors were: parents rescheduled an appointment [AOR 3.8 95%CI 2.2,6.6] and parental doubt about vaccine importance [AOR 3.3 95%CI 1.2,8.8]; Practice/provider factors: problems with appointment scheduling [AOR 3.1 95%CI 1.3,7.7], lack of a medical home [AOR 3.0 95%CI 1.7,5.3], and lack of a doctor who listens [AOR 2.7 95%CI 1.3,5.4]; Community factors: family/friends positive about immunizations [AOR 0.02 95%CI 0.01,0.05]. Maternal age and birth order were also significant. Children whose parents reported missing an immunization visit were 2.5 times more likely to have been underimmunized [AOR 2.5 95%CI 1.4,4.5].

CONCLUSIONS: Multiple modifiable factors were associated with missed immunization visits. Targetable factors include provision of a medical home, especially with a doctor who listens, barriers to scheduling and rescheduling appointments, and individual and community-wide education regarding immunization importance. Interventions designed to increase immunization visits need to take into account these factors. CDC/NIP grant U01 IP000086.

209 Fellow in Training

11:00 AM

Camphor: An Ongoing Public Health Concern for Children

Alfredo A. Maldonado, Jeffrey R. Avner, Swapnil N. Rajpathak, Hnin Khine.
Pediatric Emergency Medicine, Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY; Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, NY.

BACKGROUND: Camphor content of common cold preparations has been limited to 11% by the FDA to minimize toxic effects in children. Recent cases of camphor poisoning from the use of unregulated camphor (e.g. imported from other countries) with higher contents of camphor, highlights this important public health concern. Furthermore, camphor may be a common, yet unrecognized, source of seizures in children in certain ethnic populations that use it as a homeopathic remedy. Yet, the availability and use of these products have not been studied.

OBJECTIVE: To describe the use of unregulated camphor by an inner city population.

DESIGN/METHODS: A cross-sectional epidemiologic survey was conducted using a convenience sample of 300 parents of children in waiting rooms of a busy urban pediatric emergency department and a general pediatric clinic. Demographic data, the method, manner and frequency of unregulated camphor use and place of purchase of these products were recorded.

RESULTS: The mean age of parents was 33.8 years (±8.8). 189 (63%) of parents surveyed were Hispanic and 82 (27%) were African-American. Overall, 109 (36%) of parents used unregulated camphor in the past and 57 (19%) used it in the last year. Hispanics were significantly more likely to use camphor (Odds Ratio [OR] 3.60, 95% CI 1.51-8.61) when compared to other ethnic groups. There were no significant differences in camphor use between those who live in a nuclear family versus extended family (37% vs. 33%; p=NS) or between the 1st generation Americans and prior generations (39% vs. 30%; p=NS). Of the 109 parents who reported using camphor, 60 (55%) used it for common colds, 31 (28%) for aroma therapy and 18 (17%) as an insect/rodent repellant. Of the 73 parents who used camphor directly on their child, the methods used included: 49 (67%) inhalation, 8 (11%) topical, 4 (5%) oral and 12 (16%) used a combination of direct methods. Camphor products were purchased primarily from discount stores (43%) and pharmacies (42%). Only 60 out of 300 (20%) parents surveyed were aware of the recent Department of Health warning on the hazards of camphor.

CONCLUSIONS: The use of unregulated camphor products remains prevalent in our population, especially among Hispanics. Given camphor's potential toxicity, it is an important public health issue to educate the public about the hazards of camphor containing products and to limit the availability of unregulated products.

210
11:15 AM

Do Mothers of NICU Babies Understand Delivery Risks?

H.L. Brumberg, A. Chill, C. Hunter-Grant, J. Lund, J. Joymon, D. Tahara, D. Viola.
Neonatology, Maria Fareri Children's Hospital, Valhalla, NY; School of Public Health, NY Medical College, Valhalla, NY; Surgery, Morrison Memorial Hospital, Morristown, NJ; Lower Hudson Valley Perinatal Network, Maria Fareri Children's Hospital, Valhalla, NY.

BACKGROUND: Prematurity and cesarean section (c/s) delivery rates are rising nationally for unknown reasons, although maternal request for c/s deliveries have been implicated. There is little known regarding maternal knowledge about the length of a full term (FT) pregnancy, and how that relates to her understanding of the safety of elective c/s. In addition, existing literature regarding maternal perception and knowledge of FT gestation and delivery mode has not extended to mothers of infants in the NICU.

OBJECTIVE: To asses NICU mothers' knowledge of the length of full term pregnancy, advisability of c/s, and evaluate whether this knowledge influenced her attitude towards late preterm elective c/s.

DESIGN/METHODS: Surveys of all mothers having an infant in the NICU, 18 yrs or older, English or Spanish speaking, consent to participate, and approval from the attending neonatal physician prior to approaching mothers were collected over a 6 week period in 2008 at the Maria Fareri Children's Hospital NICU, Valhalla, NY. Chi square and Fisher's Exact Test analysis were used.

RESULTS: Of the 46 eligible mothers of NICU infants approached, 28 (61%) consented and completed the survey. When asked about an uncomplicated delivery, 32% of the study population did not know that vaginal delivery was safer then an elective c/s. Although knowledge that FT pregnancy was 37-41 wks was absent in 8% of NICU mothers, 39% were not sure of the advisability of scheduling delivery for convenience between 35-36 wks. Knowledge of safety of c/s vs. vaginal delivery was linked to that of advisability of scheduling a delivery at 35-36 wks ($p=0.004$). Married mothers and families with live at home fathers had more knowledge ($p's<0.01$) that c/s is not safer than vaginal delivery, but this knowledge did not vary by race, ethnicity, income, or maternal age. However, knowledge of the advisability of scheduling delivery at 35-36 wks gestation was associated with a history of previous births ($p=0.045$), Hispanic ethnicity ($p=0.020$), but not race.

CONCLUSIONS: In mothers of NICU babies, there are surprising knowledge gaps of safety and timing of delivery mode. Not only do these data support the association of rising prematurity and c/s, but emphasize the importance of preconception education.

211
Fellow in Training

11:30 AM

Factors Contributing to Parental Stress in a Neonatal Intensive Care Unit (NICU)

Kristin C. Voos, Gail Ross, Mary J. Ward, Anne-Lise Yohay, Jeffrey Perlman.
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BACKGROUND: Parents of premature infants experience high levels of stress in the NICU, which may impair the ability to interact optimally with their infants. High stress is associated with depression, dysfunctional parenting patterns and lower developmental outcomes. A need exists to identify parental stressors in the NICU and develop countermeasures to modify these stressors.

OBJECTIVE: To gather descriptive data on factors contributing to parental stress in the NICU.

DESIGN/METHODS: Following consent, parents were given a NICU assessment survey to complete prior to discharge. The survey gathered information on: demographics, parental perception of NICU course, stressful experiences, parent-infant attachment, preparation for discharge and availability of staff. The survey also included open-ended questions about additional stressors and possible interventions to decrease stress.

RESULTS: 79 parents were approached of whom 39 completed and 1 refused the survey. The population included mothers (n=30), fathers (n=7) and both parents (n=2); the mean parental age was 36 yrs (23-50yrs), 90% were married, and 82% graduated from college. The mean gestational age of the infants was 33.5 wks (26-41wks), 22 were male and 17 female, and mean length of stay was 4.3 wks. Most commonly ranked stress statements included "My infant was sick 61%", "I was scared 57%", "I did not know who could answer my questions" 39% and "lack of control 39%". Interventions that might reduce stress include a support group 73%, a resource room 73%, improved communication with physicians 44%, more social work involvement 39%, and reduced noise levels 22%. Only 26% stated that they were taught CPR; all wanted this teaching.

CONCLUSIONS: In this highly educated married population major stressors included the sickness of the baby, fear, loss of control, lack of provider communication, high noise levels and lack of pre-discharge CPR training. Interventions to reduce stress included a parent support group, resource room, improved communication with providers, and reduction in noise levels. Based on these findings, initial strategies implemented with participation of a Family Advisory Committee have included, monthly lunches with prior NICU parents, a psychiatrist to talk to parents, a Yacker tracker installed in all rooms to reduce noise levels and focused CPR discharged teaching. Future strategies include a resource center and family centered rounds to enhance provider communication.

212
11:45 AM

Are Birth Certificate Data Really Accurate?

H.L. Brumberg, D. Dozor, A. Pluzyczka, C. Nugent, S. Marchwinski, A. Lakhkar, S. Golombek.
Neonatology, Maria Fareri Children's Hospital, Valhalla, NY.

BACKGROUND: Birth certificate data are an important source of information for researchers, policy makers, providers, and state officials. In order to best utilize birth certificate data, the quality of the data must be examined. However, little is known regarding the consistency of how these data are collected and entered.

OBJECTIVE: 1) To determine the process of electronic birth certificate (EBC) data collection and entry in Regional Perinatal Centers (RPCs) across NY State (NYS); 2)To determine how gestational age for the EBC is assessed

DESIGN/METHODS: As part of a quality assurance project, a multiple choice survey tool was distributed to several NYS RPCs to assess data acquisition relative to each section of the EBC, containing "unshaded"(for parents to complete) and "shaded"(for hospital staff) areas. Respondents were instructed to choose all response(s) that applied for each question.

RESULTS: We surveyed the only 8 centers utilizing the EBC at that time (representing ~26,000 live births) out of 19 RPCs in NYS. Data meant for hospital staff completion was collected by a wide range of personnel with varied educational backgrounds including OB (nurse practitioner, resident, RN, attending, fellow, midwife), Pediatrics (resident, RN, attending), Neonatal (RN, attending, fellow), birth registrar, or clerk/medical records staff. Surprisingly, data meant to be completed by parents, were also done by OB resident, birth registrar, or clerk/medical records staff. Staff training for data collection and entry varied from upon hire (5-6/8), annually (2/8), upon changes to the EBC (4-5/8), and ongoing or as needed (2/8). There was no consistency on how missing data was handled: submit with missing data (5/8), default value (3/8), secretary or clerk determines answer (2/8), assistance sought from RN (2/8), physician (1/8), or parents (5/8). There was a consensus on data sources for clinical estimation of gestational age (clinician determination using perinatal factors/ultrasound; 7/8) and last menstrual period (prenatal chart; 8/8), even if it was collected by different categories of staff.

CONCLUSIONS: Our results demonstrate that training for data entry and collection provided for staff varied extensively, as well as a lack of consistency regarding which staff collect data for the EBC. Prior to utilizing these data to compare outcomes and potentially alter practice, the quality of EBC data in NYS needs to be improved through such initiatives as ongoing and consistent training.

Endocrinology/Metabolism Platform Session

Sunday, March 15, 2009
9:45 AM-12:00 PM

213
Fellow in Training

9:45 AM

Partial Cholinergic Nicotinic Agonists as Adjunctive Therapy To Preserve Epinephrine (Epi) Responses during Recurrent Hypoglycemia

Dumitru S. Turcanu, Bistra Nankova, Edmund F. LaGamma.
Division of Newborn Medicine, Maria Fareri Children's Hospital, NYMC, Valhalla, NY.

BACKGROUND: Infants of diabetic mothers fail to release Epi in response to either stress of birth or hypoglycemia - an adaptation disadvantage. Attenuated Epi secretion after repeated hypoglycemic episodes is known as Hypoglycemia Associated Autonomic Failure – HAAF; an iatrogenic complication of tight diabetes control, arising from depletion of catecholamine stores and reduced ability to replenish them. Our previous data showed that cholinergic stimuli, in association with elevated free fatty acids, inhibit catecholamine biosynthesis. We hypothesized that partial nicotinic receptor blockade may preserve the Epi responses during recurrent hypoglycemia yielding important public health implications as translational therapy for HAAF.

OBJECTIVE: To determine whether cytisine, a partial nicotinic receptor agonist (similar to Chantix® used to treat nicotine addiction) will: 1) alter the capacity of chromaffin-like cells to produce catecholamines, 2) modify the normal response to nicotine stimulation with respect to catecholamine biosynthetic capacity or 3) affect the nicotinic responses in butyrate (FFA) differentiated PC12 cells.

DESIGN/METHODS: PC12 cells (rat pheochromocytoma) were treated with combinations of cytisine, nicotine and butyrate to determine changes in TH gene expression (tyrosine hydroxylase - the rate-limiting enzyme in catecholamine biosynthesis) analyzed by northern blot.

RESULTS: Addition of cytisine (50-200 μM) to PC12 cells resulted in a modest increase in steady-state TH mRNA levels that was augmented when combined with nicotine. Similar to nicotine alone, addition of cytisine to PC12 cells differentiated with low concentrations of butyrate (1 mM) resulted in a further increase in TH mRNA. At higher concnetrations of butyrate (6 mM), cytisine caused a more pronounced reduction in TH mRNA than with high butyrate alone. Cytisine did not significantly alter the nicotinic responses in butyrate-differentiated PC12 cells suggesting that transmitter replenishment mechanism could be preserved at lower butyrate levels.

CONCLUSIONS: Pharmacological manipulation of chromaffin nicotinic receptors may mitigate the undesired consequence of suppression of epinephrine release (HAAF) due to epinephrine-induced counter-regulatory responses that accumulate FFA. In this way cytisine may help preserve the ability to replenish catecholamine stores and improve survival. Animal experiments are needed to confirm our hypothesis.

214 House Officer

10:00 AM

Bedside Blood and Plasma Glucose Measurements in Diabetic Ketoacidosis (DKA)

David F. Rodriguez, Maria L. Quintos-Alagheband.

Division of Critical Care, Winthrop University Hospital, Mineola, NY; Pediatrics, SUNY/Stony Brook, Stony Brook, NY.

BACKGROUND: Careful titration of glucose, fluid, and insulin in DKA avoids rapid changes in serum osmolality. Hourly bedside glucose levels have been relied upon during ICU management. Recent literature in the adult ICU population has demonstrated limitations of bedside glucometry. Derangements in glucose concentrations seen in pediatric DKA are above the range encountered in routine testing and those studied in adult patients. This led to our investigation of the accuracy of bedside glucometry in pediatric DKA.

OBJECTIVE: To determine the correlation between bed-side glucose (bGlu) and plasma glucose(pGlu) testing in pediatric patients with DKA.and to determine if derangements in blood pH, anion gap, and BUN/Creatinine ratio will impact the agreement between bGlu and pGlu.

DESIGN/METHODS: Retrospective observational study in a PICU of a tertiary care teaching hospital. Subjects: 91 patients (127 admissions) admitted from January 2002 to December 2007.

RESULTS: A total of 809 paired samples were collected. While the mean bGlu level was 236 mg/dl (SD, 101) and the the mean pGlu level was 231 mg/dl (SD,105) and the mean difference (bGlu-pGlu) was 5.52 (SD, 40.88), the marked variation for individual patients was more accurately reflected by measuring the limits of agreement (LOA). Utilizing the Brand-Altman method, LOAs were +86 and -75. The presence of other metabolic abnormalities (low CO2, low ph, high Anion Gap, High BUN/Creatinine ratio) did affect the LOA between bGLu and pGlu.

CONCLUSIONS: While the low value for the bGlu and pGlu difference for the whole study population might indicate that bGlu measurement provides a good estimation of the pGlu in patients with DKA, it is not true for individual patients as indicated by LOA analysis. For an individual patient with DKA the bGlu results may be unreliable as a guide for careful titration of insulin and glucose infusions. Considering LOA, a patient with a bGlu of 320 mg/dl might have a pGlu level from 245 to 405 mg/dl. This discrepancy may not be satisfactory considering that the goal of targeted therapy is a gradual decrease in serum glucose at a rate of less than 80-100 mg/dl/hr to avoid rapid fluid shifts.

215 Fellow in Training

10:15 AM

Norms for Advanced Glycation End-Products Via Auto-Fluorescence in Healthy Children

Radhika Purushothaman, Amrit Bhangoo, Sunil Sinha, Oswaldo Aguirre, Kate Pavlovich, Michael Rosenbaum, Deborah DeSantis, Lisa Altshuler, Steven Shelov, Svetlana Ten.

Pediatrics, Infants' and Children's Hospital of Brooklyn at Maimonides, Brooklyn, NY; Kids Weight Down Program, Maimonides Medical Center, Brooklyn, NY; Pediatrics, New York Presbyterian Medical Center, New York, NY.

BACKGROUND: Skin advanced glycation end-products (SAGE) are a well-known biomarker of diabetes, an excellent indicator for the integrated glycemic exposure that the body has endured. A novel noninvasive technology to measure SAGE was developed using skin fluorescence due to AGEs in vivo and provides a quantitative diabetes risk score.

OBJECTIVE: Cross-sectional study looking at advanced glycation end-products in healthy children to establish normal ranges.

DESIGN/METHODS: This was a cross-sectional study involving 6th to 8th grade children. Skin glycation end-products were measured by Veralight® via auto-fluorescence. Results were expressed as SCOUT index. Higher values indicated more advanced glycation end-products in the skin. Children underwent blood work including lipid profile, short IVGTTs.

RESULTS: SCOUT index was measured in 27 children (F: 19; Mean age: 12.8 +/- 1 yr.). Of these, 16 were in 6th grade, 3 were in 7th and 8 were in 8th grade. Predominantly, they were Hispanic (55%) followed by Asians (22%). There was no difference SCOUT index between different age groups. Mean SCOUT index was 13.6 +/- 2.6 % with no significant difference between genders. SCOUT index showed significant positive correlation with BMI Z score (R: 27; p: 0.03) and almost reached significance for fasting glucose. There was no correlation between SCOUT index and measures of insulin resistance. In order to establish age-specific norms, the group was divided based on age as less than and more than 13 years of age.

Baseline Characteristics of the Group

Characteristic	Group 1 (≤13 yrs)	Group 2 (>13 yrs)
Number	16 (F:10)	11 (F:9)
Age	12 (0.4)	14 (0.5)
SCOUT Index	13.4 (2.3)	14 (3)
Mean waist circumference	70.4 (7.2)	87 (13.5)*

*: Significant difference between groups

CONCLUSIONS: SCOUT Index provides a quick, non-invasive and painless way of measuring glucose control in children with diabetes. Norms do not exist for pediatric age range. Measurements on children of different ages and ethnicities are required to establish normal ranges.

216 Fellow in Training

10:30 AM

Maternal Response to High Fat Diet Programs Fetal Growth

Harpreet Kaur, Patricia Vuguin, Maureen J. Charron, Kirsten Hartil, Michael Kruse, Ariana Fiallo, Amy Anzovino.

Pediatrics, Albert Einstein College of Medicine, Bronx, NY; Department of Biochemistry, Albert Einstein College of Medicine, Bronx, NY.

OBJECTIVE: To determine the effects of maternal high fat diet (HF) and insulin resistance on fetal growth.

DESIGN/METHODS: 10-12 wk old female CD1 wild type (WT) and glucose transporter-4 (GLUT4) heterozygous knockout (G4) (model of prediabetes) mice were used . The mice were fed a HF (59%) or control chow (C, 22%) for 2 weeks prior to mating and in pregnancy. Mothers were sacrified at embryonic day (e) 18.5. GLUT4, GLUT1, hexokinase (HK), Akt expression in gonadal, renal fat and skeletal muscle were assesed by Western blot analysis. Maternal body weight (BW) gain at e-18.5, fetal BW, crown-rump length (CRL) and placental weight were determined (n=30-51/group). Statistical analysis was performed using ANOVA and two tailed t test. *p<0.05 vs. C #p<0.05 vs WT mothers.

RESULTS: HF causes decreased maternal BW gain in pregnancy independent of the maternal genotype (WT-C 73±4,WT-HF 53± 3,G4-C 64 ±3,G4-HF 58±3g ; p<0.01). In WT mothers, HF exposure decreased GLUT4 (4.1±1.5 vs. 1.9±0.46 AU, WT-C vs.WT-HF p=0.01) and HK expression in gonadal fat (0.46±0.22 vs. 0.19±0.06 AU, WT-C vs.WT-HF, p=0.05) and renal fat (GLUT4-3.5±0.3 vs. 2.2±0.4 AU, WT-C vs.WT-HF p<0.05; HK 0.54±0.05 vs. 0.27±0.07 AU, WT-C vs.WT-HF, p=0.01),but did not change GLUT1 or Akt expression.HF did not alter the GLUT4,GLUT1,HK and Akt expression in skeletal muscle in both genotypes and gonadal and renal fat of G4 mothers. HF resulted in a decreased fetal BW, and CRL and no change in placental weight independent of fetal or maternal genotype. Fetuses of WT mothers (Table1) were significantly smaller compared to G4 mothers (Table2) independent of the diet or genotype.

FETAL GROWTH IN WT MOTHERS

WT mothers	BW (g)	CRL (cm)
WT- C	1.3± 0.02	2.3 ± 0.02
WT-HF	0.9±0.03*	2.1 ± 0.03*
G4-C	1.3± 0.02	2.4 ± 0.02
G4-HF	0.9± 0.03*	2.1 ±0.03*

FETAL GROWTH IN G4 MOTHERS

G4 mother	BW(g)	CRL (cm)
WT-C	1.4±0.01#	2.4±0.02#
WT-HF	1.2±0.02*#	2.2±0.01*#
G4-C	1.4±0.01#	2.4±0.02#
G4-HF	1.1±0.02*#	2.2±0.02*#

CONCLUSIONS: HF is associated with decreased maternal BW, fetal growth, and tissue specific alteration in GLUT4 and HK expressions in WT mothers. Fetuses of WT mothers on HF exhibit severe growth restriction. Maternal metabolic response to HF diet may in part be responsible for the degree of growth restriction.

217 Fellow in Training

10:45 AM

Obesity Prevention, Screening and Treatment – Current Practices of Pediatric Providers

John Rausch, Emily Rothbaum, Patricia Hametz.

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BACKGROUND: One third of children aged 2 to 18 are overweight or obese. There is little evidence as to whether attempts to standardize screening and treatment of such children, such as the 2007 Expert Committee Recommendations, have had an impact on provider knowledge and practices.

OBJECTIVE: To identify knowledge, attitudes and practices of pediatric providers with regards to pediatric obesity at an academic health center (AHC).

DESIGN/METHODS: In the summer/fall 2008, we conducted a cross-sectional survey of 97 pediatric outpatient providers at an inner city AHC where 66% of children are Latino, 14% are Black and the majority (76%) are covered by Medicaid. In this population 51% of the children are overweight or obese by age 5. This self-administered survey included questions about counseling attitudes and messages, screening practices, tests ordered and referral patterns. Fisher's Test was used to see if responses varied by provider type.

RESULTS: The distribution of respondents was 57% residents, 34% attendings, 4% nutritionists and 4% fellows. Only 24% of respondents could correctly identify the diagnostic criteria for overweight and only 34% the diagnostic criteria for obesity. Attendings were significantly more likely than residents to correctly define overweight criteria (p-value <.01), but not obesity criteria. While the majority of providers (74%) felt "somewhat" or "very comfortable" with counseling on prevention of childhood obesity, 72% felt their counseling was only "a little effective". Providers offered 10 common counseling messages with over 95% of providers mentioning decreasing sweetened beverages, increasing physical activity, and making healthier food choices. Overall, providers did not agree on a standard set of laboratory tests that should be ordered when a child is diagnosed as overweight or obese. In addition, routine referrals varied considerably with nutritionists (77%) and endocrinologists (27%) being the most common specialists mentioned.

CONCLUSIONS: At a leading AHC less than half of pediatric providers surveyed could correctly define the criteria for childhood overweight and obesity. Furthermore, despite over a decade of recommendations, there continues to be considerable variability in the approach to obesity diagnosis, prevention, and treatment in children. Existing criteria must be consolidated and modified in a way that makes them practical for the majority of practices and allow for a more rational approach to the obesity epidemic.

218
11:00 AM

Cues to Action, Adolescent Version

Alexis S. Lieberman, Arlene Terras, Sherry C. Pomerantz.
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BACKGROUND: Understanding what "cues" or influences prompt adolescents to take action to improve their eating and exercise behavior would be an important tool in the treatment of obesity. In adults, the Cues to Health Action Questionnaire (CHAQ) was developed to test which messages, decisions and feelings were likely motivators to prompt a health action, such as improving one's diet. Such a survey does not exist for adolescents.

OBJECTIVE: The objective was to adapt and assess the Cues to Health Action Questionnaire for use with adolescents, and to determine the highest ranking influences with regard to healthy actions the adolescents had already taken.

DESIGN/METHODS: We revised the Cues to Health Actions Questionnaire, with permission, with a lower reading level and removal of items that were not applicable to adolescents. In order to develop this form, we conducted testing for readability with 11 adolescents, aged 15 to 20 (mean 16) and protocol analysis with 8 adolescents, aged 13 to 18 (mean 15), with revisions made between each participant, based on the results. The final form of the survey was piloted with 66 adolescents. Test-retest reliability studies had a two-week gap between time 1 and time 2, with 20 adolescents. Participants were a convenience sample of patients on exit from the Teen Health Center, which serves primarily low-income, African-American adolescents. Only participants who had made an improvement in either their diet or exercise habits were included (N=58).

RESULTS: The mean age of the 58 adolescents was 16.8 (S.D.= 1.9); 50% were males. The Average BMI was 24.7 (S.D.= 5.9), with a range of 17.7 to 50.2. The three items that were ranked the highest as having had an effect on their decision to change their eating or exercise behavior were the doctor or nurse telling them, feeling better in their mind after making the change, and having a family member tell them to change. The test-retest reliability of the ranking of items between time 1 and time 2 was 0.75. The internal consistency measure with a Cronbach alpha was 0.93.

CONCLUSIONS: The adapted and tested Cues to Action, Adolescent Version, was found to have good internal consistency and reliability for use with low-income, African-American adolescents, and provides the basis for further research on the cues that motivate this population to make changes in their diet and exercise. Further research will assess the use of this tool to differentiate those who have and have not changed eating and exercise patterns.

219
Fellow in Training

11:15 AM

Prevalence of Vitamin D Deficiency in Lean as Compared to Obese Children

Radhika Purushothaman, Amrit Bhangoo, Sunil Sinha, Oswaldo Aguirre, Kate Pavlovich, Michael Rosenbaum, Deborah DeSantis, Lisa Altshuler, Steven Shelov, Svetlana Ten.
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BACKGROUND: Vit D deficiency is prevalent in all age groups. Vit D has been postulated to be important regulators of glucose homeostasis.

OBJECTIVE: We sought to determine the prevalence of Vit D deficiency and its correlation to various metabolic indices in the lean and obese children.

DESIGN/METHODS: This was a cross-sectional study involving 3 groups: Group 1: Obese children referred to our pediatric endocrine clinic. Group 2: Lean children who participated in a school-based study. Group 3: Obese children who participated in a school-based study. Obesity was defined as BMI above 95th % for age. All groups had baseline biochemical evaluation including fasting glucose, insulin, lipid profile and vitamin D (25OHD) levels. Group 2 and 3 underwent short IVGTT. Vitamin D insufficiency was characterized by 25 OHD levels <=20ng/ml and severe insufficiency: <=10 ng/ml.

RESULTS: In Group 1 overall 55.2 % patients were vitamin D deficient (<20 ng/mL) of whom 21.6 % were severely deficient (<10 ng/mL). There were no difference in 25-OHD levels between boys and girls. The vitamin D insufficient subgroup had significantly higher BMI and systolic pressure and significantly lower HDL and QUICKI when compared to the vitamin D sufficient subgroup. In Group 2 overall 29% patients were vitamin D deficient (<20 ng/mL), but no cases of severe deficiency (<10 ng/mL). There was no significant correlation with vitamin D levels and any other metabolic parameters in this subgroup. In Group 3 overall 50% patients were vitamin D deficient (<20 ng/mL), but no cases of severe deficiency. Groups 2 and 3 combined showed 22% prevalence of vitamin D insufficiency but no child had severe vitamin D insufficiency. Vitamin D showed significant inverse correlation with waist circumference($r = -26.1$, $p<0.03$) and glucose disposition index ($r= -33.6$, $p<0.01$).

CONCLUSIONS: Prevalence of vitamin D insufficiency is 29% in lean children, which is in sharp contrast to 50-55 % in obese children. Severe vitamin D deficiency was not present in any lean child. Vit D25 correlates with other metabolic parameters in obese children but not in lean children. Vitamin D can thus be considered a marker of poor metabolic function.

220
Pediatric Resident

11:30 AM

Screening of Anemia in 2 Year-Old Children: Role of Weight Disparities

Adriana M. Rojas, Fazlul Yusef, Roberto Rojas, Fernanda Kupferman, Susana Rapaport.
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BACKGROUND: Iron deficiency (ID) is the most common cause of anemia in childhood. Iron deficiency anemia (IDA) in young children is important to identify because of its adverse effects on behavior and development. High prevalence of iron deficiency was found among overweight children, particularly in Hispanic population.

OBJECTIVE: To determine the prevalence of anemia in the first 2 years old of life of children in our community, and to establish the relation between ID (with and without anemia) and weight status during the first 2 years of life.

DESIGN/METHODS: A retrospective observational chart review study was performed in children who had routine anemia screening at 1 and 2 years of life. The age, gender, ethnicity, Hemoglobin (Hb), Mean corpuscular volume (MCV), Red cell distribution width (RDW), lead level, weight-for-length status and Body Max Index (BMI) were recorded. For 2 year-old children, weight status was categorized according to BMI in obese, overweight, and normal weight. At first year of life weight- for- length status was categorized in overweight, risk of overweight and normal weight. Anemia was defined as Hb<11.0 g/dl, and ID was considered if MCV<75 and RDW >14.5. The relationship between anemia and weight status was analyzed by Kruskal-Wallis and Dunn test for all patients' data at 1 and 2 years of age.

RESULTS: In the 118 study subject, 84% were Hispanics and 48% females. At 2 years, 27% were obese and 20 % were overweight. At 1 year, 26% were overweight and 19% were at risk of overweight. The prevalence of anemia at 1 year was 12.7 % and at 2 years was 11 %. Overall, the prevalence of ID, with or without anemia, at 2 years increased as BMI increased from normal weight to overweight to obese (4.4%, 7.9%, and 13%). The same tendency was observed at 1 year with 5.9% normal and 11% overweight. Obese children at 2 years had lower values of MCV compared with normal group (75.3 vs. 79). Overweight children at 1 year had higher values of RDW compared with the normal group (14.6 vs. 13.6). No difference was observed with Hb values.

CONCLUSIONS: Overweight and obese children demonstrated an increased prevalence of iron deficiency. Obese children at 2 years old had lower values of MCV compared with children with normal weight. Overweight children at 1 year had higher values of RDW compared with children with normal weight.

221
11:45 AM

Goals Set by Teen Weight Loss Club Website Users

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BACKGROUND: Internet health websites are one method to overcome barriers to acquiring health information faced by adolescents, and may be an important tool in treating adolescent obesity. The Internet allows young people to seek support without having to see a physician. Thus, it can overcome many of the access barriers faced by obese adolescents: denial, embarrassment, stigma and negative attitudes.

OBJECTIVE: This descriptive study examines the characteristics of Teenweightlossclub.com website users.

DESIGN/METHODS: On the Teenweightlossclub.com, users take a quiz which asks about risk factors for overweight, and then are provided with a customized report, based on their answers, which guides them to weight loss strategies. Teens' responses to the 45 questions, including diet and exercise habits, as well as the goals they choose and the progress they log in the logbook section of the site were analyzed for this report.

RESULTS: The website, functioning since January, 2006, has had 1265 users take the quiz. The average age of users was 15.5 years (range 13-20); 86% were female.705 users choose goals to work on, and 291 users log their progress. Of the 1265 registered users, many have multiple obesity risk factors: 60% watch more than 2 hours of television a day; 31% eat fruit and vegetables less than 4 times a week; 46% drink over 2 sweet beverages a day and 59% skip breakfast. 56% report that they eat when upset or sad, 46% report binge-eating and17% have made themselves vomit. The website also reached low-income users: 27% report that their family receives food stamps and that the amount of food stamps is not enough; 5% are aware of someone in their home going hungry to allow the user enough food to eat. For the 705 users who chose goals, over half chose decreasing screen time, increasing low-fat dairy or fruit and vegetable consumption, increasing exercise and asking their parents to arrange counseling for them.

CONCLUSIONS: A website guiding overweight teens in weight loss strategies is appealing to adolescent users with multiple obesity risk factors, and prompts over half to set goals which could lead to weight loss.

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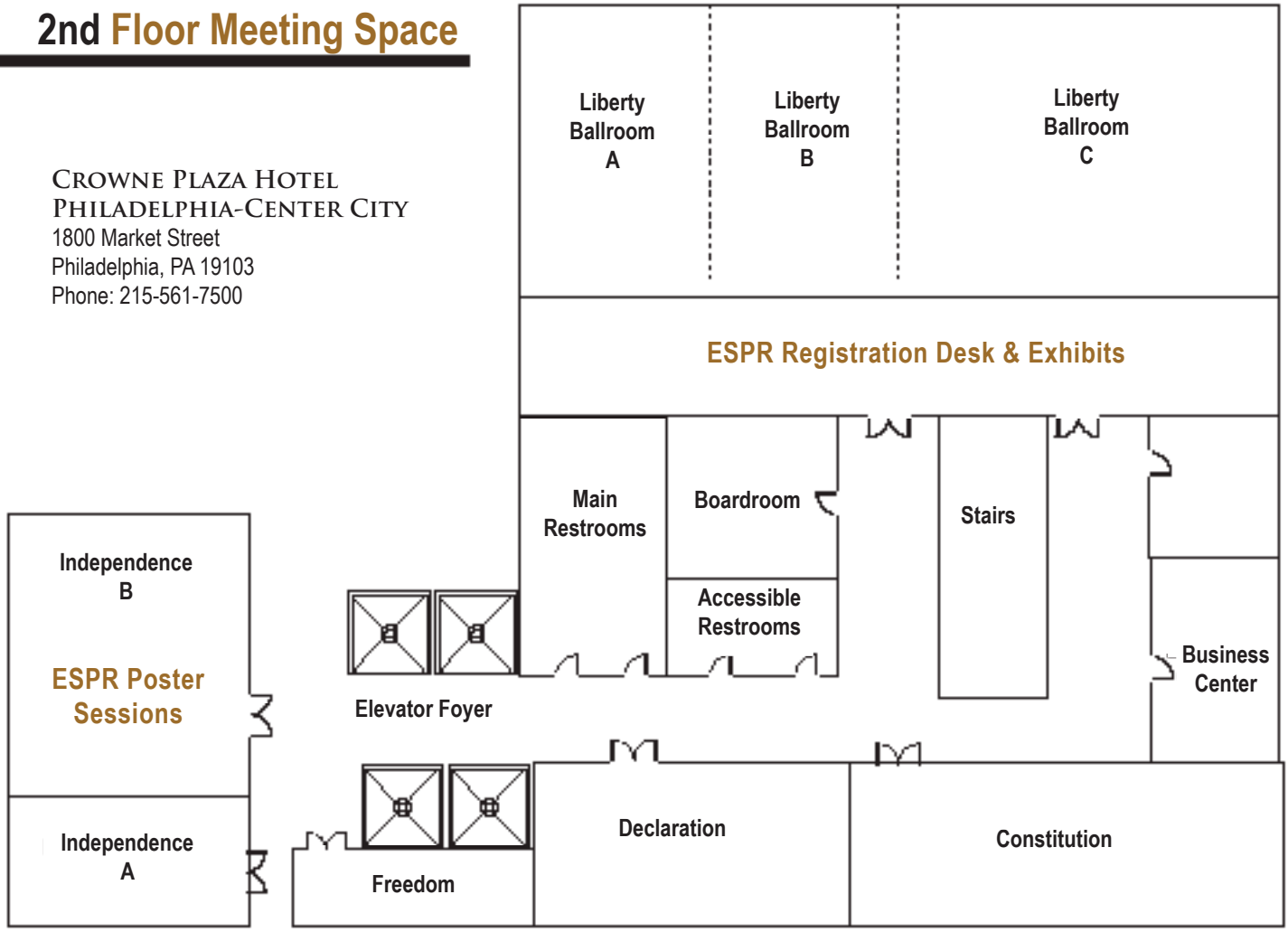

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