33rd Annual
Pediatric Research, Education and Scholarship Symposium (PRESS)

Friday, April 5th, 2019

University of Minnesota Masonic Children’s Hospital

Wilf Family Center
ACKNOWLEDGEMENTS:

Oral Presentation Judges

Eric Bomberg, MD  
Assistant Professor, Division of Pediatric Endocrinology

Annie-Laurie McRee, DrPH  
Assistant Professor, Division of General Pediatrics and Adolescent Health

Dr. Nathan Schuldt, PhD  
Assistant Professor, Division of Pediatric Rheumatology

Abstract Reviewers

Timothy Hallstrom, PhD  
Associate Professor, Division of Blood and Marrow Transplantation

Aaron Kelly, PhD  
Associate Professor, Division of Epidemiology and Clinical Research

Megan Oberle, MD, MSHP  
Assistant Professor, Division of Pediatric Endocrinology

And thank you to the many poster judges!

The PRESS 2019 Committee would like to thank everyone for their assistance in making this event possible.

Gwenyth Fischer, MD  
Aaron Kelly, PhD  
Angela Panoskaltsis-Mortari, PhD  
Sara Ramel, MD  
Emily Kukacka, Administrative Associate
FORMAL ORAL PRESENTATIONS:

1:00 - 3:00 PM: Full abstracts can be found on pages 13 - 24.

1:00 PM  Erin Balay, Pediatric Resident, Pediatric Emergency Medicine
Preventing Pain: Improving Pain Management during Infant Lumbar Punctures in the ED, a quality improvement initiative
Research Sponsors: Jeff Louie, MD and Marissa Hendrickson, MD

1:15 PM  Jess Faragher, Undergraduate Student, Pediatric Rheumatology
Endothelial-to-Mesenchymal Transition and “Don’t-Eat-Me” Signal CD47 in Autoimmune Mitral Valve Disease
Research Sponsor: Bryce Binstadt, MD, PhD

1:30 PM  Taumoha Ghosh, Pediatric Fellow, Pediatric Hematology / Oncology and Epidemiology
Obesity as a Risk Factor for Pediatric Acute Lymphoblastic Leukemia: A Report from the Children’s Oncology Group (COG AALL17D2)
Research Sponsors: Lucie Turcotte, MD, MPH and Logan Spector, PhD

1:45 PM  Marie Hickey, MD, Pediatric Fellow, Neonatology
Ultrasound Measurement of Adipose and Muscle Thickness are correlated with Whole Body Fat and Fat-Free Mass in Premature Infants
Research Sponsor: Sara Ramel, MD

2:00 PM  Ellen Ingolfsland, MD, Pediatric Fellow, Neonatology-Perinatal Medicine
Characterization of M1 and M2 Microglial Responses to Phlebotomy-induced Anemia (PIA) at 2 Time Points in the Developing Rat Retina
Research Sponsor: Tate Gisslen, MD

2:15 PM  Paulina Marell, Medical Student (MS2), Neonatology
Cord Blood-derived Exosomal Contactin-2: a Potential Biomarker for Brain Heath of Neonates at Risk of Iron Deficiency
Research Sponsor: Phu V. Tran, PhD

2:30 PM  Annie Schmiesing and John Scheuer, Medical Students (MS2), Pediatric Hospital Medicine
Prescribing Video-Based Patient Education in the Hospital Setting: Effect on Exclusive Breastfeeding Rates at Discharge
Research Sponsors: Jordan Marmet, MD and Michael Pitt, MD

2:45 PM  Branden Smeester, Graduate Student, Pediatric Hematology / Oncology
SEMA4C is a Novel Target to Limit Osteosarcoma Growth, Progression, and Metastasis
Research Sponsors: Branden Moriarity, PhD & David Largaespada, PhD
Abstract

2 Lisa Soumekh and Taylor Wells, Medical Students, Pediatric Hospital Medicine
The Heart of the Matter: Improving Treatment and Outcomes for Pediatric Patients Diagnosed with Kawasaki Disease
Research Sponsor: Jordan Marmet, MD

4 Zachary Galliger, Graduate Student, Pediatric Blood and Marrow Transplantation
3D Bioprinting Tracheal Grafts for Pediatric Applications
Research Sponsor: Angela Panoskaltsis – Mortari, PhD

6 Dira Putri, Graduate Student, Pediatric Infectious Disease & Immunology
Developing a Guinea Pig Model of Viral Chorioamnionitis
Research Sponsor: Craig Bierle, PhD

8 Amelia Pearson, Undergraduate Student, Neonatology
Developmental Iron Deficiency Reprograms the JARID1 Histone Demethylase Associated with H3K9me3 in Adult Rat Hippocampus
Research Sponsor: Phu V. Tran, PhD

10 Paulina, Marell, Medical Student (MS2), Neonatology
Cord Blood-derived Exosomal Contactin-2: a Potential Biomarker for Brain Development in Infants Exposed to Maternal Obesity and Diabetes
Research Sponsor: Phu V. Tran, PhD

12 Jacqueline S. Penaloza, Graduate Student, Pediatric Blood and Marrow Transplantation
Development of Mesp1-induced Skeletal Myogenic Differentiation
Research Sponsor: Sunny Chan, PhD

14 Daniel Cortez, Hayden Garmon, Jessica Kostecki, Eishani Kumar and Breanna Pederson, Undergraduate Students, Pediatric Emergency Medicine
Training Laryngoscope
Research Sponsor: Jonathan Strutt, MD
16  Michael Downey, Medical Student (MS4), Pediatric Blood and Marrow Transplantation
Reduced Toxicity Conditioning is Better Tolerated but has Higher Graft Failure Compared to Myeloablative Conditioning in Children with Inherited Metabolic Disorders
Research Sponsors: Ashish Gupta, MBBS, MPH & Angela Smith, MD, MS

18  Meghan Fanta, MD, Pediatric Resident, Neonatology
Increasing Procedural Skills by Empowering Pediatric Residents in a Quaternary Neonatal Intensive Care Unit
Research Sponsor: Johannah Scheurer, MD

22  Michelle M. Harbin, MS, Graduate Student, Pediatric Epidemiology and Clinical Research
Relation of Second Hand Smoke Exposure to Vascular Phenotypes in Children and Adolescents
Research Sponsor: Justin R. Ryder, PhD

24  Aubrey K. Hubbard, Graduate Student, Pediatric Epidemiology and Clinical Research
International Incidence Comparison and Trends in Ovarian Germ Cell Tumors: 1988 - 2012
Research Sponsor: Jenny N. Poynter, PhD

26  Anthony Landas and Nick Smith, Undergraduate Students, Pediatric Hospital Medicine
Location, Location, Location (+/- Design): A Crossover Study of Poster Engagement
Research Sponsor: Michael Pitt, MD

28  Jenna Johnson, Medical Student, Pediatric Critical Care Medicine
Got Records? Implementation of Standardized Rapid Response Team Documentation in a Children’s Hospital
Research Sponsor: Arif Somani, MD

29  Megan Gubichuk, MD, Pediatric Resident, Pediatric Internal Medicine
Improving Act Administration in a Pediatric Pulmonology Practice
Research Sponsor: William Gershan, MD

30  Jenna Ruggiero, Emma Schaffer, Jane Goodson and Kanchan Hulasare, Medical Students, Pediatric Hospital Medicine
Making Communication Click between Patients and Providers on Pediatric Inpatient Rounds
Research Sponsor: Jordan Marmet, MD
31 Aaron Westreich, MD, Pediatric Resident, Pediatric Emergency Medicine
Factors Affecting Admission and Length of Stay in Patients with Influenza-associated Myositis
Research Sponsor: Manu Madhok, MD

32 Octavia Ruelas, Medical Student, Pediatric Hematology / Oncology
Standardization of Central Venous Catheterization in Pediatric Patients in the ICU at the University of Minnesota Masonic Children’s Hospital
Research Sponsor: Marie Steiner, MD

33 Katie Tastad, Graduate Student, Pediatric Epidemiology and Community Health
Stated Acceptability of Newborn Cytomegalovirus Screening
Research Sponsor: Mark R. Schleiss, MD

34 Matthew Pappas, Undergraduate Student, Pediatric Blood and Marrow Transplantation
Efficient Cardiac Differentiation of MESP1+ Mesoderm
Research Sponsor: Sunny Chan, PhD

36 Timothy Marinelli, DO, Pediatric Resident, Pediatric GME
Targeted Pharmacologic Therapy for KCNQ2 Potassium Channel-related Neonatal Encephalopathic Epilepsy
Research Sponsor: Laura Speltz, MD

38 Abigail Schnaith, Undergraduate Student, Pediatric Emergency Medicine
Dog Bites to Children Managed at an Academic Level III Pediatric Trauma Center
Research Sponsor: Jeff Louie, MD

40 Pooja Brar, Graduate Student, General Pediatrics and Adolescent Health
Adolescent Condoms and Pleasure Beliefs in Association with Sexual Self-Efficacy
Research Sponsor: Sonya Brady, PhD

42 Danielle Brewer, Medical Student, Pediatric Blood and Marrow Transplantation
Cerebral Toxoplasmosis in a Pediatric Post-Hematopoietic Stem Cell Transplant Patient
Research Sponsor: Christen Ebens, MD, MPH

43 Dorothy Curran, Pediatric Resident, Pediatric GME
One-Stop Shopping: Models of Care for Childhood Cancer Survivor Care
Research Sponsor: Karim Sadak, MD

44 Dorothy Curran, Pediatric Resident, Pediatric GME
6-year-old Male with Abdominal Pain
Research Sponsor: Jeff Louie, MD
46 Jacob Goodwin, Medical Student (MS3), Pediatric Hospital Medicine
Anchoring Bias and Failed HEADSS Assessment in a Case of Fitz-Hugh-Curtis Syndrome
Research Sponsor: Gloria Swanson, MD

48 Sandy Liu, MD, Pediatric Resident, Pediatric Endocrinology
Case Report: 17 Year Old Female Presenting with Throat Pain, a Case of Likely Pediatric Myxedema with Hypothyroid Myopathy and Pericardial Effusion
Research Sponsor: Bradley Miller, MD, PhD

52 Baila Elkin, Tobias Donlon, Anna Dovre, Marvin So, Katherine Beck-Esmay, Kristin Chu, and Kylie Blume, Medical Students, Pediatric Hospital Medicine
Advancing Effective Healthcare for Sexual and Gender Minority Pediatric Patients: an Evaluation of the LGBTQIA+ Symposium
Research Sponsor: Matthew Armfield, MD

54 Tanisha Ronnie, Medical Student, Pediatric Emergency Medicine
PRESsed for Diagnosis: a Case of Reversible Vascular Encephalopathy
Research Sponsor: Jeff Louie, MD

58 Zineb Alfath, Medical Student (MS2), Pediatric Rheumatology
Henoch-Schonlein Purpura: An Unusual Presentation of Neuroblastoma in a Pediatric Patient
Research Sponsor: Colleen Correll, MD

60 Trisha K. Paul, MD & CJ Koozer, MD, Pediatric Residents, Pediatric Cardiology
A Pupil Blown Out of Proportion: Unilateral Mydriasis Caused by a Rare Offender
Research Sponsor: Daniel Cortez, MD

64 Hayley Sharma, Medical Student, Global Pediatrics
Post-traumatic Stress Disorder in Unaccompanied Refugee and Asylum-seeking Minors: a Literature Review
Research Sponsor: Cynthia Howard, MD, MPHTM & Charles Oberg, MD, MPH

66 Paul Chatterton, Medical Student (MS3), Pediatric Emergency Medicine
Unilateral Renal Abscess in Healthy 16 – Year – Old Male
Research Sponsor: Jeff Louie, MD
Abstract #

1  Nicholas Kucher, MD, Pediatric Fellow (PGY-5), Pediatric Critical Care
   Implementation of a Critical Asthma Protocol in a Pediatric Intensive Care Unit
   Research Sponsor: Sameer Gupta, MD

3  Patrick M. Basile, MD, Pediatric Fellow, Pediatric Hematology / Oncology
   Influence of the CNS Niche on Acute Lymphoblastic Leukemia Biology
   Research Sponsor: Peter Gordon, MD, PhD

5  Maryam Ebadi, MD, Post-doctoral Fellow, Pediatric Hematology / Oncology
   Overcoming Acute Lymphoblastic Leukemia Chemoresistance Induced by the Meninges
   Research Sponsor: Peter Gordon, MD, PhD

7  Eric Velazquez, MD, Pediatric Fellow, Pediatric Endocrinology
   Needs Assessment and Early Experience Using Pediatric Subspecialty EPAS as a Formative
   Assessment Tool
   Research Sponsor: Antoinette Moran, MD

9  Megan V. Hilgers, MD, Pediatric Fellow, Pediatric Hematology / Oncology / BMT
   Successful Treatment of Pediatric Subcutaneous Panniculitis-like T-Cell Lymphoma with
   Cyclosporine A
   Research Sponsor: Nathan Gossai, MD

11 Caleb Skipper, Infectious Disease Fellow, Infectious Disease and International
    Medicine
    Cytomegalovirus Viremia Associated with Increased Mortality in Crytococcal Meningitis in
    sub-Saharan Africa.
    Research Sponsor: Mark Schleiss, MD

13 Mollika A. Sajady, DO, MPH, Pediatric Fellow, Developmental-Behavioral Pediatrics
    More than Just a Nice View: Are Fewer Impervious Surfaces Surrounding Schools
    Associated with Improved Student Adjustments
    Research Sponsor: Cathy Jordan, PhD, LP

15 Shannon L. Andrews, MD, Pediatric Fellow, Pediatric Infectious Disease
    Assessing Resident Experience with Antimicrobial Stewardship
    Research Sponsor: Laura Norton, MD
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<td>Luke Erber, Post-doctoral Fellow, Neonatology</td>
<td>Ne</td>
<td>Global Quantification of Proteome and Phosphoproteome Revealed in Novel Cellular Signaling Mechanisms Responsive to Hypoxia and Iron Deficiency</td>
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<td>Juan David Gonzalez Villamizar and Ellen Ingolfslund, Pediatric Fellows, Neonatal-Perinatal Medicine</td>
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<td>Implementing QI Initiative Decreases Inappropriate Treatment of Ventilator Associated Tracheitis in Level IV NICU</td>
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<td>Juan David Gonzalez Villamizar, Pediatric Fellow, Neonatal-Perinatal Medicine</td>
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<td>Sara Ramel, MD</td>
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<td>Marie Hickey, MD, Pediatric Fellow, Neonatology</td>
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<td>Otherwise Healthy Term Infants Exposed to Antibiotics due to Concerns for Sepsis After Birth Demonstrate Altered ERP Performance at 1 Month</td>
<td>Cheryl Gale, MD</td>
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<td>Lauren McClure, DO, Pediatric Fellow, Pediatric Endocrinology</td>
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<td>Glucose Variability in East African Children and Youth with Type 1 Diabetes: a Pilot Study</td>
<td>Antoinette Moran</td>
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<td>Steven Skolasinski, Pediatric Fellow, Pediatric Pulmonology and Critical Care</td>
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<td>Angela Panoskaltsis-Mortari, PhD</td>
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<td>Lindsey Williams, PhD, MPH, Pediatric Post-doctoral Fellow, Pediatric Epidemiology and Clinical Research</td>
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<td>Sex-ratio Among Childhood Cancers by Single-year of Age</td>
<td>Jenny N. Poynter, MPH, PhD &amp; Logan G. Spector, PhD</td>
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<td>Fat Embolus Syndrome after Minor Trauma</td>
<td>Jordan Marmet, MD</td>
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<td>Brian J. Sandri, PhD, Pediatric Post-doctoral Fellow, Neonatology</td>
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<td>Kathleen K. Miller, Pediatric Fellow, General Pediatrics and Adolescent Medicine</td>
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<td>Effects of Systemic Steroid Administration on Recurrence of Pericardial Effusion in Pediatric Patients Following Hematopoietic Stem Cell Transplantation</td>
<td>Guru Hiremath, MD</td>
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<td>50</td>
<td>Kieran Leong, DO, Pediatric Fellow, Pediatric Cardiology</td>
<td>Isolated, Incidental Quadricuspid Aortic Valve</td>
<td>Guru Hiremath, MD</td>
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<td>Leslie Kummer, MD FAAP, Pediatric Fellow, General Pediatrics and Adolescent Health</td>
<td>Lactation Curricula in U.S. Medical Education Programs: A Systematic Review</td>
<td>Iris Borowsky, MD, PhD</td>
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<td>Asmaa Fedjallah, MD, Pediatric Fellow, Pediatric Hematology / Oncology / BMT</td>
<td>Mixed Epithelial and Stroma Tumor (MEST) After Pediatric Kidney Transplant</td>
<td>Peter Gordon, MD, PhD and Priya Verghese, MD, MPH</td>
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<td>Lerraughn Morgan, Pediatric Fellow, Pediatric Cardiology</td>
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<td>Lerraughn Morgan, Pediatric Fellow, Pediatric Cardiology</td>
<td>Cardiac Imaging and Virtual Reality Use in Management of Thoraco-omphalopagus Conjoined Twins</td>
<td>Matthew Ambrose, MD</td>
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<td>Rebecca Ameduri, MD</td>
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59  **Erick Jimenez, Pediatric Fellow, Pediatric Cardiology**
Peripartum Management of a Patient with Catecholaminergic Polymorphic Ventricular Tachycardia
**Research Sponsor:** Matthew Ambrose, MD

61  **Mark McGill, MD, Pediatric Fellow, Pediatric Cardiology**
Single Deployment Implementation of a Leadless Pacemaker in a Pediatric Patient with Tetralogy of Fallot
**Research Sponsor:** Daniel Cortez, MD

63  **Janna R. Gewirtz O’Brien, MD, Pediatric Fellow, General Pediatrics and Adolescent Health**
Running the Risk: A Comparison of Mental Health Outcomes among Runaway, Homeless, and Stably Housed Youth
**Research Sponsor:** Annie – Laurie McRee, DrPH

65  **Hani Siddeek, MD, Pediatric Fellow, Pediatric Cardiology**
Pediatric VAD – A Case Series of Clinical Presentations and Imaging Modality
**Research Sponsor:** Shanthi Sivanandum, MD, FASE
REFRESHMENTS AND HORS D’OEUVRES:

3:30 - 5:00 PM, Food is served at the poster sessions

Gardens of Salonica Catering (Butler passed and buffet)

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<thead>
<tr>
<th>Appetizers</th>
<th>Salads / Entrees</th>
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<tbody>
<tr>
<td>Tryo dip with vegetables</td>
<td>Tomato / Cucumber Salad</td>
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<tr>
<td>Melitzana with pita crisps</td>
<td>Gyros (with lettuce, tomato and onion)</td>
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<td>Spinach-feta Boughatsa</td>
<td>Chicken Skewers</td>
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<td>Mezethes Skewers</td>
<td>Tzatziki sauce and Pita</td>
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<th>Dessert Buffet</th>
<th>Drinks</th>
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<tr>
<td>Handmade baklava</td>
<td>Coffee</td>
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<tr>
<td>Lemon Cream Boughatsa</td>
<td>Peppermint tea</td>
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<tr>
<td>Gioconda Truffles</td>
<td>Souroti sparkling water</td>
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<td></td>
<td>Lemonade (100% honey sweetened)</td>
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AWARDS:

5:00 - 5:30 PM, Awards will be held in the Wilf Family Center Auditorium
FORMAL ORAL PRESENTATIONS

Pediatric Research, Education and Scholarship Symposium (PRESS) - April 5th 2019

Abstracts
Oral Presentation #1

Name: Erin Balay  Division: Pediatric Emergency Medicine

Status: Pediatric Resident  Research Sponsor: Jeff Louie, MD & Marissa Hendrickson, MD

Preventing Pain: Improving Pain Management during Infant Lumbar Punctures in the ED, a quality improvement initiative

Background

Lumbar puncture is an important diagnostic tool for evaluation of the febrile infant. This procedure is potentially painful for patients, and emotionally distressing to families. The AAP recommends analgesic use during lumbar puncture to minimize distress. Oral Sucrose has been advocated as a valuable analgesic for infants undergoing procedures10 however, recent evidence suggests that it may not offer as effective analgesia as expected. The goal of this project was to identify analgesics use during LP procedures and establish a system of procedural analgesic administration.

Methods

We utilized PDSA cycle methodology to initiate an multifaceted interventional approach involving providers, nursing staff and the Electronic Medical Record. Data was abstracted using ICD-10 code for lumbar puncture. PDSA Cycle 1 included: ED staff educational poster, ED staff acknowledgement of initiative, resident and nursing education, and modification of LP dot phrase. PDSA Cycle 2 included an informational poster with 6-month progress and repeat nursing staff teaching.

Results

100 LP procedures were performed, 52 pre-intervention and 48 post-intervention. Use of 1 analgesic was increased to 100% from 98.1% pre-intervention. Use of 2+ analgesics was increased to 87.5% from 57.7%. Procedural success rates increased to 93.8% from 90.3%. LMX utilization was increased to 72.5% from 55.8%. This increase did not result in a decrease in the use of injectable lidocaine during procedure.

Conclusion

Implementation of educational interventions and collaboration between health care providers created a successful environment for improving patient care during an LP procedure. Our results demonstrate that nurse education and empowerment produced an increase in the use of analgesics by 30%. Further, this intervention did not produce a negative effect on the use of lidocaine. Through this project our staff became familiar with a staged process for pain management and testified to increased awareness in preventing pain in this population.
<table>
<thead>
<tr>
<th>Subjects, N</th>
<th>Pre-intervention</th>
<th>Intervention</th>
<th>Combined cohort</th>
<th>Success rate</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>52</td>
<td>48</td>
<td>100</td>
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<tr>
<td>0 analgesics (1)</td>
<td>1.9% (1)</td>
<td>0% (1)</td>
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<td>0%</td>
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<tr>
<td>1 analgesic (28)</td>
<td>98.1% (51)</td>
<td>100% (48)</td>
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<td>92.8%</td>
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<td>LMX only (7)</td>
<td>100%</td>
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<td></td>
<td></td>
<td></td>
<td>Lidocaine only (19)</td>
<td>95%</td>
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<td></td>
<td></td>
<td></td>
<td>Sucrose only (2)</td>
<td>50%</td>
</tr>
<tr>
<td>2+ analgesics</td>
<td>57.7% (30)</td>
<td>87.5% (42)</td>
<td></td>
<td>94.0%</td>
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<tr>
<td>2 (50)</td>
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<td>LMX + Lidocaine (11)</td>
<td>100%</td>
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<tr>
<td>2+ (72)</td>
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<td></td>
<td>LMX + Sucrose (29)</td>
<td>96%</td>
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<td></td>
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<td>Lidocaine + Sucrose (10)</td>
<td>90%</td>
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<tr>
<td>3+ analgesics</td>
<td>11.5% (6)</td>
<td>31.3% (15)</td>
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<td>90.5%</td>
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<tr>
<td>3+ (21)</td>
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<td>LMX + Lidocaine + Sucrose (17)</td>
<td>94%</td>
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<td>Lidocaine + Sucrose + J-tip lidocaine (1)</td>
<td>100%</td>
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<td></td>
<td>Lidocaine + J-tip lidocaine + LMX (1)</td>
<td>100%</td>
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<td>Other 3+ type (1)</td>
<td>100%</td>
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</table>
Oral Presentation #2

Name: Jess Faragher (2nd Author Lee Meier)  Division: Pediatric Rheumatology

Status: Undergraduate Student  Research Sponsor: Bryce Binstadt, MD, PhD

Endothelial-to-Mesenchymal Transition and “Don’t-Eat-Me” Signal CD47 in Autoimmune Mitral Valve Disease

Rationale

The mitral valve (MV) is the most commonly diseased cardiac valve. We have shown using a mouse model of autoimmune inflammation that fibro-inflammatory remodeling of the MV is orchestrated by discrete populations of mononuclear phagocytes (MNPs). How MNPs interact with non-immune MV cells during the course of disease and how these interactions contribute to disease severity are largely unknown.

Objective

Here we sought to clarify how MV endothelial cells (MV-ECs) interact with MNPs during the initiation and progression of MV disease (MVD). Our first objective was to characterize endothelial-to-mesenchymal transition (EndoMT) transition in the K/B.g7 model of inflammatory MVD and arthritis. Secondly, we sought to understand expression of the canonical ‘don’t-eat-me’ signal, CD47, on ECs undergoing EndoMT in the inflamed and fibrotic MVs. Our third objective was to clarify the potential therapeutic efficacy of CD47-blockade in MVD and to determine how EndoMT is altered by CD47 blockade.

Methods and Results

Using flow cytometry, quantitative multi-parameter immunofluorescence (IF) imaging, and monoclonal antibody (mAb) blockade, we demonstrate that EndoMT is a feature of K/B.g7 MVD, that CD47 upregulation of is a hallmark of ECs undergoing EndoMT, and that both preventative and therapeutic mAb blockade of CD47 significantly attenuate fibro-inflammatory remodeling of the MV. Finally, we show evidence of EndoMT and CD47 expression in MV samples taken from humans with rheumatic heart disease (RHD).

Conclusions

These are the first studies to demonstrate that CD47 expression is a hallmark of MV ECs undergoing EndoMT, and that targeting CD47 represents a potential therapeutic strategy in human inflammatory cardiac valve disease. Additionally, we provide evidence from human disease that support our experimental observations and provide a putative link from them to human pathology.
Oral Presentation #3

Name: Taumoha Ghosh

Division: Pediatric Hematology / Oncology and Epidemiology

Status: Pediatric Fellow

Research Sponsor: Lucie Turcotte, MD, MPH and Logan Spector, PhD

Obesity as a Risk Factor for Pediatric Acute Lymphoblastic Leukemia: A Report from the Children’s Oncology Group (COG AALL17D2)

Taumoha Ghosh MD, Peter Gordon MD/PhD, Michaela Richardson MPH, Justin Ryder PhD, Logan Spector PhD, Lucie Turcotte MD/MPH

Background

Increases in the incidence of obesity (a risk factor for many adulthood cancers) and acute lymphoblastic leukemia (ALL) in childhood have been observed over the past four decades. We sought to identify whether obesity may be an unrecognized risk factor for childhood ALL.

Methods

Demographics, anthropometrics and disease characteristics from children and young adults (aged 1-30 years) diagnosed with ALL between 2004-2017 and treated on Children’s Oncology Group (COG) frontline protocols with available pre-treatment anthropometric data (n=4775) were matched to National Health and Nutrition Examination Survey (NHANES) controls. Underweight, normal weight, overweight, or obesity was defined using standard CDC definitions for body mass index (BMI). Multivariate logistic regressions were performed to assess associations between BMI classification and ALL.

Results

ALL patients (71% B-ALL, 29% T-ALL) were more likely to be male (62%), 58% were non-Hispanic white, 9% non-Hispanic black and 24% identified as Hispanic. Five percent had underweight, 58% normal weight, 17% overweight and 20% obesity. Using normal weight as the reference group, obesity was found to be associated with ALL diagnosis (OR=1.20, 95% CI 1.06-1.36, p=0.005). When stratified by ALL immunophenotype, association with obesity was only observed in B-ALL (OR=1.57, 95% CI 1.30-1.91, ptrend<0.0001). When stratified by sex, an association with obesity was only observed in males (OR=1.27, 95% CI 1.08-1.48, p=0.003). Obesity was also associated with moderate to high levels of ALL central nervous system (CNS) involvement (OR=1.70, 95% CI 1.20-2.42, p=0.003).

Conclusions

This is the first study, to our knowledge, to show associations between pre-treatment obesity and ALL. This association may suggest a role for underlying mechanisms of obesity (inflammation, environmental exposures, or other genetic susceptibility) in ALL pathogenesis. Further analyses are needed to elucidate whether other ALL disease characteristics may be associated with pre-treatment childhood BMI.
Ultrasound Measurement of Adipose and Muscle Thickness are Correlated with Whole Body Fat and Fat-Free Mass in Premature Infants

Marie Hickey MD, Emily Nagel MS, RD, LD, Levi Teigen PhD, RD, Carrie Earthman PhD, RD, LD, Ellen Demerath PhD, Sara Ramel MD

Background

Decreased fat-free mass (FFM) and increased adiposity are common body composition derangements in premature infants. Gains in FFM, but not fat mass (FM), are linked to better neurodevelopmental outcomes, while gains in FM may contribute to risk for obesity and metabolic disease.

Objective

To assess the relationship between muscle and adipose measures by ultrasound and body composition by air displacement plethysmography (ADP) in premature infants.

Methods

Forty-five infants born between 25-34 weeks gestation were included. Ultrasound images of the biceps, abdomen, and quadriceps were taken in triplicate using zero compression. Muscle and adipose tissue thickness were measured using electronic calipers. Whole body FFM and FM were calculated using ADP. Intra-rater reliability of ultrasound measurements was calculated using intraclass correlation coefficient (ICC) and percent coefficient of variation (%CV). The relationship between ultrasound measurements and FFM or FM was assessed using Spearman’s correlation coefficient.

Results

Mean postmenstrual age (PMA) at measurement was 35.0 ± 1.21 weeks. Mean weight at measurement was 2.05 ± 0.31 kg, mean FM was 0.19 ± 0.10 kg and mean FFM was 1.86 ± 0.26 kg. Ultrasound measurements revealed ICC between 0.92-0.97 for all sites except biceps adipose tissue (ICC = 0.83). %CV varied between 2.0 and 7.7%. After adjusting for PMA at measurement, abdominal (r = 0.48) and quadriceps (r = 0.50) adipose tissue measures were moderately but significantly correlated with total body FM (p = 0.001). Quadriceps (r = 0.53) muscle thickness was moderately but significantly correlated with total body FFM (p<0.001).

Conclusions

Ultrasound measurements of adipose and muscle tissue thickness have excellent intra-rater reliability for all sites except for biceps adipose tissue. Ultrasound measurements of adipose and muscle tissue thickness are moderately correlated with total body FM and FFM, respectively. With more data, regression analysis will be conducted to formulate prediction equations for total body FM and FFM. Should ultrasound prove to be an accurate method to monitor the quality of weight gain in premature infants, it would provide a portable, noninvasive tool to direct nutritional interventions targeted at optimizing growth and neurodevelopmental outcomes and reducing risk for metabolic disease.
Oral Presentation #5

Name: Ellen Ingolfsland, MD  Division: Neonatology-Perinatal Medicine
Status: Pediatric Fellow  Research Sponsor: Tate Gisslen, MD

Characterization of M1 and M2 Microglial Responses to Phlebotomy-induced Anemia (PIA) at 2 Time Points in the Developing Rat Retina

Ellen C Ingolfsland, Michael K Georgieff, Linda K McLoon, Tate A Gisslen

Background

Inflammation plays an important role in the angiogenesis that underlies the development of retinopathy of prematurity (ROP). The role of microglia, particularly the characterization of microglial activation states, M1 (primarily pro-inflammatory) and M2 (primarily anti-inflammatory) in the developing retina is understudied. PIA is a comorbidity experienced almost universally among extremely preterm infants and has been recently reported to be pro-inflammatory in other tissues. The impact of PIA on the microglial response in the retina is unknown and may shed new light on molecular mechanisms underlying ROP development.

Objective

Determine the gene expression patterns of M1 and M2 markers in the retinas of anemic and non-anemic rat pups at key time points during retinal development.

Design/ Methods

4 litters of 18 Sprague Dawley rat pups each were reared in normoxia. Half of the pups underwent facial vein phlebotomy from postnatal day (P) 3 until they reached a target hematocrit (hct) of 15-20% (50% of control hct). Phlebotomy was then reduced to maintain anemia. Pups were euthanized, followed by immediate whole retinal dissection at P15 and P20, times of high a vascularity and maximal neovascularization, respectively. M1 (TNFα, IL-1β, CD86) and M2 (Arg-1, CD206) markers were tested by RTqPCR using s18 as a reference gene. Comparisons were made by unpaired t-tests.

Results

See Table 1. At P15, M1 markers CD-86, TNFα, and IL-1β were increased in anemic pups compared to non-anemic controls (p<0.005). There was an increase in M2 marker Arg-1 (p=0.018). At P20, M1 markers TNFα and IL-1β were decreased in anemic pups (p<0.05), and M2 marker Arg-1 was increased, though not significantly (p=0.07).

Conclusions

PIA induces an early M1 pro-inflammatory response in the developing rat retina that is then replaced by a later M2 anti-inflammatory response. Anemia-induced alterations to inflammatory responses may contribute to the pathology of ROP.
Table 1. Relative expression of M1 and M2 genes to reference gene, s18 at two time points, P15 and P20 between anemic and non-anemic control rat pups. SD= Standard deviation.

<table>
<thead>
<tr>
<th>Gene</th>
<th>Control P15 Mean</th>
<th>SD</th>
<th>Anemic P15 Mean</th>
<th>SD</th>
<th>P-value</th>
<th>Control P20 Mean</th>
<th>SD</th>
<th>Anemic P20 Mean</th>
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<td>IL-1B</td>
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<td>24.47</td>
<td>6.61</td>
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<td>20.79</td>
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<td>0.49</td>
<td>0.28</td>
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Oral Presentation #6

Name: Paulina Marell
Division: Neonatology

Status: Medical Student (MS2)
Research Sponsor: Phu Tran, PhD

Cord Blood-derived Exosomal Contactin-2: a Potential Biomarker for Brain Heath of Neonates at Risk of Iron Deficiency

Paulina Marell, Sharon Blohowiak, Michael Georgieff, Pamela J. Kling, and Phu V. Tran

Background

Exosomes are extracellular vesicles involved in intercellular communication. A neural-specific glycoprotein, Contactin-2, can be used to isolate neural-specific exosomes in cord blood (CB). In the developing brain, Contactin-2 impacts neuronal migration, neuronal differentiation, and axonal elongation and myelination. While we have tools to assess blood circulating iron status, none exist for brain iron, and Contactin-2-positive exosomes are a possible index for neonatal brain health.

Objective

Establish a relationship between CB-derived Contactin-2 exosomes and neonates at risk for iron deficiency (ID).

Methods

CB samples were obtained at C-section deliveries. Prematurity (<36 wks gestational age [GA]) and pregnancy with complication (e.g. infections) were excluded. Maternal anemia or diabetes during pregnancy were assessed. CB exosomes were isolated and validated by Western blot for CD81 and Contactin-2. CB ferritin and exosomal Contactin-2 levels were quantified by ELISA. Correlation analysis was performed using Pearson. Group differences were determined using two-tailed t-test with $\alpha \leq 0.05$.

Results

Exosomal Contactin-2 of 25 female and 34 male newborns were distributed into two clusters (Panel A, $0.0033 \pm 0.0015$ and $0.0160 \pm 0.0040$, Means $\pm$ SDs). Maternal anemia showed 1.9x chance to have low cord blood exosomal Contactin-2 (Panel B, OR=0.53). CB Ferritin and Contactin-2 were directly covaried in male, but not female, neonates (Panel C-D). Male neonates from diabetic mothers showed lower level of Contactin-2 compared to those from non-diabetic mothers (Panel E).

Conclusions

The correlation between CB ferritin, which indexes peripheral iron status, and the neural-derived exosomal Contactin-2 provides a potential biomarker reflecting synaptic and axonal impairments associated with neonatal ID. Furthermore, male infants of diabetic mothers, who are at risk of neonatal brain ID, have lower exosomal Contactin-2 levels. A sex-specific effect was noted. Further analyses of CB Contactin-2 positive exosomes will potentially identify additional markers that assess developing neonatal brain health.
Figure 1.

A

B

Exosomal Contactin-2 Cluster

# Cord Blood

0 10 20 30 40 50

Non-anemia Anemia

Maternal Iron Status

C

Male Cord Blood

Contactin-2 (ng/Total protein (µg))

0 5 10 15 20 25

CB Ferritin (ng/mL)

R=0.45, P=0.01

D

Female Cord Blood

Contactin-2 (ng/Total protein (µg))

0 10 20 30 40 50

CB Ferritin (ng/mL)

R=0.23, P=0.22

E

Male Cord Blood

Contactin-2 (ng/Total protein (µg))

0 5 10 15 20 25

Non-diabetes Diabetes

Maternal Diabetic Status

P = 0.02
Oral Presentation #7

Name: Annie Schmiesing & John Scheuer  Division: Pediatric Hospital Medicine

Status: Medical Students

Research Sponsor: Jordan Marmet, MD & Michael Pitt, MD

Prescribing Video-Based Patient Education in the Hospital Setting: Effect on Exclusive Breastfeeding Rates at Discharge

Background

Despite usage of videos for discharge education, a paucity of literature exists evaluating their effectiveness. Since discharge for postpartum mothers is standardized and high in volume, we focused on this population. Additionally, exclusive breastfeeding at discharge is a predictor of breastfeeding success at home and is therefore tied to a measurable and positive health outcome.

Objective

Evaluate the impact of educational videos on the rates of exclusive breastfeeding at postpartum hospital discharge.

Methods

In November 2015, we added four breastfeeding education videos to the newborn admission set and tracked videos watched. We generated a dataset including all healthy term (37.0 - 41.6 week) infants, eliminating those with stays longer than 4 days, and babies that were SGA or LGA. We captured 12 months before and after the intervention (eliminating the month of initiation). We compared exclusive breastfeeding rates pre and post intervention and compared rates between mothers who watched any videos in the post-intervention period vs those who watched none.

Results

Our final dataset included 2,685 infants (1,467 pre- and 1,218 post-intervention). Post- intervention, the exclusive breastfeeding rate was 68.6% compared to 68.4% pre-intervention, and the exclusive formula feeding rate was 4.4% post vs 4.8% pre. 986 mothers (81%) watched all four videos, and 230 (19%) watched none. The mothers who watched all four videos were more likely to breastfeed exclusively (71.8% vs 54.3%) and less likely to exclusively formula feed (1% vs 19.1%).

Conclusion

There was no meaningful change in exclusive breastfeeding rates pre vs post intervention. However, mothers who watched the videos were more likely to attempt any breastfeeding (99%) compared to those who watched none (80.8%). While this may speak to increased engagement of those already wishing to pursue breastfeeding, more study is needed to determine if the video intervention contributed to increased willingness to breastfeed.
Oral Presentation #8

Name: Branden A. Smeester Division: Pediatric Hematology / Oncology

Status: Graduate Student

Research Sponsor: Branden S. Moriarity, PhD & David Largaespada, PhD

SEMA4C is a Novel Target to Limit Osteosarcoma Growth, Progression, and Metastasis

Semaphorins, specifically type IV, are important regulators of axonal guidance and have been increasingly implicated in poor prognoses in a number of different solid cancers. In conjunction with their cognate PLXNB family receptors, type IV members have been increasingly shown to mediate oncogenic functions necessary for tumor development and malignant spread. In this study, we investigated the role of semaphorin 4C (SEMA4C) in osteosarcoma growth, progression, and metastasis. We investigated the expression and localization of SEMA4C in primary osteosarcoma patient tissues and its tumorigenic functions in these malignancies. We demonstrate that overexpression of SEMA4C promotes properties of cellular transformation, while RNAi knockdown of SEMA4C promotes adhesion and reduces cellular proliferation, colony formation, migration, wound healing, tumor growth, and lung metastasis. These phenotypic changes were accompanied by reductions in activated AKT signaling, G1 cell cycle delay, and decreases in expression of mesenchymal marker genes SNAI1, SNAI2, and TWIST1. Lastly, monoclonal antibody blockade of SEMA4C in vitro mirrored that of the genetic studies. Together, our results indicate a multi-dimensional oncogenic role for SEMA4C in metastatic osteosarcoma and more importantly that SEMA4C has actionable clinical potential.

Figure
POSTER SESSION A

Pediatric Research, Education and Scholarship Symposium (PRESS) - April 5th 2019

Undergraduate, Graduate and Medical Student Abstracts
**Abstract #2**

**Name:** Lisa Soumekh and Taylor Wells  
**Division:** Pediatric Hospital Medicine  
**Status:** Medical Students  
**Research Sponsor:** Jordan Marmet, MD

The Heart of the Matter: Improving Treatment and Outcomes for Pediatric Patients Diagnosed with Kawasaki Disease

Kawasaki Disease (KD) is an acute pediatric inflammatory illness and is the leading cause of acquired heart disease in children. Each year in the United States, there are 19 cases/100,000 of KD. In 25% of these cases, patients develop coronary aneurysms. If misdiagnosed or left untreated, KD can lead to serious long-term complications, including coronary aneurysms, arrhythmias, heart attack, and death. The etiology of this disease remains poorly understood and diagnoses are made clinically.

We conducted a quality improvement project aimed to reduce the number of coronary aneurysms (z-score > 2.5) in KD patients under the age of 18 years at University of Minnesota Masonic Children’s Hospital (UMMCH) by 25% by January 2019. Figure 1 outlines a timeline of interventions aimed at standardizing treatment and improving outcomes of pediatric KD patients at UMMCH.

A critical component of our study was a seven-year chart review, from which a few key vulnerable components of care for KD were exposed. Most importantly, the average number of days from onset of fever to IVIG treatment of KD is 9.3 days at UMMCH. It is known that the earlier the administration of IVIG, the better the patient outcome. Additionally, 10.2% of patients diagnosed with KD at UMMCH are returning to the ED within two weeks of discharge. This is a higher percentage of patients than we would like to see returning post discharge with recurrent fevers or other complaints.

Although, the chart review revealed that only 24.1% of KD patients at UMMCH had a coronary aneurysm with z-score > 2.5, the goal remains to reduce this number in the future. The initial aim of this study was likely too lofty for only one round of interventions. The information gathered offers insight into areas we can target for future improvements.

![Interventions Diagram](image)

**Figure 1.** Timeline of interventions for KD project at UMMCH.
Abstract #4

Name: Zachary Galliger  
Division: Pediatric Blood and Marrow Transplantation  
Status: Graduate Student  
Research Sponsor: Angela Panoskaltsis-Mortari, PhD  

3D Bioprinting Tracheal Grafts for Pediatric Applications

As of 2017 9.93% of births in the United States were preterm, a rate that has been increasing over the last few years. These preterm term infants often require prolonged intubation to manage airway challenges, which may lead to tracheal stenosis and critical length defects requiring surgical intervention. While in adults, critical length defects are 50% of the trachea length, that number is only 30% in pediatric patients. In adults the defective tissue is generally replaced by a synthetic graft like silicone. Unfortunately, synthetic grafts cannot adjust to a growing patient and must be replaced multiple times before the patient reaches adulthood. This motivates our current research, developing 3D bioprinted trachea from biological materials that can grow with the patient.

To achieve this goal, our work focuses on modifying decellularized extracellular matrix (dECM) from tracheal cartilage to produce extracellular matrix methacrylamide (EMA), capable of directing cell behavior and remodeling in tracheal grafts. There are two major techniques for isolating extracellular matrix: pepsin digestion which favors larger structural proteins (P-ECM) generally responsible for tissue mechanics, and urea extraction which favors smaller proteins (U-ECM) usually associated with cell signaling. We hypothesize the addition of these tissue specific ECM and EMA to gelatin methacrylamide (GelMA) hydrogels seeded with human mesenchymal stromal cells (hMSCs) will improve the compressive modulus, the mechanical stability of the tissue, and the maturation of hMSCs to cartilage producing chondrocytes compared to GelMA alone. While we expected the EMA and P-ECM to have a greater impact on the mechanical properties, our preliminary results show U-ECM to significantly improve the compressive modulus over GelMA alone while P-ECM and the EMA improvements were not statistically significant. Staining for collagen II to assess cartilage production, both ECM conditions were positive for collagen II while the EMA conditions and GelMA alone were not. We are further investigating this decrease in bioactivity and the production of 3D bioprinted neocartilage.

Abstract #6

Name: Dira S. Putri  Division: Pediatric Infectious Disease & Immunology
Status: Graduate Student  Research Sponsor: Craig Bierle, PhD

Developing a Guinea Pig Model of Viral Chorioamnionitis

Dira S. Putri, Zachary W. Berkebile, Craig J. Bierle

The fetal membranes – the chorioamnion – function as an immunologic and physical barrier to infection of the fetus during pregnancy. Infection of the membranes could expose the tissues to an inflammatory response that leads to premature rupture of membranes and preterm birth. While these processes are well studied in the context of bacterial infections, how viral infections cause fetal membrane dysfunction remains unclear due to the lack of animal models of viral chorioamnionitis. Congenital cytomegalovirus (CMV) infection occurs in up to 2% of all births. These CMV infections have been significantly associated with preterm birth and the virus observed to persistently infect the amnion. In this study, the effects of the timing of CMV infection during pregnancy and host genetic background on fetal membrane infection were evaluated using a guinea pig model. Time mated guinea pigs were infected with guinea pig CMV (GPCMV) either late in the first trimester (21 of 65 days) or late in the second trimester (35 days). Pregnant dams were euthanized at defined times post-infection and the viral load in the fetal membranes (amnion and yolk sac), placenta, and amniotic fluid were quantified by digital droplet PCR. Significantly higher rates of fetal membrane infection and GPCMV viral loads were observed in animals challenged at the 35 day time point. GPCMV was rarely detected in the amniotic fluid and generally detected in both the yolk sac and amnion of each pup. RNA-seq analysis revealed patterns of gene expression that were associated with maturation of the amnion or CMV infection. In conclusion, GPCMV naturally infects the fetal membranes and CMV infection of the membranes may occur independent of fetal infection, originating from the maternal decidua in a paraplacental route of infection.
Abstract #8

Name: Amelia Pearson
Division: Neonatology
Status: Undergraduate Student
Research Sponsor: Phu V. Tran, PhD

Developmental Iron Deficiency Reprograms the JARID1 Histone Demethylase Associated with H3K9me3 in Adult Rat Hippocampus

Background

Iron deficiency (ID) during fetal and early postnatal periods causes neurocognitive deficits. Preclinical models suggest these deficits are driven partly by permanent reprogramming of hippocampal gene expression, likely mediated by epigenetic modification. JARID histone demethylases require iron for enzymatic removal of methyl groups from lysine residues of histone tails. Early-life ID reduces JARID1B expression during and beyond ID period; however, the mechanism underlying JARID1B dysregulation remains uncharacterized. The methyl donor choline partially rescues neurocognitive deficits of early-life ID. It is unknown whether choline supplementation alters histone methylation in the ID hippocampus.

Objective

Determine whether early-life ID and prenatal choline supplementation alters histone methylation at the JARID1B locus in the rat hippocampus.

Methods

Timed-pregnant Sprague-Dawley rats were fed a purified iron deficient diet (ID, 4mg Fe/kg) from gestational day (G)2 until postnatal day (P)7. At P7, nursing dams where switched to a purified-iron sufficient diet (IS, 200mg Fe/kg). Control IS were fed exclusively IS diet. Choline supplemented groups (FIDCh and ISCh) were fed ID or IS diet with choline (5g/Kg) from G11-18. All rats were fed IS diet after weaning. Hippocampi from the four groups were collected at P65. Chromatin-Immunoprecipitation (ChIP) was used to enrich H3K9me3 and HDAC1. Enrichment of these marks at the JARID1B promoter was assessed using RT-qPCR. Results were analyzed using ANOVA with Tukey post hoc t-test.

Results

Early-life iron deficiency increased K9me3 and HDAC1 enrichment at the JARID1B promoter in the FID compared to IS controls. Prenatal choline supplementation normalized these effects.

Conclusion(s)

Early-life ID alters H3K9me3 and HDAC1 enrichment at the JARID1B promoter. These chromatin modifications may underlie the long-term JARID1B downregulation associated with early-life ID. Prenatal choline supplementation reverses these effects. Further analyses will probe the timing when these modifications occur during development and whether choline supplementation alters DNA methylation at the JARID1B promoter.
Figure: Early-life ID alters (A) H3K9me3 and (B) HDAC1 enrichment at the JARID1B promoter in adult P65 rat hippocampus. Prenatal choline supplementation ameliorates these effects. Abbreviations: Iron-sufficient (IS), Formerly iron-deficient (FID), IS+Choline (ISCh), and FID+Choline (FIDCh). Values are Mean ± SEM, n=4-6, ANOVA, *P<0.05.
Abstract #10

Name: Paulina Marell  
Division: Neonatology

Status: Medical Student (MS2)  
Research Sponsor: Phu V. Tran, PhD

Cord Blood-derived Exosomal Contactin-2: a Potential Biomarker for Brain Development in Infants Exposed to Maternal Obesity and Diabetes

Megan Paulsen, Paulina Marell, Sharon Blohowiak, Michael Georgieff, Pamela Kling, and Phu Tran

Background

Maternal obesity and diabetes (MOD) are highly prevalent during pregnancy. Exposure to MOD during critical periods of development, such as pregnancy, has been associated with neurodevelopmental and psychiatric disorders in offspring. Contactin-2, a neural-specific exosomal glycoprotein, plays an important role in brain development.

Objective

Determine the relationship between neonatal Contactin-2 and exposure to MOD during pregnancy.

Methods

Maternal age, body mass index (BMI), gestational weight gain, diabetes status, and delivery mode as well as infant sex were recorded. Neural-specific exosomes were isolated from cord blood and validated by Western blot for CD81 and Contactin-2. Contactin-2 levels were quantified by ELISA. Results were analyzed by Pearson correlation, unpaired T test, or one-way ANOVA, with p<0.05 considered significant.

Results

Exosomes were isolated from 25 female (F) and 32 male (M) term infants (Ave. gestational age 39.5). 20 neonates (F=8, M=12) were exposed to maternal obesity (BMI≥30). 14 neonates (F=5, M=9) were infants of diabetic mothers (IDM). Female, but not male, Contactin-2 levels were correlated to maternal BMI (R=0.51, p=0.01, Panel A). Contactin-2 levels were elevated (+1.9 fold) in infants born to obese mothers compared to lean mothers (p=0.006, Panel C). IDM males, but not females, had lower Contactin-2 levels (59%) compared to non-IDMs (p=0.04, Panel E).

Conclusions

Contactin-2 levels were elevated in infants born to obese mothers. Female Contactin-2 levels were correlated to maternal BMI in contrast to IDM males having lower Contactin-2 levels. These findings may represent sex-specific differences in fetal brain development when exposed to MOD. Interestingly, gestational weight gain and neonatal/infant growth parameters were not correlated to neonatal Contactin-2 levels. Further studies to investigate maternal metabolic parameters, as well as offspring neurodevelopmental and psychiatric health, are needed prior to determining if Contactin-2 is a novel neonatal biomarker to predict brain development following intrauterine exposure to MOD.
Figure 1.

A. **Female Cord Blood**

B. **Male Cord Blood**

C. **Cord Blood**

D. **Female Cord Blood**

E. **Male Cord Blood**

Maternal BMI (kg/m²) at Delivery

BMI < 30: 4 mothers with diabetes.
BMI > 40: 3 mothers with diabetes.
Abstract #12

Name: Jacqueline S. Penaloza  
Division: Pediatric Blood and Marrow Transplantation

Status: Graduate Student  
Research Sponsor: Sunny Chan, PhD

Development of Mesp1-induced Skeletal Myogenic Differentiation

Muscular dystrophies are a group of genetic disorders characterized by progressive loss of muscle functions. Interestingly, muscular dystrophies often have varied severity among different muscle groups. For example, Duchenne muscular dystrophy primarily affects trunk/limb muscles, while head muscles are relatively spared. During embryo development, head muscles derive from cardiopharyngeal mesoderm (CPM) – distinct from trunk/limb muscles which derive from the somites. We have recently developed an in vitro CPM model based on transient Mesp1 induction during mouse embryonic stem cell differentiation. We discovered that Mesp1-induced head muscle development can be traced by dynamic expression of PDGFRA and VCAM1. We further profiled Mesp1+ CPM development trajectories using single-cell RNA-seq. This approach enables us to study the heterogeneity of CPM and its derivatives, and to delineate key factors regulating head muscle development.

Figure: Single-cell RNA-seq analysis of Mesp1+ muscle cell fate.
Abstract #14

Name: Daniel Cortez, Hayden Garmon, Jessica Kostecki, Eishani Kumar and Breanna Pederson

Division: Pediatric Emergency Medicine

Status: Undergraduate Students

Research Sponsor: Jonathan Strutt, MD

Training Laryngoscope

It is estimated that 7,000 dental injuries occur in the U.S. every year during unplanned endotracheal intubations. These injuries range from cosmetic damage, which can cost thousands of dollars to repair, to aspiration of tooth fragments. They are caused by excessive force delivered to the teeth via improper use of a laryngoscope blade. These unplanned endotracheal intubations often occur in emergency situations, during which there is a significant amount of stress for the health care provider. Under such conditions, it is imperative that the provider be able to respond swiftly and use the correct technique to ensure a successful procedure. Current products on the market aiming to address this need include force-sensing airway trainers that are large, represent an ideal anatomy, and cost upwards of $1,300 dollars. Our team is approaching this challenge in a radically different way, by making improvements to the laryngoscope itself. We aim to create a device that integrates sensors onto the laryngoscope blade and provides sensory feedback mechanisms in the handle (see Figure 1 for a representation of our device prototype). It will be compact, intuitive, and applicable for training on a variety of anatomies, from idealistic intubation mannequins to cadavers. With this novel device, medical school students, EMTs, and other health care professionals will gain real-time feedback on their laryngoscopy technique, allowing them to make adjustments as they master the procedure. Presently, the team has a working prototype serving as a proof of concept and is on pace to have a final prototype completed by April 1st.

Figure 1: Our prototype which uses a Timesco Callisto Single Use Laryngoscope as the scaffold. (A) indicates the laryngoscope blade and (B) indicates the laryngoscope handle.
Abstract #16

Name: Michael Downey  
Division: Pediatric Blood and Marrow Transplantation

Status: Medical Student (MS4)

Research Sponsors: Ashish Gupta, MBBS, MPH and Angela Smith, MD, MS

Reduced Toxicity Conditioning is Better Tolerated but has Higher Graft Failure Compared to Myeloablative Conditioning in Children with Inherited Metabolic Disorders

Background

Hematopoietic stem cell transplantation (HCT) is a primary treatment option for various inherited metabolic diseases (IMDs). Successful engraftment is crucial for favorable survival which correlates with optimal conditioning, in these patients with an intact immune system. Traditional myeloablative regimens use Busulfan and Cyclophosphamide (BuCy), which is associated with significant morbidity. Alternate reduced toxicity regimens use Busulfan and Fludarabine (BuFlu) to reduce treatment related toxicities.

Objective

To compare outcomes and complications with BuCy and BuFlu based conditioning regimens in patients with IMDs.

Methods

University of Minnesota’s transplant database was investigated retrospectively for patients with IMDs who underwent HCT using BuCy or BuFlu based regimens. Overall survival (OS), the incidence of neutrophil and platelet recovery were determined using standard definitions. Complications such as graft failure, immune cytopenias, sinusoidal obstruction syndrome, hemorrhagic cystitis, respiratory failure, and incidence of viral infections were compared.

Results

Total of 101 patients were studied (BuCy n = 64, BuFlu n = 37) with comparable one year overall survival (81% vs. 85%, figure 1a). The incidence of grade 2-4 acute GVHD was comparable between the two groups. A higher cumulative incidence of graft failure (29% vs 14%, p= 0.08, figure 1b) and immune cytopenias (33% vs 20%, p=0.19, 1c) was noted with BuFlu conditioning. The incidences of adenoviral infection (14% vs. 0%, p=0.02) and hemorrhagic cystitis (23% vs. 3%, p=0.01, figure 1d) were notably higher in the BuCy group. T-cell engraftment occurred significantly sooner with BuCy conditioning until 1-year post transplant, though donor myeloid engraftment was similar in both groups.

Conclusions

Reduced toxicity conditioning leads to lower rates of transplant related complications, but is associated with a high rate of graft failure in patients with IMD. Alternative immunosuppressive agents and donor options warrant consideration to reduce graft failure and minimize toxicities.
Abstract #22

Name: Michelle M. Harbin, MS
Division: Pediatric Epidemiology and Clinical Research
Status: Graduate Student
Research Sponsor: Justin R. Ryder, PhD

Relation of Secondhand Smoke Exposure to Vascular Phenotypes in Children and Adolescents

Michelle M. Harbin, M.S., Aaron S. Kelly, Ph.D., Donald R. Dengel, Ph.D., Kyle D. Rudser, Ph.D., Nicholas G. Evanoff, M.S., Justin R. Ryder, Ph.D.

Introduction

The cardiovascular risks of secondhand smoking exposure among children and adolescents remains unknown.

Methods

We conducted a cross-sectional study of 368 children and adolescents (48.4% male, 12.9±2.8 years), with a total of 57 (15.5%) self-reported cases of secondhand smoke exposure. Measures of arterial elasticity and stiffness, including distensibility, compliance, and incremental elastic modulus (IEM) were obtained with ultrasound in the abdominal aorta, brachial artery, and carotid artery. Brachial artery flow-mediated dilation (FMD) was obtained via ultrasound imaging during reactive hyperemia. Carotid- and radial-aortic blood pressure, and pulse wave velocity were obtained via applanation tonometry.

Results

Secondhand smoke exposed cases were older, had higher body mass index (BMI), and percent body fat (%BF). Unadjusted abdominal aorta diameter distensibility (aDD) (p=0.021) and abdominal aorta cross-sectional distensibility (aCSD) (p=0.019) were significantly lower among the exposed cases; abdominal aorta IEM (aIEM) was significantly higher (p=0.002). After adjustment for tanner stage, sex, BMI, and race most of these differences were no longer significant; however, aIEM remained significantly higher (p=0.028). No significant differences in FMD, brachial and carotid artery distensibility and compliance were observed. Multiple linear regression analysis demonstrated that, with adjustment for tanner stage, sex, hypertension status, and race, secondhand smoking was significantly associated with higher aIEM (b=257.9, p=0.005), lower aDD (b=-1.9, p=0.051), and lower aCSD (b=-4.6, p=0.047). Following adjustment for %BF, only aIEM remained significantly associated with secondhand smoking.

Conclusion

Exposure to secondhand smoke among children and adolescents was associated with increased arterial stiffness in the abdominal aorta, but the majority of vascular measures remained unaffected after adjusting for covariates. These data suggest that exposure to secondhand smoke may predispose children and adolescents to risk factors that affect abdominal aorta stiffness, a vascular bed that previous research has shown to be affected earlier than others.
Abstract #24

Name: Aubrey K. Hubbard, MPH  
Division: Pediatric Epidemiology and Clinical Research  
Status: Graduate Student  
Research Sponsor: Jenny N. Poynter, PhD

International Incidence Comparison and Trends in Ovarian Germ Cell Tumors: 1988 - 2012

Ovarian germ cell tumors (OGCT) are the primary ovarian malignancy affecting girls and young women. International incidence rates for OGCTs have not been compared in the literature and their etiology is not well described. While trends have reportedly been stable, there have been some reports of increasing incidence in 10-19-year-olds. Further, international incidence comparisons could inform etiologic hypotheses. The aim of this analysis was to evaluate geographic variation in OGCT incidence and trends. Rates of OGCT incidence were extracted from Cancer Incidence in 5 Continents (CI5) from 1988-2012. Rates of cancers in women and girls were calculated for ages 0-9, 10-19, and 20-39 years and standardized to the 2015 world population. To overcome small numbers in individual registries, numerators and denominators were aggregated within regions corresponding to the United Nations Statistics Division (UNSD) geoscheme. Incidence rates were compared in subregions and average annual percent change (AAPC) was estimated using Poisson regression.

Overall, the highest incidence rates were observed in 10-19-year-olds. Incidence was generally the highest in Eastern Asia, Central America and North America. While incidence was variable by geographic region, the variation was low in 0-9-year-olds. Significant increases in incidence were seen in some regions (Eastern Asia, Oceania, Western Europe, Southern Europe, and North America) and in countries with a high or very high human development index for one or more age groups.

Evaluating 25 years of OGCT incidence data, the highest incidence rates and largest increases in incidence were seen in Eastern Asia. Future studies should focus on etiologic features that may account for geographic variation and increases in incidence of OGCT.
Figure 2: Ovarian germ cell tumor incidence (per million) by geographic subregion for each age group during 2008-2012

*Incidence was not calculated or plotted for regions with less than 5 cases.*
Abstract #26

Name: Anthony Landas & Nick Smith          Division: Pediatric Hospital Medicine
Status: Undergraduate Students             Research Sponsor: Michael Pitt, MD

Location, Location, Location (+/- Design): A Crossover Study of Poster Engagement

Background

There is a growing emphasis on creating visually appealing and readable posters.

Objective

Evaluate the effect of poster design on viewer engagement.

Methods

We submitted two similar abstracts to PRESS in 2018 describing real ethics cases about parental involvement in end of life care (one on withdrawing total parental nutrition; another about initiating comfort-only feeds). For each abstract, we created two posters – one using the traditional university poster template and one using a stylized infographic (Fig 1).

One poster was hung as the infographic, with the other poster topic hung as the template across the room. After one hour, each poster was switched to the opposite design for the second hour. Hidden observers counted how many people entered the conference room, and how many stopped and viewed each poster for 5 seconds or more. The posters were unmanned and used pseudonyms.

Results

212 people entered the conference room during the poster sessions (126 for the first hour, 86 for the second). When comparing each abstract to itself (between session 1 and 2), a slightly higher percentage of attendees engaged with the infographic design than the template version (16.2% vs 15.1% for poster 1 and 3.2% vs 1.2% for poster 2). The layout of the room with conference table placement and people made poster 2 difficult to access, however, and accordingly there was a large discrepancy between engagement the two posters with the more accessible poster receiving sevenfold engagement compared the other poster.

Conclusion

In our crossover pilot at a single conference, there was slightly more engagement of posters using the infographic style when compared to the same abstract being presented in template form. While not the intended study question, the location of the poster appears to have a large effect on engagement with easier access leading to more interaction.
Got Records? Implementation of Standardized Rapid Response Team Documentation in a Children’s Hospital

Background

Rapid response teams (RRTs) provide rapid assessment and intervention for patients exhibiting signs of deterioration on the floor. RRTs have been shown to decrease intensive care unit (ICU) admissions and length of stay, decrease failure-to-rescue codes, and increase patient and family satisfaction. While the University of Minnesota Masonic Children’s Hospital has an RRT in place, our audit of RRTs demonstrated that documentation occurs in multiple places, is filled out inconsistently, and is missing one or more of literature-supported key elements. Our goal is to create and implement a standardized EPIC RRT dot phrase that will improve RRT documentation and allow for better communication regarding RRTs between staff.

Methods

A retrospective electronic medical record chart review of RRTs called at UMMCH was conducted. Multidisciplinary input allowed for creation of a literature-supported best-practice EPIC dot phrase for RRTs that includes six elements of standard of care for RRTs. We are currently in our first PDSA cycle of implementing this dot-phrase. Our outcome measure consists of comparing RTT outcome and follow-up documentation and a balancing measure of staff satisfaction via pre- and post-implementation surveys.

Results

We expect that the standardized EPIC RRT dot phrase will improve RRT documentation, communication, and follow-up and that this dot phrase may be implemented at other patientcare areas across the institution

Discussion

The implementation of a standardized RRT dot-phrase will make RRT documentation more consistent and encourage more complete documentation given its ease of use. In addition, it will improve communication between staff and allow tracking of future RRTs. If successful, our goal is to implement this system-wide and to facilitate audits of RRT encounter. This may also enable the RRT to be more fully utilized in an anticipatory manner in borderline or potentially vulnerable patient transitions within the hospital setting.
Abstract #30

Name: Jenna Ruggiero, Emma Schaffer, Jane Goodson, Kanchan Hulasare

Division: Pediatric Hospital Medicine

Status: Medical Students Research Sponsor: Jordan Marmet, MD

Making Communication Click between Patients and Providers on Pediatric Inpatient Rounds

Objective

Evaluate provider medical jargon use in order to improve patient perception of communication by 20% within 6 months.

Methods

As an intervention, the inpatient care team provided the patients/parents with a clicker at the start of rounds and instructed the patient/parent to click every time “jargon” (a word or phrase was used that they did not understand) was used. After a week of using the clicker, the inpatient team was given a survey to evaluate their perception of their own communication and jargon use pre and post clicker intervention. This was done weekly for 6 months.

Results

Pre-intervention, 50% of providers rated their jargon use as moderate, 33% of providers rated their jargon use as light, and 17% of providers rated their jargon use as almost none. Post-intervention, 66.7% of providers rated their jargon use as light and 33.3% of providers rated their jargon use as almost none. Providers indicated mixed perception of patient comfort level in interrupting the medical team via the clicker. 50% of providers felt the clicker had a minor negative impact on the flow of rounds.

Conclusion

It is well known that physician to patient communication and vice-versa impacts patient outcomes. Specifically, as medical jargon decreases, patient outcomes improve. After the introduction of the clicker intervention, providers perceived themselves as using less jargon overall. However, due to the small sample sizes, limited conclusions could be drawn from this data. Many barriers were met during this study, such as resistance to using the clicker by medical teams, high number of patients on isolation or requiring an interpreter, and various other quality improvement studies simultaneously being conducted.
Abstract #32

Name: Octavia S. Ruelas  
Division: Pediatric Hematology / Oncology  
Status: Medical Student (MS2)  
Research Sponsor: Marie Steiner, MD

Standardization of Central Venous Catheterization in Pediatric Patients in the ICU at the University of Minnesota Masonic Children’s Hospital

Introduction

Central venous catheterization (CVC) is performed in critically ill patients for medication delivery and blood sampling. Unfortunately, it is invasive and associated with risks of thromboembolic events, bloodstream infections, and other potential safety complications. Practice variability among healthcare providers precludes evaluation of best practice, quality, and risk management. Our goal was to standardize CVC placement focusing on: 1) controlling risk of bloodstream infections, 2) reducing frequency of associated clot burden events post procedure, 3) utilizing dual confirmation techniques to confirm ideal line placement, and 4) standardizing documentation in the electronic health record (EHR) for future QI metrics.

Methods

Onboarding involved interdepartmental input from Interventional Radiology, Pediatric Intensive Care, Vascular Access, Pediatric Surgery, and Informatics. Initially, we created a single-page document that contained the factors we wanted to measure (ultrasound-guided placement, catheter-to-vein ratio measurement, and dual confirmation of line placement) to be used whenever a CVC was placed in the CVICU/PICU. Further input from stakeholders requested merging our proposed metrics with their preexisting procedural documentation. We subsequently created an electronic template (“smartphrase”) in the EHR that combined the documentation previously in use with our proposed measurements relevant to risk modulation as supported in current literature and Solutions for Patient Safety Cohort (SPS).

Results

Currently, the smartphrase is in use by providers in the CVICU and PICU. Its use is monitored and metrics from each CVC placement are documented in a categorized spreadsheet. Data collection will be used as a guideline to implement relevant and necessary components to CVC standardization. We anticipate other departments that routinely perform central line placement in pediatric patients will be onboarded.

Discussion

We anticipate that implementation of the smartphrase will create better organization in the EHR and improve patient outcomes. Formal data analysis on the frequency and types of adverse events after standardization implementation is ongoing.
Abstract #33

Name: Katie J. Tastad, MPH  Division: Pediatric Epidemiology and Community Health

Status: Graduate Student  Research Sponsor: Mark R. Schleiss, MD

Stated Acceptability of Newborn Cytomegalovirus Screening

Background

Congenital cytomegalovirus (cCMV) is the most common cause of birth defects in the U.S. Screening newborns for cCMV enables early intervention and treatment. Only ~20% of infants born with cCMV develop symptoms; newborn screening alone cannot determine which infants will be affected. Since ~80% of infants with cCMV have normal long-term outcomes, universal screening that identifies asymptomatic infections may lead to unnecessary medical evaluations or treatments. Although its value remains unproven, interest in universal cCMV screening is increasing. We therefore aimed in this study to assess the acceptability of CMV screening among women of reproductive age.

Methods

We constructed an index of cCMV screening acceptability based on responses of female Minnesota residents aged 18-44 at the 2018 Minnesota State Fair. Ten index items were selected based on face validity, uni-dimensionality, and variance of responses. Cross-tabulations and correlation coefficients were used to identify empirical relationships between items in the index. We assessed differences in index score by pregnancy history, attitudes towards newborn vaccination, and attitudes towards screening for genetic conditions using multiple linear regression.

Results

Of 746 participants, 254 had been or were currently pregnant (34%); 226 had worked in healthcare (30%). The mean index score was 25, and scores ranged from -3 to 37. Index score was not associated with pregnancy history (p=0.44) or acceptability of childhood vaccines (p=0.88) but was associated with acceptability of screening for rare, treatable genetic disorders (p<0.01) and having heard of CMV previously (p<0.01).

Conclusions

Women in our study were overwhelmingly supportive of newborn screening for cCMV. As states consider legislation mandating targeted or universal newborn screening for cCMV, these results should be considered as evidence that screening is acceptable to women of childbearing age. Future analyses will establish groups of acceptability (accepting, undecided, and unaccepting) and examine which factors may be most influential.
Abstract #34

Name: Matthew Pappas  Division: Pediatric Blood and Marrow Transplantation

Status: Undergraduate Student  Research Sponsor: Sunny Chan, PhD

Efficient Cardiac Differentiation of MESP1+ Mesoderm

Cardiac and skeletal myogenesis are generally regarded as distinct processes. However, a population of progenitors exists that develops into both the second heart field and cranial skeletal muscle. The embryonic progenitor population that can give rise to both cardiac and skeletal muscle is known as cardiopharyngeal mesoderm (CPM). Progenitors that are functionally similar to CPM can be generated by induction of transcription factor MESP1 in mouse embryonic stem cells. The development of these progenitors can be directed toward cardiomyogenesis by activation of BMP signaling and by inhibition of the TGFβ signaling pathway. This work seeks to optimize MESP1 induction and TGFβ inhibition in order to maximize the efficiency of cardiomyogenesis. Expression of cardiac-specific markers and beating capacity are analyzed in order to determine the maximally efficient windows of transient MESP1 induction and TGFβ inhibition. Optimized development of MESP1+ mesoderm derived cardiomyocytes without the use of prohibitively expensive growth factors provides a suitable source of this unique cell population for further study.
Abstract #38

Name: Abigail Schnaith  Division: Pediatric Emergency Medicine
Status: Undergraduate Student  Research Sponsor: Jeff Louie, MD

Dog Bites to Children Managed at an Academic Level III Pediatric Trauma Center

Introduction

According to the CDC more than 4.5 million people are bitten by dogs annually and greater than 800,000 need medical attention. Children are particularly vulnerable to facial injuries, such as nose and cheek due to their short stature. Published reports are primarily from Level I Pediatric Trauma Centers. In this study, we sought to be the first Level III Trauma Center to describe dog related injuries.

Methods

This was a retrospective case series from January 1, 2013 until October 31, 2018. Medical record numbers were obtained from the Trauma Registry. Variables abstracted included age, gender, type of analgesics administered, human and canine vaccination status, subspecialty involvement, location (ED or OR) of primary repair, location(s) of injury, disposition, length of stay, injury severity score, description of patient arrival, post-repair infection, and antibiotic use in ED.

Results

50 children met our dog bite criteria. The mean age was 5.2 years (range 8 months-14.5 years) with a median age 3.8 years. There were 21 males (42%) and 29 females (58%). Of the 50 children there were 106 injuries, an average of 2 injuries/child. There were 75 consults to specialists placed. The majority of the children (47 patients, 94%) were transferred from outside hospitals. 23 patients (46%) required an injury repair in the Operating Room. The median Injury Severity score was 1. The majority of the dog bites occurred above the neck (42 patients, 84%). There were no deaths.

Conclusion

In this small cohort, the majority of patients were transferred from outside hospitals, had injuries above the neck, and required operative repair of their injuries. The children seen in our ED had an average of 2 wounds and 1.5 specialist consultations per child. Children requiring specialist consultation and/or OR management were significantly more prevalent than in previously reported literature.
Abstract #40

Name: Pooja Brar
Division: General Pediatrics and Adolescent Health
Status: Graduate Student, LEAH
Research Sponsor: Sonya Brady, PhD

Adolescent Condoms and Pleasure Beliefs in Association with Sexual Self-Efficacy

Sexual self-efficacy is key to understanding adolescent women’s ability to use condoms for prevention of pregnancy and sexually transmitted infections and to refuse sex without condoms. Bandura posited that weak sexual self-efficacy can increase the likelihood of engaging in risky sexual behaviors because of inability to manage intrapersonal, interpersonal, and social factors that promote risk.

This study is a secondary data analysis of 128 sexually active adolescent women (14-18 years) who participated in an online, interactive intervention promoting condom use and healthy romantic relationships. Women were recruited through community clinics and schools. Analyses examined (1) whether adolescent women’s beliefs that condoms interfere with sexual pleasure were associated with their self-efficacy to both refuse sex without condoms and use condoms, and (2) whether these associations were moderated by women’s perception of her partner’s belief that condoms interfere with pleasure.

Bivariate correlations indicated that her belief condoms interfere with pleasure was significantly associated with both self-efficacy to refuse sex without condoms, $r = -.24, p < .001$, and use condoms, $r = -.24, p < .001$. Her perception of partners’ belief that condoms interfere with pleasure was also significantly associated with both her self-efficacy to refuse sex without condoms, $r = -.25, p < .001$ and use condoms, $r = -.24, p < .001$. In the regression analysis, perceived partner belief that condoms interfere with pleasure ($\beta = -.20, p < .05$) was associated with women’s lower self-efficacy to refuse sex without condoms (Table 1). No significant findings were observed for self-efficacy to use condoms.

Perceiving that a partner believes condoms interfere with pleasure may hinder women’s confidence to refuse sex without condoms. If both adolescent men and women can be taught to view condoms as part of the dance of sexual intimacy, condoms may be accepted rather than viewed as a hindrance to sexual pleasure.

<table>
<thead>
<tr>
<th>Table 1: Regression Analysis for Self-Efficacy to Refuse Sex Without Condoms and Self-Efficacy to Use Condoms</th>
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</thead>
<tbody>
<tr>
<td>Variable</td>
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<td>------------</td>
</tr>
<tr>
<td>Age</td>
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<tr>
<td>Race/Ethnicity</td>
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<tr>
<td>Study Group</td>
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<tr>
<td>Hormonal/IUD Contraception</td>
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<tr>
<td>Multiple Partners</td>
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<tr>
<td>Her belief condoms interfere pleasure</td>
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<tr>
<td>Partners belief condoms interfere pleasure</td>
</tr>
<tr>
<td>Her*His pleasure belief</td>
</tr>
<tr>
<td>$R^2$</td>
</tr>
</tbody>
</table>

Note. * $p < .05$, ** $p < .01$
Abstract #42

Name: Danielle Brewer
Division: Pediatric Blood and Marrow Transplantation
Status: Medical Student
Research Sponsor: Christen Ebens, MD, MPH

Cerebral Toxoplasmosis in a Pediatric Post-Hematopoietic Stem Cell Transplant Patient

Introduction

Cerebral toxoplasmosis is a rare but serious complication of allogenic hematopoietic stem cell transplantation (HSCT). Caused by the protozoan parasite Toxoplasma gondii, toxoplasmosis most often occurs as a result of reactivation of latent infection in immunocompromised patients. It is the most common opportunistic infection of the central nervous system (CNS), with greatest prevalence noted in populations with severe immunodeficiencies such as advanced acquired immunodeficiency syndrome (AIDS). Incidence of post-HSCT toxoplasmosis is speculated to range from 0.3% to 9%, with great variation between endemic and nonendemic countries. Although the incidence and treatment of toxoplasmosis in post-HSCT patients has been reported, few studies have focused specifically on CNS toxoplasmosis in pediatric patients.

Case

Here we describe a case of Toxoplasma CNS infection in a 13-year-old male 9 months after an HLA-matched unrelated donor bone marrow transplant for severe aplastic anemia. This patient had significant risk factors for opportunistic infection, including prolonged neutropenia and lymphopenia, post-HSCT immunosuppression (tacrolimus or sirolimus for graft-versus-host disease prevention, rituximab for EBV viremia, steroids and rituximab for immune mediated cytopenias), and possible hematopoietic graft failure (bone marrow cellularity declined to 5-10% immediately prior to diagnosis). With clinical symptom of severe headaches, a brain MRI was obtained revealing numerous enhancing cerebellar and cerebral lesions (Fig 1). Toxoplasma gondii diagnosis was made on day +309 post-HSCT with positive CSF PCR and serum cell free DNA testing. Currently the patient has completed 1 week of first-line therapy with sulfadiazine and pyrimethamine. His anticipated treatment course will be dependent upon his immune system recovery and response to therapy, monitored by routine evaluation of neurologic status and repeat neuroimaging and lumbar puncture after 4 weeks of therapy.

Discussion

This case hopes to demonstrate the successful treatment of cerebral toxoplasmosis in a severely immune suppressed pediatric post-HSCT patient.

Fig 1.
Anchoring Bias and Failed HEADSS Assessment in a Case of Fitz-Hugh-Curtis Syndrome

Perihepatitis (Fitz-Hugh-Curtis syndrome) is a manifestation of Pelvic Inflammatory Disease (PID) that presents with right upper quadrant (RUQ) pain due to inflammation of the liver capsule and adjacent peritoneal surfaces. Generally caused by Neisseria gonorrhoea and Chlamydia trachomatis, the diagnosis is often masked due to the severity of RUQ pain and focal tenderness on exam suggesting other abdominal causes. We report the case of a 15-yo girl who presented from an outside hospital with 3 weeks of unrelenting, waxing and waning RUQ pain suspected to be caused by inflammatory bowel disease. After extensive imaging and workup was inconclusive for other causes of her abdominal pain, exploratory laparoscopy revealed Fitz-Hugh-Curtis Syndrome (FHCS). On subsequent chart review, it was found that no sexual history or HEADSS assessment had ever been documented. Upon performing a HEADSS assessment, the primary team discovered that the patient had a history of multiple sexual partners. This case illustrates the importance of performing routine HEADSS assessments on adolescent patients as well as keeping a broad differential diagnosis to avoid anchoring on previously suggested diagnoses.
Figure 1: Front and Back of Procedure Cards

<table>
<thead>
<tr>
<th>Block:</th>
<th>Observe</th>
<th>Perform</th>
<th>Perform</th>
<th>Perform</th>
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<tbody>
<tr>
<td>Delivery room lead</td>
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<td>Line placement</td>
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<tr>
<td>Intubation</td>
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<tr>
<td>Lumbar puncture</td>
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<tr>
<td>Other</td>
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</tbody>
</table>

**Describe procedure:**

**General procedure functions for competency:**
- Demonstrate the technical (motor) skills required for the procedure.
- Understand and explain the anatomy, physiology, indications, risks, contraindications, benefits, alternatives, and potential complications of the procedure.
- Communicate with the patient/family to ensure pre- and post-procedure explanation and instructions.
- Manage post-procedure complications.
- Demonstrate confidence that puts patients and families at ease.

**Stages toward competency**
1. Observe
2. Assist
3. Perform with direct supervision
4. Perform with indirect supervision
5. Perform independently
Abstract #52

Name: Baila Elkin, Tobias Donlon, Anna Dovre, Marvin So, Katherine Beck-Esmay, Kristin Chu, Kylie Blume

Division: Pediatric Hospital Medicine

Status: Medical Students

Research Sponsor: Matthew Armfield

Advancing Effective Healthcare for Sexual and Gender Minority Pediatric Patients: an Evaluation of the LGBTQIA+ Symposium

Background

Multi-level factors including stigma, social inequity, and lack of awareness among healthcare providers drive health disparities experienced by LGBTQIA+ populations. To address this, the Sexual and Gender Minority Health Initiative organized a three-hour Symposium focusing on care for LGBTQIA+ children and youth. We hypothesized that participating in the Symposium, involving interprofessional didactic and active learning components, would promote increased effectiveness working with this population.

Methods

67 individuals completed a retrospective post-then-pre evaluation survey. Respondents included graduate students (48%), undergraduate students (12%), healthcare providers (21%), and community members (19%). The survey assessed five indicators of Symposium effectiveness: knowledge about this population, comfort in discussing their healthcare needs, confidence in finding resources, comfort in interacting with this population, and comfort in recommending care for this population. We conducted 1-tailed paired t-tests to evaluate the effectiveness of the Symposium, and ANOVA tests to compare differences by professional role.

Results

Participants reported significantly higher (p<0.001) scores across all five measures of effectiveness from pre- to post-Symposium. By role, scores significantly improved (p<0.05) for all measures except comfort in interacting with LGBTQIA+ pediatric patients or clients among (1) undergraduates and (2) community members. Although not significant, we found a trend showing healthcare providers seeing the greatest value and relevance in the Symposium’s active-learning component compared to other groups. Groups who did not find the session relevant (average rating of <4 on a 1-5 scale) found it useful in contextualization.

Conclusions

Our results indicate that the Symposium was effective in increasing participants’ effectiveness in serving LGBTQIA+ pediatric patients, even within the short timeframe. This demonstrates that an educational model including interprofessional didactic and active learning components is an effective way to increase proficiency in pediatric LGBTQIA+ health and other specialized topics that may not be sufficiently addressed by traditional education.
Fig. 1

Bar graph showing pre- and post-Symposium responses across five measures of effectiveness. Error bars show 95% confidence intervals. Pre- and post-symposium results are significantly (p<0.05) different for all five measures. n57.
Abstract #54

**Name:** Tanisha Ronnie  
**Division:** Pediatric Emergency Medicine  
**Status:** Medical Student  
**Research Sponsor:** Jeff Louie, MD

**PRESsed for Diagnosis: a Case of Reversible Vascular Encephalopathy**

A 10-year-old female with a history of systemic lupus erythematosus (SLE), lupus nephritis, secondary hypertension, and cardiomyopathy presented to an emergency department with acute onset of vision change that she described as “a shadow coming over her eyes” and disorientation. Her parents noted that she had been bumping into furniture and had seemed confused. Vitals upon arrival included blood pressure of 154/116, heart rate of 113, respiratory rate of 20/min, and weight of 35.2 kg. She was afebrile and visual acuity bilaterally was 20/200. There was mild abdominal distention on physical exam, but was otherwise unremarkable. Blood pressures at home were reportedly well controlled. Differential diagnosis included CNS vasculitis, posterior reversible encephalopathy syndrome (PRES), venous sinus thrombosis, intracranial hemorrhage, posterior circulation stroke, seizure disorder, infective encephalitis, metabolic/toxic encephalopathy, and autoimmune encephalitis.

During an ophthalmology consult, the patient lost bladder control, had noticeable altered mental status with left eye deviation, lip smacking, and a rise in blood pressure to 170/100. Multiple doses of IV Hydralazine and Versed were given, followed by a loading dose of Fosphenytoin. She required intubation. Head CT revealed focal hypoattenuating areas within the right occipital, bilateral posterior frontal and parietal cortex, and subcortical areas (Figure 1). CXR showed cardiac silhouette enlargement and mild pulmonary vascular congestion. Lab results showed a Hgb 8.5 g/dL, normal platelets, CRP < 2, ESR 44mm/h, negative troponin, BNP 8792 pg/ml. UA revealed proteinuria and hematuria.

The patient was transferred to the PICU with probable diagnosis of PRES and status epilepticus. MRI was consistent with vasogenic edema, small petechial hemorrhage in the posterior left paramedian parietal lobe, with scattered bilateral superimposed foci of restricted diffusion. Given the patient’s past medical history, clinical findings of headache, altered mental status, hypertension and visual changes, a diagnosis of PRES was made and confirmed with head imaging.

**Figure 1:** Head CT with areas of hypcatteruation in the right parietal (Image 1) and left parietal lobes (Image 2)
Henoch-Schonlein Purpura (HSP) is the most common vasculitis affecting children, and typically causes a palpable purpuric rash on the legs and buttocks, arthritis, gastrointestinal symptoms, and sometimes nephritis. HSP is diagnosed clinically based upon these typical findings. It typically self-resolves within 6 weeks, and is often treated with supportive measures. HSP is almost never associated with malignancies in children but has been associated with malignancy in adults. Here we describe a 7-year-old boy who presented with classic features of HSP, but who was found to have neuroblastoma. He initially presented to an emergency department with purpuric rash on the legs and buttocks, joint pain, stomachache, scrotal swelling, mild microscopic hematuria, and fever. He was diagnosed with HSP and given a course of corticosteroids with improvement of most of his symptoms. However, several weeks later, symptoms worsened again and he was referred to pediatric rheumatology for further management. There, he was ill-appearing on exam, had significant tenderness with range of motion of the hips, and lab work showed a higher degree of inflammation than would be expected for HSP (erythrocyte sedimentation rate 78, c-reactive protein 71.4 mg/dl) and a hemoglobin 8.7 g/dl. The differential diagnosis included atypical HSP, other systemic vasculitides, inflammatory bowel disease, systemic juvenile idiopathic arthritis, and malignancy. A peripheral smear showed a mild leukoerythroblastic reaction raising a concern for a nonhematopoietic malignancy. Bone marrow biopsy confirmed an infiltrative neuroblastic tumor. Further imaging revealed a tumor in the right hepatorenal recess with metastasis into the spine. Biopsy of the tumor identified poorly differentiated neuroblastoma. Although this patient presented with classic features of HSP, he also had atypical features including persistent fever, severe limb pain, and a high degree of systemic inflammation. This case highlights the importance of searching for underlying malignancy in children with atypical presentations of HSP.

Co-Authors:

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Abstract #64
Name: Hayley Sharma
Division: Global Pediatrics
Status: Medical Student
Research Sponsor: Cynthia Howard, MD, MPHTM & Charles Oberg, MD, MPH

Post-traumatic Stress Disorder in Unaccompanied Refugee and Asylum-seeking Minors: a Literature Review

Background
Worldwide, up to 50 million children have migrated across borders or been forcibly displaced, with 300,000 unaccompanied or separated. Post-traumatic stress disorder (PTSD) is prevalent among refugee minors, with its negative effects thoroughly studied, but few studies have been done regarding PTSD in unaccompanied refugee and asylum-seeking minors.

Objective
Review literature regarding PTSD in unaccompanied refugee and asylum-seeking minors; define what factors separate this group in PTSD prevalence; identify effective interventions; and introduce the Budapest Declaration as a quality advocacy policy.

Methods
Databases searched included Ovid Medline, Embase, and Cochrane Library, from January 1, 2008, through September 9th, 2018. 2,046 abstracts were screened by 2 independent reviewers and were included if the research mentioned PTSD and studied refugee and/or asylum-seeking minors. From this, 31 full texts were screened, with 8 chosen that specifically studied unaccompanied refugee and asylum-seeking minors.

Results
Unaccompanied refugee minors have a higher prevalence of PTSD at 34-68% than accompanied refugee minors at 19-54%. There were four exacerbating factors: Cumulative trauma, semi-independent living, legal status uncertainty, and daily stressors. Three protective factors were indicated: Having family, especially mother, secured refugee status, and resiliency. Four interventions tested effective: Trauma-Focused Cognitive Behavioral Therapy (TF-CBT), Narrative Exposure Therapy (KIDNET), TF-CBT and group-processing mixed therapy (“Mein Weg” My Way), and meditation.

Conclusion
With a high prevalence of PTSD in unaccompanied refugee and asylum-seeking minors, the Budapest Declaration on the Rights, Health, and Well-Being of Children and Youth on the Move proposed by the International Society for Social Pediatrics and Child Health (ISSOP) would be a helpful advocacy policy that would ensure that these children receive full legal rights, a holistic response to their health needs using evidence-based protocols, and trauma-informed, culturally-sensitive care.
Abstract #66

Name: Paul Chatterton

Division: Pediatric Emergency Medicine

Status: Medical Student (MS3)

Research Sponsor: Jeff Louie, MD

Unilateral Renal Abscess in Healthy 16-Year-Old Male

Paul Chatterton, Kelly Dietz MD, Michael Murati MD, Jeff Louie MD

Renal abscesses are a rare but serious infection in the pediatric population. Early diagnosis and initiation of treatment are important in reducing morbidity and mortality. This case report highlights an important but atypical presentation. A previously healthy 16-year-old male, without risk factors, presented to a community emergency department within two weeks of symptoms, which included nausea and vomiting along with one day of new onset right-sided abdominal pain. Diagnosis of unilateral right sided renal abscess was made incidentally via abdominal CT scan. Broad spectrum IV antibiotics were started, and the patient was transferred and admitted to a pediatric academic hospital. Upon admission, a thorough review of systems elucidated pertinent additional information, including two weeks of anorexia, night sweats, and a 10-pound weight loss. Although not often necessary, the patient in this case report required percutaneous drainage of abscess due to failure to improve with broad spectrum antibiotics alone. Abscess aspirate cultures grew a single organism, pan-sensitive streptococcus intermedius, a rare but well understood cause of deep-seated abscesses. The patient improved post abscess drainage and was discharged to finish three weeks of IV antibiotics without further complication. This case report highlights an atypical but important presentation of a rare disease that without proper history gathering and diagnostic workup could easily be missed and therefore result in a critical delay in treatment.

Figure 1: Complex area in the upper pole of the right kidney with central decreased echogenicity. Area measures 4.6 x 4.0 x 4.3 cm. No evidence of hydropnephrosis or congenital malformation.
POSTER SESSION A

Pediatric Research, Education and Scholarship Symposium (PRESS) - April 5th 2019

Pediatric Resident Abstracts
Abstract #18

Name: Meghan Fanta, MD  
Division: Neonatology  
Status: Pediatric Resident  
Research Sponsor: Johannah Scheurer, MD

Increasing Procedural Skills by Empowering Pediatric Residents in a Quaternary Neonatal Intensive Care Unit

Meghan Fanta, Emily Borman-Shoap, James Gray and Johannah Scheurer

Background

Residents desire increased procedural skill development; they are not performing enough procedures to feel competent in practice. We expect residents to become competent in procedures, per the Entrustable Professional Activities (EPA) for General Pediatrics. Competing needs of learners and lack of understanding about progression of procedural skill performance are obstacles to obtaining procedural experience.

Objectives

To empower residents to increase procedural skill practice including neonatal endotracheal intubation, umbilical venous catheter placement, and lumbar puncture, as specified in EPA 17. To clarify expectations about procedures during NICU rotations.

Methods

Our intervention was development and distribution of procedure checklist cards (Figure 1). Post-intervention surveys assessing intervention efficacy were sent to residents after completion of their rotation. Number of procedures were tracked via procedure cards.

Results

Nine interns completed the survey (100%) and 4 upper level residents completed the survey (40%). 83% of residents agreed (from strongly to somewhat) that the NICU procedure card helped empower them to take part in procedural and delivery room opportunities. Six residents (24%) returned procedure cards at the end of rotation; 100% of residents performed at least one procedure. Residents performed 9 umbilical line placement procedures, 0.36 procedures per resident month compared to 0.06 per resident month (3 total) electronically logged procedures in 2017-2018.

Conclusions

Early post-intervention surveys and procedure numbers versus a historical control give preliminary evidence suggesting increased NICU procedures since procedure card implementation. Future project cycles will seek to increase card usage through education of the entire care team.
Figure 1: Front and Back of Procedure Cards

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</table>

**Describe procedure:**

**General procedure functions for competency:**

- Demonstrate the technical (motor) skills required for the procedure.
- Understand and explain the anatomy, physiology, indications, risks, contraindications, benefits, alternatives, and potential complications of the procedure.
- Communicate with the patient/family to ensure pre- and post-procedure explanation and instructions.
- Manage post-procedure complications.
- Demonstrate confidence that puts patients and families at ease.

**Stages toward competency**

1. Observe
2. Assist
3. Perform with direct supervision
4. Perform with indirect supervision
5. Perform independently
Abstract #29

Name: Megan Gubichuk, MD  
Division: Internal Medicine  
Status: Pediatric Resident  
Research Sponsor: William Gershan, MD

Improving Act Administration in a Pediatric Pulmonology Practice

Introduction

1 in 12 children (8.3%) in the U.S. are affected by asthma. Asthma control should be assessed at each office visit, guiding therapeutic modification. The Asthma Control Test (ACT) is the cornerstone of this assessment. The ACT was infrequently utilized in the Pediatric Pulmonology clinic, leading to a decline in asthma control compared to other area practices. This project sought to determine the baseline frequency of administration as well as to implement an effective strategy to increase ACT administration in eligible visits, thereby meeting standard of care and improving patient care.

Methods

The study period occurred between April 1st, 2018 and January 1st, 2019. Patients were selected based on diagnosis of asthma in the medical record. 359 eligible patients were reviewed retrospectively at the completion of the baseline period and each intervention period. Using the flowsheet feature in EPIC, ACT administration was assessed for each visit and documented. The goal rate of administration was 70 percent.

Baseline data was obtained from a period of April 1st to June 13th. The primary intervention occurred over a subsequent 15-week period. This consisted of an alert, placed in the electronic health record by a nurse, that identified eligible patients in advance and instructed rooming staff to administer ACT upon rooming.

The secondary intervention consisted of a single educational session during which a clinical nurse instructed rooming staff on how to identify eligible patients independently and administer ACT upon rooming. Final data collection and statistical analysis occurred following completion of this 12-week study period.

Results

In the baseline period, 48.9% of eligible patients received an ACT. This improved to 70.7% during the primary intervention and 62.7% during the secondary intervention. The results indicate difficulty sustaining administration at goal range. Further study is necessary to identify alternative strategies for sustaining ACT administration long-term.
Table 1: Percentage of ACT administration at baseline, during primary intervention, and secondary intervention. Goal administration was 70%.
Abstract #31

Name: Aaron Westreich, MD
Division: Pediatric Emergency Medicine
Status: Pediatric Resident
Research Sponsor: Manu Madhok, MD

Factors Affecting Admission and Length of Stay in Patients with Influenza-associated Myositis

Aaron Westreich, MD, Jing Jin, MS, CCRP, Aashika Ramkumar, Manu Madhok, MD

Introduction

Influenza-associated myositis (IAM) is often seen in children who present with Influenza-like illness and leg pain. Better understanding of its expected course would allow for more standardized treatment. The aim of this study is to describe the clinical and laboratory profiles of patients presenting with IAM and to identify features affecting admission and length of stay (LOS).

Methods

A retrospective chart review was conducted on patients presenting to a pediatric ED between 10/1/2014-4/30/2018 with Influenza-like illness and myositis. Chi-sq, t-test and logistic regression were implemented to compare clinical and laboratory features between admission and non-admission groups (Table 1), and in the admission group between patients with short (≤ 2 days) and long (>2 days) LOS. Statistically significant results are defined as p≤0.05.

Results

123 cases met our inclusion criteria. The median age of patients was 6.6 years and 86 patients were male (70 %). 119 cases (97%) reported difficulty/refusal to ambulate. 106 (86%) experienced calf pain. 119 (98%) patients presented with elevated Creatinine Phosphokinase (CPK). Primary treatments were IV fluids (90%) and pain control (65%). Longer duration of leg pain (1.6 vs. 0.5 days, p=0.0007) and higher CPK values (5133 vs. 1199, p<0.0001) increased rate of admission. The median LOS for admitted patients was 2.1 days. Patients with higher maximum temperatures (38.1°C vs. 37.5°C, p=0.0035) were more likely to be hospitalized for more than 2 days.

Conclusions

Our results indicate that providers are more likely to admit patients with longer duration of leg pain and higher CPK levels. Due to a small cohort of admitted patients, we were unable to determine which variables most affected LOS and discharge readiness. A multicenter study with a larger population is required.
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Patients admitted</th>
<th>Patients discharged from ED</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Age (mean) in years</td>
<td>6.7</td>
<td>6.5</td>
<td>Not significant</td>
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<tr>
<td>Gender</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Female</td>
<td>21 (17.1%)</td>
<td>16 (13%)</td>
<td>Not significant</td>
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<tr>
<td>Male</td>
<td>56 (45.5%)</td>
<td>30 (24.4%)</td>
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<td>History of influenza vaccine</td>
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<td>No</td>
<td>68 (55.3%)</td>
<td>41 (33.3%)</td>
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<td>9 (7.3%)</td>
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<tr>
<td>Tamiflu given before ED visit</td>
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<td></td>
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<tr>
<td>No</td>
<td>68 (55.3%)</td>
<td>41 (33.3%)</td>
<td>Not significant</td>
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<tr>
<td>Yes</td>
<td>9 (7.3%)</td>
<td>5 (4.1%)</td>
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<tr>
<td>Type of Influenza</td>
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<td>0.0033</td>
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<tr>
<td>Type A</td>
<td>19 (15.5%)</td>
<td>9 (7.3%)</td>
<td></td>
</tr>
<tr>
<td>Type B</td>
<td>40 (32.5%)</td>
<td>12 (9.8%)</td>
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<tr>
<td>Negative rapid antigen testing*</td>
<td>7 (5.7%)</td>
<td>4 (3.3%)</td>
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<tr>
<td>Positive but type not specified</td>
<td>3 (2.4%)</td>
<td>5 (4.1%)</td>
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<tr>
<td>Untested</td>
<td>8 (6.5%)</td>
<td>16 (13.0%)</td>
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<td>Influenza test</td>
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<td>Positive</td>
<td>62 (50.4%)</td>
<td>26 (21.1%)</td>
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<tr>
<td>Negative</td>
<td>7 (5.7%)</td>
<td>4 (3.3%)</td>
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<tr>
<td>Untested</td>
<td>8 (6.5%)</td>
<td>16 (13%)</td>
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<tr>
<td>Level of difficulty in ambulating</td>
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<td>Not significant</td>
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<tr>
<td>Refusal to walk</td>
<td>55 (44.7%)</td>
<td>25 (20.3%)</td>
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<tr>
<td>Having difficulty</td>
<td>19 (15.5%)</td>
<td>20 (16.3%)</td>
<td></td>
</tr>
<tr>
<td>No difficulty</td>
<td>3 (2.4%)</td>
<td>1 (0.8%)</td>
<td></td>
</tr>
<tr>
<td>Days onset of leg pain (mean)</td>
<td>1.6</td>
<td>0.5</td>
<td>0.0007</td>
</tr>
<tr>
<td>Initial CPK (mean)</td>
<td>5132.5</td>
<td>1199.2</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Initial WBC (mean)</td>
<td>3.71</td>
<td>5.32</td>
<td>0.012</td>
</tr>
<tr>
<td>Initial ANC (mean)</td>
<td>1.53</td>
<td>2.92</td>
<td>0.0078</td>
</tr>
</tbody>
</table>

*Patients with influenza-like illness and negative antigen testing were not excluded from our study due to limited sensitivities and predictive values of rapid influenza testing
Abstract #36

Name: Timothy Marinelli, DO  Division: Pediatric GME

Status: Pediatric Resident  Research Sponsor: Laura Speltz, MD

Targeted Pharmacologic Therapy for KCNQ2 Potassium Channel-related Neonatal Encephalopathic Epilepsy

Timothy Marinelli, Mac Garrett MS IV, Rebecca Speltz Paiz MD, and Sonya Wang MD

Historically, mutations in KCNQ2-coded KV7.2 potassium channel have been associated with benign familial neonatal epilepsy. Recently, a more severe phenotype of early infantile epileptic encephalopathy characterized by intractable seizures, infantile spasms, and severe psychomotor impairment has been appreciated. This rare syndrome, which typically presents within the first week after birth, has only been identified in about 100 families worldwide. Seizures typically cease after several years of life, but patients experience significant developmental delays and poor neurologic outcomes. Our team was involved in the care of a patient who presented in the first week of life with intractable seizures. An epilepsy genetic panel returned positive for a pathogenic heterozygous mutation at KCNQ2 (variant p.Gly290Asp resulting in a G>A substitution) which has been described in the literature in association with a neonatal epileptic encephalopathy. The KCNQ2 channel was identified as a promising target for anti-epileptic medications, primarily because targeting this channel avoids adverse effects on KCNQ1 (a similar voltage-gated potassium channel present on cardiomyocytes). This phenomenon is explained by the presence of a tryptophan residue only present on KCNQ2 that forms a lipophilic binding-site for ezogabine, an anticonvulsant. A retrospective review of patients with KCNQ2 who were treated with ezogabine showed improvement in 3 of the 4 patients started on the medication before 6 months of age, and 2 of the 7 patients treated later, with no serious side effects observed. Ezogabine is not currently FDA approved and is currently only available for compassionate use. Targeted genetic evaluation enabled us to provide tailored therapy with oxcarbazepine and vigabatrin based on the current literature about KCNQ2 related epilepsy. However, in order to improve long-term neurodevelopmental outcomes for these patients, it is critical to diagnose accurately, initiate treatment early, and develop additional pharmacological interventions based on the disease specific pathophysiology.

Figure 1: KCNQ2 transmembrane topology including intracellular amino acid (N) and carboxy (C) terminals, 6 transmembrane segments (S1-S6), and a pore loop between S5 and S6 which partly enters the membrane. The two models show the distribution within KCNQ2 protein of variants in self-limiting epilepsy vs epileptic encephalopathy. (A) Each symbol represents the location of an amino acid aberration associated with benign familial neonatal epilepsy (BFNE). (B) Each symbol represents the location of an amino acid aberration associated with KCNQ2 encephalopathy. (Used with permission.)
Abstract #43

Name: Dorothy Curran
Division: Pediatric GME
Status: Pediatric Resident
Research Sponsor: Karim Sadak, MD

One-Stop Shopping: Models of Care for Childhood Cancer Survivor Care

Background

Since the 1990s, childhood cancer survivors (CCS) have received care from long-term follow-up (LTFU) programs. These programs are typically open to survivors of all childhood cancers and include a pediatric oncologist and/or nurse practitioner. Subspecialty referrals are made as needed. Many centers deliver LTFU care through a specialized multidisciplinary model of care, involving visits over one or two days in the same clinic. This model is often termed “one-stop shopping.”

Objective

To determine if a multidisciplinary model of care is an acceptable method of care delivery to patients and families in a LTFU CCS program, and describe the benefits and potential challenges of such delivery.

Design/Methods

At our institution, 250 survivors receiving structured LFTU care were asked to rank the top three subspecialties that they would want to see in clinic as part of their LTFU care.

Results

Thirty-eight percent reported wanting an endocrinologist present followed by 25% indicating a cardiologist would be desirable. Next were psychiatry (15%), nutrition (14%) and ophthalmology (14%). Patients and parents were also asked if they preferred a short 1-2 hour visit with a provider knowledgeable in CCS LTFU care or a longer 2-5 hour visit with a multidisciplinary team of providers knowledgeable in CCS LFTU care. Twenty-five percent preferred the shorter 1-2 hour visit, 14% the longer 2-5 hour multidisciplinary visit and 59% reported having no preference as long as the necessary care was delivered.

Conclusion(s)

Survivors and parents reported that endocrinology and cardiology were the most desired subspecialties to include in multi-disciplinary LTFU care. Our survey showed that CCS and their parents were open to multiple models of care as long as the appropriate survivor-focused care was being delivered. Benefits and challenges of a multidisciplinary clinic are detailed in Table 1.
<table>
<thead>
<tr>
<th>Benefits</th>
<th>Challenges</th>
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<tbody>
<tr>
<td>Patient Scheduling</td>
<td>Convenience. Several appointments in one visit.</td>
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<tr>
<td></td>
<td>Difficult to reschedule. Multiple appointments are missed if patient unable to attend.</td>
</tr>
<tr>
<td>Provider Scheduling</td>
<td>Adaptability. Providers can easily see multiple patients at multiple times in the day.</td>
</tr>
<tr>
<td></td>
<td>Efficient use of time. Not all patients will need all subspecialties.</td>
</tr>
<tr>
<td>Provider to Provider Communication</td>
<td>Face to Face discussion. Subspecialty providers can communicate real-time in-person to promote streamlined discussion that optimizes time efficiency</td>
</tr>
<tr>
<td></td>
<td>Documentation redundancy. In-person discussions and verbal communications need to be duplicated in the necessary chart documentation</td>
</tr>
<tr>
<td>Provider to Patient Communication</td>
<td>Improved communication. Subspecialty providers make joint recommendations on same day to patient.</td>
</tr>
<tr>
<td></td>
<td>Information overload. Multiple appointments and recommendations on one day potentially overwhelming.</td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>Cost-effective for patients. Patients' family only need to take one day off of school/ work and one time travel expensive compared to multi-day visits.</td>
</tr>
<tr>
<td></td>
<td>Increase clinic costs. Funding required for nurse coordinator, clinic specialists, and administrative tasks.</td>
</tr>
<tr>
<td>Research Implications</td>
<td>Ripe for research. Possibly easier to develop multidisciplinary research projects.</td>
</tr>
<tr>
<td></td>
<td>Research a distraction. Implementing research during clinic may be seen as a distraction for some patients.</td>
</tr>
<tr>
<td>Clinical Outcomes</td>
<td>Improved Outcomes. Same day access to subspecialists may lead to earlier diagnosis of late effects.</td>
</tr>
<tr>
<td></td>
<td>Risk of delayed care. Missed appointments may lead to delays in late effects care.</td>
</tr>
<tr>
<td></td>
<td>Structural complexity. Ability to deliver this type of complex care delivery method well to satisfy patients requires careful planning and appropriate education and investment in staff.</td>
</tr>
</tbody>
</table>

TABLE 1. Benefits and challenges of a single-day multidisciplinary clinic.
Abstract #44

Name: Dorothy Curran  Division: Pediatric GME
Status: Pediatric Resident  Research Sponsor: Jeff Louie, MD

6-year-old Male with Abdominal Pain

We describe a previously healthy 6-year-old male who presented with two weeks of abdominal pain with worsening emesis and abdominal distention. Toward the beginning of his illness, he had diarrhea but later had constipation somewhat improved with enemas. He had presented multiple times to the Emergency Department (ED) and clinic and diagnosed initially with viral gastroenteritis, then constipation, and streptococcus pharyngitis. He was completing a course of amoxicillin. In the ED his vitals were stable, yet he looked unwell and in pain but non-toxic appearing. Physical exam was remarkable for hypoactive bowel sounds, markedly distended abdomen and diffuse tenderness to palpation without rebound, masses, or organomegaly.

He clinically had signs and symptoms of small bowel obstruction, and differential included volvulus, stool impaction, intussusception, abdominal mass, and appendicitis. There was no history of surgeries so adhesions were less likely.

WBC was elevated to 15 10^9/L with 78% neutrophils, CRP was elevated to 13.2 (0.0-8.0 mg/L). CMP was unremarkable. Two-view abdominal radiograph demonstrated several dilated loops of small bowel and air-fluid levels in the upper abdomen concerning for small bowel obstruction. CT of the abdomen with IV contrast showed small bowel obstruction, with concern for segmental volvulus, and a large appendicolith an dilation of appendix measuring 1.5 cm with no evidence of abscess or free air.

Nasal Gastric tube was placed to low intermittent suction and IV antibiotics were administered. Surgery was consulted who took the patient for exploratory laparoscopy that showed acute appendicitis with contained perforation mesenteric/pelvic abscess with extensive omental adhesions contributing to small-bowel obstruction. Appendectomy was performed with conversion to open exploration for adhesiolysis and abscess drainage. Pathology confirmed diagnosis of acute appendicitis. Although rare, acute appendicitis has been recognized as a cause of small bowel obstruction.

Figure 1. Upright and supine abdominal radiograph showing multiple dilated loops of bowel and air-fluid levels in upper abdomen.
Abstract #48

Name: Sandy Liu, MD  Division: Pediatric Endocrinology
Status: Pediatric Resident  Research Sponsor: Bradley Miller, MD, PhD

Case Report: 17 Year Old Female Presenting with Throat Pain, a Case of Likely Pediatric Myxedema with Hypothyroid Myopathy and Pericardial Effusion

Case Presentation

The patient was a 17 year old female who presented as a transfer from an outside hospital via helicopter with facial swelling, hypotension, bradycardia, and incidental finding of hypothyroidism on cardiac workup. She presented initially with throat pain, chest tightness, swelling in her fingers, face, and feet for one day. She denied any recent skin, hair, nail changes, constipation, abdominal pain, palpitations, large fluctuations in weight, or changes in energy levels. Her menstrual periods were regular.

Her physical exam was notable for edematous face, hands and feet without pitting, an erythematous posterior oropharynx, and chest wall pain. Sustained bradycardia with drop in systolic blood pressures to 80/40’s despite fluid resuscitation precipitated emergent transfer.

There is a significant family history of hyper and hypothyroidism.

Discussion

Myxedema coma is rare in pediatrics, with very few cases in the literature [1-6]. This patient’s presentation of facial and peripheral edema, hemodynamic instability initially unresponsive to fluid resuscitation, and mental slowing without electrolyte imbalance met criteria for myxedema diagnosis. Pericardial effusion and myopathy are known complications of profound hypothyroidism, but there is no case in the literature that discusses a pediatric case of myxedema coma with both complications concurrently. Her TSH on presentation was significantly elevated to 89.8, free T4 of 0.2, CK elevated at 1089, ALT of 295 and AST of 138. Her EKG was consistent with pericardial effusion and confirmed with ECHO. She had elevated anti-TPO antibodies of 669 and ANA to 160. Thyroglobulin antibody, complement, and ds-DNA were negative.

Autoimmune polyglandular syndrome was also considered as a unifying diagnosis given elevated transaminases and autoimmune hypothyroidism, however, she had acute onset of symptoms, blunted response to ACTH stimulation instead of elevated ACTH, and showed no signs of parathyroid dysfunction or type I diabetes.

References


A Pupil Blown Out of Proportion: Unilateral Mydriasis Caused by a Rare Offender

We present a 5 year old male with single ventricle physiology (RV dominant AVSD), transposition of the great vessels, pulmonary atresia s/p RV to PA conduit, who suffered from a respiratory-mediated cardiac arrest during catheterization requiring 20 minutes of CPR and ECMO resulting in HIE also with atrial tachycardia requiring daily atenolol. Baseline neurologic exam included minimal responsiveness to stimuli, global hypotonia, and bilateral clonus. Twenty four days following cardiac arrest, new findings included the left pupil 5mm round and reactive to light and the right pupil 8mm round and fixed. Non-contrast CT head showed no acute intracranial hemorrhage or mass effect and was consistent with known anoxic brain injury. CT head and neck angiogram with contrast showed patent vasculature with no evidence of thrombosis.

The differential included increased intracranial pressure, acute ischemic or hemorrhagic stroke, adverse medication effects, or subacute symptoms due to previous anoxic brain injury. The patient had no bradycardia or hypertension to suggest increased ICP or herniation. Recent episodes of atrial tachycardia and the presence of a surgical cardiac conduit increased the risk of ischemic stroke secondary to thrombus, but he had been on daily aspirin therapy. Imaging showed no evidence of hemorrhagic stroke, although CT cannot rule out an ischemic stroke. Active medications known to cause unilateral mydriasis included ipratropium nebulizer treatments and topical clonidine. Ipratropium, an anticholinergic nebulizer treatment for respiratory clearance, had most recently been administered 4 hours prior. The clonidine patch had been switched from the left shoulder to the right shoulder 4 days prior. Given improvement in pupil asymmetry without removal of the clonidine patch, unilateral mydriasis was determined to be caused by droplets from the recent ipratropium nebulizer treatment which had made contact with the right eye due to incomplete mask seal, causing anticholinergic-induced mydriasis.
POSTER SESSION B

Pediatric Research, Education and Scholarship Symposium (PRESS) - April 5th 2019

Pediatric Fellow Abstracts
Implementation of a Critical Asthma Protocol in a Pediatric Intensive Care Unit

Background

Critical asthma or status asthmaticus is a common cause of admission to pediatric intensive care units (ICUs) causing significant morbidity. Use of protocol-driven therapy has been shown to be successful in managing asthmatic patients on general floors, but there is a wide variability in ICU-level management.

Objectives

Using a standardized pathway for critical asthma, we will compare pre- and post-implementation data with a primary endpoint of time on continuous albuterol, and secondary endpoints of ICU length of stay (LOS), hospital LOS, and time from stopping continuous albuterol to transfer.

Methods

Patient data was obtained retrospectively for a pre-implementation cohort using patients admitted to the PICU for status asthmaticus or critical asthma. A post-implementation cohort was obtained over 13 months through Virtual PICU Systems. Analysis of pre- vs post-implementation endpoints was performed using Wilcoxon rank-sum test.

Results

52 pre-intervention patients were compared with 54 post-intervention patients with no significant demographic differences. Primary endpoint of median time on continuous albuterol showed no significant difference (14.4 vs 11.0, p=0.365). There was also no difference in median ICU LOS (38.7 v 26.7 hours, p=0.051) and hospital LOS (2.8 v 2.7 days, p=0.474), but median time from stopping continuous albuterol to transfer out of ICU (18.0 v 12.7 hours, p=0.009) was significantly improved. Overall adherence to clinical pathway was low with only 37% of patients correctly following the pathway through completion.

Conclusions

While time from ending continuous albuterol to ICU discharge was reduced with our pathway, more clinically significant endpoints were not. It is difficult to definitively discount the effects of a clinical pathway for critical asthma due to overall low adherence. Further iterations and follow up data is needed.
**Abstract #3**

**Name:** Patrick M. Basile, MD  
**Division:** Pediatric Hematology / Oncology  
**Status:** Pediatric Fellow  
**Research Sponsor:** Peter Gordon, MD, PhD

**Influence of the CNS Niche on Acute Lymphoblastic Leukemia Biology**

Patrick M. Basile, MD, Leslie M. Jonart, MS, Maryam Ebadi, MD, Kim Johnson, Jessica Makori, and Peter M. Gordon MD/PhD

Acute lymphoblastic leukemia (ALL) is the most common pediatric cancer. Central nervous system (CNS) relapse is a major cause of treatment failure among patients with ALL and current CNS-directed therapies are also associated with significant morbidities. Consequently, novel CNS-directed therapies are needed to improve long-term outcomes and side effects.

We developed in vitro and in vivo models of CNS leukemia in order to identify the unique characteristics of the CNS microenvironment. Using ALL cell lines injected into immune deficient mice, we identified the meninges as the predominant CNS site that harbors leukemia cells both before and after chemotherapy.

To accurately model the leukemia-meningeal niche in in vitro experiments, we substituted tissue culture media for cerebral spinal fluid (CSF). We found that leukemia cells in CSF have limited survival. We hypothesized this may be secondary to elevated reactive oxygen species (ROS) given the lower levels of redox proteins in CSF. Accordingly, we found leukemia cells in CSF showed a higher level of ROS compared to the leukemia cells in regular media. Addition of N-acetyl-cysteine, a ROS scavenger, to CSF decreased ROS levels and cell death in leukemia cells. Moreover, leukemia cells co-cultured with meningeal cells in CSF showed decreased ROS levels compared to leukemia cells growing in suspension in CSF. Leukemia cells co-cultured with meningeal cells were also significantly more resistant to chemotherapy-induced apoptosis. Moreover, leukemia cells cultured in meningeal conditioned media also exhibited mild chemoresistance, indicating a role for a soluble factor(s), several of which we identified as candidate molecules using proteomic approaches. These results show that meningeal cells influence key aspects of leukemia biology.

We are leveraging this knowledge of the CNS leukemia niche into the development of novel CNS-directed therapies that modulate ROS levels, target candidate soluble factors, or that disrupt the interactions between leukemia and meningeal cells.
Abstract #7

Name: Eric Velazquez, MD
Division: Pediatric Endocrinology
Status: Pediatric Fellow
Research Sponsor: Antoinette Moran, MD

Needs Assessment and Early Experience Using Pediatric Subspecialty EPAS as a Formative Assessment Tool

Eric Velazquez, MD, Antoinette Moran, MD, Brandon Nathan, MD, and Emily Borman-Shoap, MD

Background

Compared to semi-annual Milestone-based assessment models of fellowship training, Entrustable Professional Activities (EPAs) may be better at assessing fellow development. EPAs formative assessment capabilities are unknown, nor have they been adopted for formal evaluations. EPAs entrustment scale usage may allow for more specific, actionable feedback from faculty during training.

Methods

In a pilot study, we created a needs assessment on feedback in pediatric fellowship training and a readily accessible online EPA assessment form. Fellows use the form to ask faculty to choose EPAs to assess following clinical experiences. Fellows from Neonatology, Endocrinology, Adolescent Medicine, and Developmental & Behavioral Pediatrics were recruited. Fellows are asked to obtain a minimum of four EPA assessments monthly. Time spent completing forms and providing feedback is recorded for each encounter.

Results

20 faculty, 4 program directors and 9 fellows completed the needs assessment. 77% of fellows reported current Milestone-based feedback aided their professional development, and 60% were satisfied with the quantity and quality of feedback received. 80% of faculty believed fellows were provided adequate feedback using Milestones, and 50% reported they provided good feedback. Faculty identified many barriers to giving good feedback using Milestones. 85% felt use of a structured EPA template and more frequent opportunities would improve their feedback. In the first 4 months, 27 episodes of EPA based feedback occurred. 12 different faculty members have used the template. Lead Team was the most used EPA while Public Health was least used. An average of 9 minutes of feedback per assessment was reported.

Table. Entrustable Professional Activities Evaluated

<table>
<thead>
<tr>
<th>Entrustable Professional Activity (Abbreviation, ABP Number)</th>
<th>Number of Evaluations (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead an interprofessional health care team (Lead Team, EPA 15)</td>
<td>15 (55%)</td>
</tr>
<tr>
<td>Provide consultation to other healthcare providers caring for children and adolescents and refer patients requiring further consultation to other subspecialty providers if necessary (Consultation)</td>
<td>12 (44%)</td>
</tr>
<tr>
<td>Contribute to the fiscally sound, equitable and collaborative management of a healthcare workplace (Management, EPA 13)</td>
<td>12 (44%)</td>
</tr>
<tr>
<td>Facilitate handovers to another healthcare provider either within or across settings (Handovers, EPA 16)</td>
<td>8 (29%)</td>
</tr>
<tr>
<td>Lead within the subspecialty profession (Subspecialty Leadership)</td>
<td>7 (25%)</td>
</tr>
<tr>
<td>Apply public health principles and quality improvement methods to improve population health (Public Health, EPA 14)</td>
<td>5 (18%)</td>
</tr>
</tbody>
</table>
Conclusions

Our pediatric faculty and fellows feel an opportunity exists to improve the quality and quantity of feedback from our current Milestone approach. An online EPA tool is being used by faculty and fellows to provide more frequent feedback. Future assessments will evaluate the utility and specificity of feedback provided.
Successful Treatment of Pediatric Subcutaneous Panniculitis-like T-Cell Lymphoma with Cyclosporine A

Megan Hilgers MD, Nathan Gossai MD, Michael Richards, MD

Background

Subcutaneous panniculitis-like T-cell lymphoma (SPTCL) is a rare malignancy characterized by infiltration of subcutaneous tissue by neoplastic T-cells. SPTCL has a variable clinical course and often responds poorly to traditional anthracycline-based chemotherapy. Given the rarity, no consensus exists for treatment of pediatric patients with refractory disease, thus novel therapy approaches are necessary. There are recent reports of adults receiving cyclosporine A (CSA) as a therapeutic intervention. We report the case of a pediatric patient with SPTCL that was refractory to multiple chemotherapy regimens and ultimately achieved remission after treatment with CSA.

Case Description

The patient was healthy until 14-years-old when he presented with fevers, fatigue, poor appetite, and subcutaneous nodules throughout his extremities. Biopsies of the nodules revealed an atypical lymphohistiocytic infiltrate surrounding adipose tissue characterized by cytotoxic T-cells with alpha-beta T-cell receptor (TCR), consistent with SPTCL. PET/CT scan revealed extensive PET-avid subcutaneous lesions extending from mid-chest to feet.

The nodules progressed and fevers recurred after treatment with vinblastine and dexamethasone and intensified therapy with fludarabine, mitoxantrone, and dexamethasone. Treatment with CSA (4 mg/kg/day, goal trough level of 200-250 ug/L) led to dramatic improvement of nodules and resolution of fevers within 2-weeks. PET/CT scans showed near resolution and complete resolution of PET-avid disease at 4-months and 1-year post-initiation of CSA, respectively. CSA was discontinued after 24-months and the patient remains clinically well with no evidence of disease 5-months off therapy. The only adverse event noted while on CSA included hypertension that was controlled with medication.

Conclusion

CSA has been effectively used to treat SPTCL in adults and we are enthusiastic to share a unique case of successful applicability to a pediatric patient. This suggests that CSA is a potentially safe, tolerable, and effective therapy for SPTCL in children. It is important to investigate this further to improve outcomes of pediatric patients with SPTCL.
Abstract #11

Name: Caleb Skipper
Division: Infectious Disease and International Medicine
Status: Infectious Disease Fellow
Research Sponsor: Mark Schleiss, MD

Cytomegalovirus Viremia Associated with Increased Mortality in Cryptococcal Meningitis in sub-Saharan Africa

Background

Cryptococcal meningitis and tuberculosis are both major causes of death in persons with advanced HIV/AIDS. Cytomegalovirus (CMV) viremia may be associated with increased mortality in HIV-infected persons with tuberculosis. It is unknown if CMV viremia is associated with mortality in other AIDS-related opportunistic infections.

Methods

We prospectively enrolled HIV-infected Ugandans with cryptococcal meningitis from 2010-2013. Subsequently, we analyzed stored baseline plasma samples from 111 subjects for CMV DNA. We compared CMV viremia versus 10-week survival by time-to-event analysis.

Results

Of 111 participants, 52% (58/111) had detectable CMV DNA (median plasma viral load 281 copies/mL (IQR, 142 to 1420). The median age was 35 years (SD, + 7.8), and the median CD4+ T-cell count was 19 cells/μL (IQR, 9 to 70). Median CD4 counts did not differ between CMV-positive and CMV-negative (P=0.47) nor HIV viral loads (P=0.71). A total of 34 deaths occurred. The mortality was 40% (23/58) in the CMV-positive group and 21% (11/53) in the CMV-negative group by 10-weeks (Hazard Ratio=2.19; 95%CI, 1.07-4.49; P=0.03) (Figure

1). Mortality remained significant when adjusting for factors previously associated with death in cryptococcal meningitis (HR=3.30; 95%CI, 1.51-7.23; P=0.003).

Conclusion

Half of persons with advanced AIDS and cryptococcal meningitis had CMV viremia. CMV viremia was significantly associated with mortality in persons with cryptococcal meningitis, even after multivariate adjustment. It remains unclear if the relatively low level CMV viremia in the setting of high baseline mortality due to cryptococcal meningitis contributes to this mortality or may reflect underlying immune dysfunction (i.e. cause vs. effect). Further investigation is warranted.
Figure 1: Kaplan Meier Curve of Cumulative Survival Stratified by CMV status

Log Rank P-Value = 0.028
More than Just a Nice View: Are Fewer Impervious Surfaces Surrounding Schools Associated with Improved Student Adjustments

Authors: Mollika Sajady, DO, MPH, Amy Gower, PhD, Michael McCullough, MS, Cathy Jordan, PhD

Introduction

Research indicates that greenery, particularly tree canopy, surrounding schools can improve academic achievement, enhance focus, and reduce stress in students. However, there are no studies that have examined the associations with various school landscape elements and anxiety, depression, and behavioral concerns in elementary school students. The purpose of this study is to determine whether the percentage of greenery and impervious surfaces surrounding schools are associated with student internalizing and externalizing problems.

Methods

Student-level data (n=21,378) come from the 2016 Minnesota student survey, an anonymous school-based survey of 5th grade students. Geographic information system (GIS) landscape data were available for 268 schools in metropolitan areas. We calculated the percentage of tree canopy, grass and shrub cover, and impervious surfaces within a 300-meter radius area around each school building. Multilevel regression models evaluated associations between student-level internalizing and externalizing behaviors and school-level greenery percentages, controlling for sex, race, and student-reported free/reduced-price lunch.

Results

Students attending schools with a higher percentage of impervious surfaces were more likely to engage in externalizing behaviors (OR=1.91, p<0.05) and reported marginally more internalizing symptoms (b = 0.23, p= 0.06) than students in schools with a lower percentage of impervious surfaces. Higher percentages of tree canopy and grass and shrub cover surrounding schools were, unexpectedly, not associated with internalizing or externalizing behaviors.

Conclusions

Fewer impervious surfaces and built surroundings around schools were associated with fewer internalizing and externalizing behaviors among elementary school students. We did not find significant associations with tree canopy or grass and shrub cover surrounding schools and student adjustment. Further studies are necessary to understand the relative importance of types of greenery, impact of greenery on student adjustment in rural settings, and with varying buffer zones surrounding schools. These results could be used to inform initiatives to improve school landscapes.
Abstract #15

Name: Shannon L Andrews, MD  Division: Pediatric Infectious Disease
Status: Pediatric Fellow  Research Sponsor: Laura Norton, MD

Assessing Resident Experience with Antimicrobial Stewardship

Background

Inappropriate antimicrobial use is common in the outpatient setting. Antimicrobial stewardship prevents inappropriate antimicrobial prescribing and its deleterious effects. Resident physicians might benefit from directed antimicrobial stewardship efforts.

Methods

Resident physicians with continuity clinic at the Minneapolis Veterans Affairs Health Care System were eligible for this study. Antimicrobial prescriptions, number of visits, and number of clinics per month were extracted from the Computerized Patient Record System from July 1, 2017 to March 31, 2018. Antimicrobial rate (prescriptions per clinics) was calculated monthly. A survey, linked to antimicrobial rate, consisted of 21 questions including demographics, attitudes regarding antimicrobial stewardship, and case-based multiple-choice knowledge questions.

Results

Prescription and clinic data were available for 37 resident physicians. Average antibiotic prescribing rate was 0.3 prescriptions per clinic (range 0.02-1.17). Surveys were completed by 19 physicians (51% response rate) with a mean age of 30 years (range 26-35). Physicians were 32% female, 32% interns, and 11% international foreign medical graduates. Attitudes regarding antimicrobial stewardship and education are summarized in table 1. Resident physicians most commonly use Up-to-date to learn about antimicrobial use and resistance. They find lectures series and small-group sessions for residents the most helpful for learning regarding antimicrobials. Knowledge was low on a quiz administered to resident physicians. Out of a total of 11 knowledge questions, the average percentage correct for all respondents was 61% with an interquartile range from 50-71%.

Conclusions

There is variation in the prescribing of antimicrobials among resident physicians. Resident physicians largely agree with key concepts of antimicrobial stewardship, but they lack preparation in basic tasks related to antimicrobial prescribing and stewardship. Knowledge regarding antimicrobial prescribing was low. Targeted interventions, including lectures and small-group sessions with faculty, may help resident physicians to improve their prescribing.
Abstract #19

Name: Juan David Gonzalez Villamizar and Ellen Ingolfsland

Division: Neonatal-Perinatal Medicine

Status: Pediatric Fellows

Research Sponsor: Laura Norton, MD

Implementing QI Initiative Decreases Inappropriate Treatment of Ventilator Associated Tracheitis in Level IV NICU


Background

Respiratory tract infections are the most common hospital acquired infection in the neonatal intensive care unit (NICU). Currently, there are not published guidelines to aid in the diagnosis and treatment of VAT in this population. VAT is likely over-treated, increasing antibiotic burden and cost in the NICU. Incorporating changes in secretions and Gram stain results into decision-making may reduce inappropriate treatment and its associated risks.

Objective(s)

To reduce the percentage of intubated neonates in the NICU treated for VAT with 1) < 25 PMNs on Gram stain and 2) antibiotic duration >7 days through a QI initiative involving multidisciplinary team education and implementation of a VAT diagnosis and treatment algorithm.

Methods

A VAT diagnosis and treatment algorithm was created for use in the care of intubated patients in the NICU. Education was provided to physicians, nurse practitioners, nurses and respiratory therapists. To measure impact of implementation of the algorithm, randomly selected medical records of intubated patients with tracheal cultures were retrospectively reviewed. Patients with tracheostomy were excluded.

Results

33 charts were reviewed in the 12 months pre-intervention and 20 charts reviewed in the 4 months post-intervention. The percentage of intubated patients treated for VAT with < 25PMNs on Gram stain decreased from 79% to 43%. Treatment of VAT with >7 days antibiotic therapy decreased from 42% to 14%. Measured as a counterbalance, NICU ventilator associated events (defined as increase in FiO2 by 25% or MAP by ≥4 cmH 2 O in a previously stable, intubated patient) per ventilator days was 2.9% vs 0.2%

Conclusion(s)

Implementing a multidisciplinary QI initiative to optimize diagnosis and treatment of VAT in the NICU decreased the proportion of patients treated inappropriately for VAT. Further tests of change will determine sustainability.
Abstract #20

**Name:** Juan David Gonzalez Villamizar  
**Division:** Neonatology-Perinatal Medicine  
**Status:** Pediatric Fellow  
**Research Sponsor:** Sara Ramel, MD

**Impact of Neonatal Hyperglycemia on Body Composition and Neurodevelopmental Outcomes on Infants Born Less Than 32 Weeks Gestation**

Gonzalez Villamizar, Juan D. ; Haapala, Jacob L. ; Scheurer, Johannah M. ; Rao, Raghavendra ; Ramel, Sara E.

**Background**

Early neonatal hyperglycemia is common among extremely and very preterm infants. Its effects on the developing brain are complex. Evidence regarding its association with long term neurodevelopment is limited. Poor postnatal growth and abnormal body composition have been linked to early hyperglycemia.

**Objective**

Evaluate the effects of hyperglycemia on body composition and neurodevelopmental outcomes, and assess the role of early nutrient intake and illness in mediating these relationships.

**Methods**

Prospective data were collected on 97 appropriate for gestational age (AGA) infants born <32 weeks gestational age (GA). Inpatient hyperglycemia days (>150 mg/dL) were recorded. Body composition (BC) (fat mass (FM), fat free mass (FFM), and % FM) was measured at discharge and 4 months corrected GA (CGA). Bayley Scales of Infant Development III were administered at 12 months CGA. Possible associations between hyperglycemia, BC and Bayley scores were analyzed in models accounting for illness severity and macronutrient deficits.

**Results**

Mean GA at birth was 27.8 weeks. Hyperglycemia occurred in 48.5% of infants; 21.6% had >5 days. Hyperglycemia for >5 days was negatively associated with Both FM and FFM z-scores at discharge, while only FFM z-score was negatively associated at 4 months CGA (p<0.05). Hyperglycemia for >5 days was negatively associated with Bayley scores at 12 months in all areas (p≤0.01). Associations with BC and Bayley scores were diminished when models were adjusted for first week nutrient intake while remained unchanged for early illness severity.

**Conclusion(s)**

In infants <32 weeks, frequent hyperglycemia is associated with decreased lean mass accretion out to 4 months CGA and poorer 12 month CGA neurodevelopmental outcomes. These associations may be mediated by decreased nutrient intake received in the first week of life as a management strategy.
Abstract #21

Name: Marie Hickey, MD  Division: Neonatology
Status: Pediatric Fellow  Research Sponsor: Cheryl Gale, MD

Otherwise Healthy Term Infants Exposed to Antibiotics due to Concerns for Sepsis after Birth Demonstrate Altered ERP Performance at 1 Month

Marie Hickey MD, Neely Miller, Jacob Haapala, Katie Pfister MD, Michael Georgieff MD, Cheryl Gale MD

Background

Existing animal model data suggests that there are neurodevelopmental effects from a perturbed gut microbiota. The exact processes underlying this relationship are not clearly understood, and there is a paucity of human studies investigating this relationship. Furthermore, we know that infancy is a critical time-window for brain development that coincides with exposure to several risk factors for dysbiosis, including treatment with antibiotics, which has been shown to significantly alter the neonatal gut microbiota.

Objective

To determine if infants at risk for dysbiosis due to antibiotic exposure demonstrate changes in electrophysiologic measures of early brain development.

Methods

We assessed auditory recognition memory function using an established mother-stranger voice paradigm in 15 otherwise healthy infants with negative cultures who received a short course of antibiotics after birth and 46 healthy control infants by analysis of event-related potentials (ERPs) obtained with a 64-channel Sensor-Net scalp electrode system. Linear regression associations, with adjustment for sex and gestational age at the time of testing, were used to assess the relationship between the exposure (antibiotic) and control group ERP features (P2 amplitude and latency, markers of early stimulus processing; negative slow wave, marker of novelty detection).

Results

Antibiotic-exposed infants exhibited lower mean P2 amplitudes for both mother and stranger-voice conditions (p = 0.002), with attenuation in P2 amplitude being greatest in response to mother’s voice. There were no significant differences in P2 latency or negative slow wave between the antibiotic-exposed and control infants.

Conclusions

To our knowledge, this is the first human study to show that otherwise healthy infants at risk for dysbiosis demonstrate altered auditory recognition memory responses, including reduced amplitude of attentional response and reversal of the expected P2 amplitude pattern in response to familiar versus novel stimuli. Our ongoing longitudinal studies are investigating the potential contribution of altered gut microbiota, inflammation, and clinical factors such as delivery mode and diet to ERP performance and early neurodevelopmental outcomes.
**Abstract #23**

**Name:** Lauren McClure, DO  
**Division:** Pediatric Endocrinology  
**Status:** Pediatric Fellow  
**Research Sponsor:** Antoinette Moran, MD

**Glucose Variability in East African Children and Youth with Type 1 Diabetes: a Pilot Study**

**Background**

East African patients with type 1 diabetes (T1D) commonly have hemoglobin A1c (HbA1c) levels >10%, indicating very poor diabetes control. NPH and regular insulin are provided by international donation programs. However, test strip availability is limited and patients cannot routinely monitor blood glucose levels. This observational pilot study was performed to determine blood glucose (BG) homeostasis in Ugandan children and youth with T1D using a blinded continuous glucose monitor (CGM). The data will inform power analysis for a future intervention study.

**Methods**

Patients were recruited from their local pediatric endocrinology clinic. The Freestyle Libre Pro sensor was placed, and participants were instructed to continue usual activities and diabetes cares. While the sensor continuously recorded BG levels, patients were not able to see data in real-time. They returned 2 weeks later for sensor removal, data were downloaded for analysis, and local physicians used the data for insulin adjustment.

**Results**

Sixty-two participants were recruited; 56 returned with their CGMs. Mean HbA1c was 11.3%. Average sensor wear was 13.9 days. Mean glucose was 240 (SD 85) mg/dL, mean glucose range was 82-418 mg/dL, and mean coefficient of variation (CV) was 50.3% (SD 22.3%). Percent time spent below, above and within target range by age is seen in Figure 1. In all age groups, the majority of time (57-72%) was spent above the target range of 70-180 mg/dl. Despite hyperglycemia, there was an average of 8 episodes of hypoglycemia (BG <54 mg/dL) per participant. Average duration of each hypoglycemic event was 108 minutes.

**Conclusions**

Participants spent most of the time above target range; however, this did not protect them from hypoglycemia. Thus, Ugandan children and youth with T1D have large variability in BG levels and are at risk for serious complications of both high and low glucose levels, necessitating new treatment approaches.
Figure 1: The average percent time participants spent in each blood glucose range categorized by age group. In each group, greater than 50% of the time was spent hyperglycemic (>180 mg/dL), with 9-12 year olds spending 55% of the time with blood glucose values greater than 250 mg/dL.
Abstract #25

Name: Steven Skolasinski  Division: Pediatric Pulmonology and Critical Care
Status: Pediatric Fellow  Research Sponsor: Angela Panoskaltsis-Mortari, PhD

Assessing an Airway Cell Spray Device for In-Vitro Application of Cells

Purpose

Assess a novel device to deliver living cells onto pulmonary airway tissue for therapy and bioengineering.

Background

Substantial research is focused on developing cell therapies for a wide variety of applications in pulmonary diseases. Examples include the use of stem or progenitor cells to repopulate areas of superficial tracheal injury such as those caused by infection, malignancy, or thermal, or caustic inhalation, or to recellularize decellularized scaffolds. These strategies rely on coating the target area with a uniform layer of cells. We developed a coaxial spray device to nondestructively aerosolize cells, essentially “spray painting” them onto a tissue surface. The device is sufficiently long and narrow to pass several generations into the bronchial tree.

Methods

Prototype sprayers were assembled and tested to determine optimal parameters to rapidly deliver cells with high viability. Once viability was optimized, the device was used to apply human bronchial epithelial cells to denuded or decellularized porcine trachea. Viability was assessed by calcein-AM / ethidium homodimer staining. Cell distribution and phenotype was assessed by immunofluorescence.

Results

We have previously shown that cells survive when sprayed into liquid media. In this follow up study, we show that human bronchial epithelial cells adhere and survive (> 98% viability relative to non-sprayed cells) when sprayed onto vertical sections of denuded or decellularized porcine trachea. The device facilitates rapid delivery of the high cell numbers likely needed for clinical application. We have paired our device with a custom guidance sleeve allowing broad cell delivery throughout the airways, or localized delivery to specific target sites.

Conclusions

The microjet sprayer provides a method for real world application of emerging bioengineering techniques. The device can uniformly apply large numbers of cells with high viability to tissue surfaces which aren’t readily accessible. Ongoing studies are focused on assessing proliferation, differentiation, and function of sprayed cells.
Abstract #39

**Name:** Ancil “AJ” Abney, MD  
**Division:** Pediatric Hospital Medicine

**Status:** Pediatric Fellow  
**Research Sponsor:** Jordan Marmet, MD

**Fat Embolus Syndrome after Minor Trauma**

Ancil Abney, Ben Trappey, Jordan Marmet

**Case Presentation**

A 19 year old male with a history of Duchenne Muscular Dystrophy (DMD), Atrial fibrillation, and nightly BiPAP requirement presented after being ejected from his electric wheelchair. During initial evaluation he was found to have a minimally displaced Salter Harris type II fracture of the right distal femur. After splinting he developed respiratory distress severe headache, and O2 requirement leading to admission. He subsequently developed vision loss. Physical exam was significant for obesity, diffuse maculopapular rash on both legs, and normal cardiopulmonary examination. Labs were significant for mild elevations of transaminases, large elevation of CRP, and negative infectious workup. Chest x-ray was normal. Chest CT revealed ground glass opacities consistent with diffuse multifocal pneumonia. Dilated ophthalmological examination was significant for cotton wool spots and MRI brain revealed > 20 micro infarcts of the deep white matter consistent with Fat embolus syndrome (FES). The patient received respiratory support and pain control, and within 6 days had complete resolution of all symptoms.

**Discussion**

Patients with DMD have extensive fatty degeneration of many tissues in their body, because of this they are at a significant increased risk for FES. While the increased risk for FES is well documented in the literature, there are only 16 cases describing FES after minor trauma. The reports are significant for a high mortality rate (7/16) and association with unrestrained use of electric wheelchairs (6/16).

**Conclusions**

FES is a rare, but recognized complication in patients with DMD and most reports of FES are associated with minor trauma. The rare case reports of FES after minor trauma in patients with DMD identify serious associated morbidity and mortality. Practitioners who work with patients with DMD should have a high index of suspicion for FES when patients with minor trauma develop respiratory distress or neurologic symptoms.
The Role of Family Acceptance and Religion on the Mental Health of LGBTQ Youth

Background

While family acceptance is a key protective factor for LGBTQ youth, the role of religion as a protective factor is debated given the non-affirming practices embedded in some religions.

Study purpose

To determine if religion of origin among LGBTQ youth correlates with depressive symptoms, determine if family acceptance is influenced by religion of origin, and determine if the known protective association between family acceptance is different for youth from different religious backgrounds.

Methods

Data from the 2017 LGBTQ National Teen Survey was utilized, including 9,261 youth ages 13-17 who participated in this online survey and were “out” to family member(s). Key variables included 1) religion of origin, 2) family acceptance regarding LGBTQ status, and 3) mean depression scores. ANOVA, Pearson’s correlations, and multiple linear regression models were conducted, including an interaction term to test for differences in the primary association across religious groups.

Results

Religion of birth was strongly associated with degree of family acceptance, with the Atheist/Agnostic/No Religion category and Jewish category having the highest levels of family acceptance. Buddhist/Hindu, Catholic, Mormon, Muslim, Orthodox Christian, and Protestant categories all had lower than the average family acceptance means. All religions except for Jewish and Catholic had higher average depression scores than the Atheist/Agnostic/No Religion category. There was a strong inverse relationship between family acceptance and depression score. No significant interaction between religion of origin and family acceptance was found, indicating that family acceptance was protective against depression in all religious groups.”

Conclusions

Our research supports existing literature confirming that family acceptance is a strong protective factor for LGBTQ youth, and suggests that family acceptance is more predictive of depression in LGBTQ youth than religion of birth. Promotion of family acceptance of LGBTQ children in religious settings would likely confer additional protection to youth at risk of mental health complications.
Abstract #49

Name: Kieran Leong, DO  
Division: Pediatric Cardiology  
Status: Pediatric Fellow  
Research Sponsor: Guru Hiremath, MD

Effects of Systemic Steroid Administration on Recurrence of Pericardial Effusion in Pediatric Patients Following Hematopoietic Stem Cell Transplantation

Although rare in the general pediatric population, the incidence of pericardial effusion is significantly increased in pediatric patients undergoing hematopoietic stem cell transplant (HCT) with a reported incidence of up to 16.9%. The development of pericardial effusion in this setting is associated with higher mortality. While pericardiocentesis is a relatively safe procedure for treating pericardial effusion, it is invasive, painful, and exposes an immunosuppressed patient to the risks of infection, bleeding and injury to surrounding structures. Given the procedural risks of pericardiocentesis, systemic steroids are often administered for treatment of pericardial effusion given their use for pericarditis in the general population. However, the effectiveness of systemic steroids for the treatment of pericardial effusion in the pediatric HCT population has not been confirmed.

We studied the role of systemic steroids, administered at the time of initial pericardiocentesis performed for pericardial effusion, in preventing repeat pericardiocentesis. A total of 37 pericardiocentesis after HCT were performed during the study period with 25 patients undergoing first time pericardiocentesis and 15 of those patients receiving systemic steroids. Eight patients required repeat pericardiocentesis; 5/15 (33%) received steroids and 3/10 (30%) did not receive steroids. The use of systemic steroids, initiated within 48 hours of pericardiocentesis, did not significantly affect the need for repeat pericardiocentesis in the pediatric HCT patient population.
Abstract #50

Name: Kieran Leong, DO  
Division: Pediatric Cardiology

Status: Pediatric Fellow  
Research Sponsor: Guru Hiremath, MD

Isolated, Incidental Quadricuspid Aortic Valve

Quadricuspid aortic valves can be present along with other types of congenital heart disease in 18-32% of patients. However, isolated quadricuspid aortic valves are an incredibly rare. There is an estimated incidence of 0.003 to 0.033% [2]. Most cases are discovered incidentally during aortic valve surgery or autopsy. However current transthoracic echocardiography has increasing allowed non-invasive diagnosis. They can progress to significant aortic regurgitation and stenosis.

Here we present an incidental finding of isolated quadricuspid aortic valve on transthoracic echocardiogram in a child who was referred to us for chest pain. Her EKG was normal, and an outpatient echocardiogram showed a quadricuspid aortic valve with mild aortic insufficiency and no stenosis. The supernumerary cusp was noted to have three equal-sized cusps and one smaller cusp (variant B) and the supernumerary cusp was present between the right and non-coronary cusps (type II).
Abstract #51

Name: Leslie Kummer, MD, FAAP  Division: General Pediatrics and Adolescent Health

Status: Pediatric Fellow  Research Sponsor: Iris Borowsky, MD, PhD

Lactation Curricula in U.S. Medical Education Programs: A Systematic Review

Leslie Kummer, MD and Iris Borowsky, MD, PhD

Background

Human milk and breastfeeding are essential for optimal health of infants and mothers, yet lactation physiology and clinical management have only recently been introduced into medical education programs. We conducted a systematic review of the effect of lactation curricula on U.S. medical student and resident learning and on patient outcomes.

Methods

We conducted a literature search in MEDLINE, Embase, PsycInfo, CINAHL, and ERIC. Studies presenting empiric data on the effect of undergraduate or graduate medical education lactation curricula on learner or patient outcomes were included. Studies must have been conducted in the U.S. or Canada and published in a peer-reviewed, English-language journal between January 1, 1993 and December 1, 2018. Outcomes included learner knowledge, confidence, attitudes/beliefs, clinical behaviors, and breastfeeding rates among patients of intervention participants, compared to controls. Data on study design, participant number and learner type, curriculum design and duration, inclusion of active skills practice, measurement tools, outcomes assessed, and results were extracted.

Results

Of 180 studies initially identified, 9 met the inclusion criteria. All 9 studies were done in the U.S. and evaluated resident curricula. Instructional time ranged from 25 minutes to 80 hours. Active skills practice, such as shadowing a lactation consultant or structured clinical encounters with standardized patients, was included in 78% of the curricula. Overall, there were significant increases in resident knowledge, confidence, attitude/belief, and clinical behavior scores, compared to pre-intervention and controls. Two programs demonstrated statistically significant increases in exclusive breastfeeding rates among the patients of intervention participants, compared to controls or those with low levels of participation in the intervention.

Conclusion

Graduate-level lactation curricula in the U.S. have resulted in improvements in resident knowledge, confidence, clinical behaviors, and patient outcomes. Further research is needed to evaluate the impact of undergraduate-level lactation curricula on student knowledge, confidence, attitudes and clinical behaviors.
<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Study design</th>
<th>#</th>
<th>Curriculum description</th>
<th>ASP</th>
<th>Measurement</th>
<th>Outcome(s)</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert et al. (2017)</td>
<td>Prospective cohort;; pediatric residents</td>
<td>45</td>
<td>Mandatory 2-week rotation incl. 50 hrs w/IBCLC, triage calls, observation of support group and outpatient lactation visits, scholarly presentation (80 hrs total)</td>
<td>Yes</td>
<td>AAP</td>
<td>Knowledge, perceived confidence</td>
<td>Significant increases in knowledge and perceived confidence scores between pre- and post-rotation. Gains in knowledge and confidence sustained over 12 months post-rotation.</td>
</tr>
<tr>
<td>Tender et al. (2014)</td>
<td>Quasi-experimental (no control); pediatric residents</td>
<td>39</td>
<td>Group 1: Shadow IBCLC for 1 hour Group 2: Watch 25--min case--based DVD Group 3: observe 3--hr prenatal parent breastfeeding class</td>
<td>No</td>
<td>AAP</td>
<td>Knowledge, perceived confidence, clinical skills</td>
<td>Knowledge and confidence increased across all groups. IBCLC group had significantly higher gain in general knowledge. Clinical performance in OSCE not sig different between groups</td>
</tr>
<tr>
<td>Holmes et al. (2012)</td>
<td>Non-randomized controlled trial;; family medicine residents and faculty</td>
<td>60</td>
<td>One--year intervention including case--based seminar, Grand Rounds, observation of IBCLC, QI review of baseline breastfeeding rates, journal club, and 2--hour workshop with structured clinical encounters with SP</td>
<td>Yes</td>
<td>Self--designed assessment pre/post--test, Breastfeeding rates by chart review at hospital discharge, 2wks, 1mo, 2mo, 4mo and 6mo</td>
<td>Knowledge, attitudes and beliefs, any and exclusive BF rates in patients of study participants</td>
<td>Knowledge and attitude scores increased significantly after intervention. At 4 and 6 months, patients of physicians with high levels of participation in curricular activities had 3--fold higher rates of any BF and 4--fold higher rates of exclusive BF. Resident mean score increased from 84% (pre) to 93% (post)</td>
</tr>
<tr>
<td>O'Connor et al. (2011)</td>
<td>Prospective cohort;; MCH providers including pediatric, FM and OB residents</td>
<td>767</td>
<td>“Breastfeeding Basics” online course (duration unknown)</td>
<td>No</td>
<td>Pre-- and post--test mean scores</td>
<td>Knowledge</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Feldman--Winter et al. (2010)</td>
<td>Non--randomized, controlled group trial;; pediatric, FM and OB residents</td>
<td>260</td>
<td>AAP Breastfeeding Residency Curriculum (time variable)</td>
<td>Yes</td>
<td>AAP</td>
<td>Knowledge, perceived confidence, practice patterns</td>
<td>Trained residents more likely to show improvements in knowledge (OR 2.8 [95% CI 1.5--5.0]), confidence (OR 2.4 [95% CI</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Study Type</td>
<td>Study Group(s)</td>
<td>Duration</td>
<td>Intervention Details</td>
<td>Outcome Measures</td>
<td>Significant Differences</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
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<td>---------------------------------------------------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Bunik et al (2006)</td>
<td>Non-randomized, controlled trial; pediatric residents</td>
<td>48</td>
<td>&quot;Field Trip Model:&quot; Four half-day sessions (La Leche League meeting, Lactation clinic, Hospital lactation rounds, Children's hospital-- based referral clinic (16 hours)</td>
<td>Yes</td>
<td>Modified Williams and Hammer Breastfeeding Questionnaire</td>
<td>Knowledge, attitudes, perceived confidence</td>
<td>1.4--4.1), practice patterns (OR 2.2 [95% CI 1.3--3.7]) compared to controls. Infants at training institutions more likely to exclusively BF 6mo after intervention (OR 4.1 [95% CI 1.8--9.7])</td>
</tr>
<tr>
<td>Ogburn et al (2005)</td>
<td>Prospective cohort; pediatric residents</td>
<td>24</td>
<td>Wellstart self--study modules, didactics, daily postpartum ward and newborn nursery rounds, hands--on sessions with IBCLC (time variable, 4+ hours)</td>
<td>Yes</td>
<td>Self--assessment of knowledge pre-- and post--didactic session (5-point Likert scale)</td>
<td>Perceived knowledge</td>
<td>Perceived knowledge increased after didactic sessions</td>
</tr>
<tr>
<td>Hillenbrand et al (2002)</td>
<td>Prospective cohort; pediatric residents</td>
<td>48</td>
<td>Reading, discussion, role--playing, group practice, videos, demonstration, panel discussion with breastfeeding mothers (duration unknown)</td>
<td>Yes</td>
<td>Modified Freed (1995b) questionnaire; patient telephone interview assessment</td>
<td>Knowledge, clinical behaviors by patient report</td>
<td>Mean knowledge score increased 69% to 80%; confidence increased; clinical behavior pass rate increased 22% to 65% Significant increase in total OSCE, attitude and experience scores compared to controls; trend toward increased knowledge but not stat sig</td>
</tr>
<tr>
<td>Haughwout et al (2000)</td>
<td>Non-randomized, controlled trial; family medicine residents</td>
<td>23</td>
<td>4.5--hour interactive workshop with didactic presentations and opportunities to work with IBCLCs and SPs</td>
<td>Yes</td>
<td>OSCE and modified Freed questionnaire</td>
<td>OSCE score, knowledge, attitude and experience</td>
<td></td>
</tr>
</tbody>
</table>
Abstract #53

Name: Asmaa Ferdjallah, MD  
Division: Pediatric Hematology / Oncology / BMT

Status: Pediatric Fellow

Research Sponsors: Peter Gordon, MD, PhD & Priya Verghese, MD, MPH

Mixed Epithelial and Stroma Tumor (MEST) After Pediatric Kidney Transplant

Mixed epithelial and stromal tumors (MEST) of the kidney are a benign group of tumors with very rare incidence of malignant transformation. First described in 1998, this tumor has never been reported in a transplanted organ before. We present a unique case of de novo MEST in a donor kidney four years after transplant into a pediatric patient. Although removal of the lesions is curative without risking malignant transformation, in this case, surgical removal was not attempted to prevent reduction in transplant longevity. In this unique report of MEST in a transplanted kidney, we describe the patient/transplant outcomes without MEST resection.

A: Transverse renal ultrasound image of the biopsied MEST lesion (white arrow). B: T2 weighted-fat suppressed axial MR image of the biopsied MEST lesion (white arrow). C and D: Representative images of renal allograft biopsy findings. The tumor is composed mainly of multiple, variably sized cysts. The epithelial cells often are flat (C, H&E, x100), "hobnailed", cuboidal, or columnar (D, H&E, x400).
Abstract #55

**Name:** Lerraughn Morgan  
**Division:** Pediatric Cardiology  
**Status:** Pediatric Fellow  
**Research Sponsor:** Shanthi Sivanandam, MD

**Imaging and Management Strategies in Aortic Dilation**

Lerraughn Morgan DO, Brian Harvey BA, Nathan Rubin MS, Timothy Rauschke MD MPH, Jamie Lohr MD, Shanthi Sivanandam MD

**Background**

Limited criteria are available to guide therapy for aortic dilation (AoD) outside of specific syndromes. Our aim was to identify aortic diameters that prompt intervention.

**Methods**

We performed a single center retrospective chart review of patients from birth to 30 years between 2011 and 2017. Conotruncal defect patients were excluded. Advanced imaging [magnetic resonance (MR)/computed tomography (CT)] and echo diameters at the sinuses of Valsalva (SoV) and ascending aorta (AAo) were reviewed. We identified patients on beta-blocker, ACE inhibitor, or ARB therapy, and who underwent aortic replacement surgery.

**Results**

We identified 47 patients (73% male; 74% white non-Hispanic). Bicuspid aortic valve (BAV) [41%], Marfan syndrome (MFS) [28%], isolated aortic dilation [22%], Turner syndrome (TS) [5%], and Loeys-Dietz syndrome (LDS) [4%]. MFS (N=13), LDS (N=2), and TS (N=2) patients started on medication at the median diameter of 32 mm [IQR: 28, 36] at the SoV and 27 mm at the AAo [IQR: 25, 30]. BAV (N=19) patients started on medications at a diameter of 35 mm [IQR: 29, 42] at the SoV and 34.5 mm [IQR: 30, 44] at the AAo. Patients without a genetic diagnosis and isolated AoD (N=9) started on medications at a diameter of 34 mm [IQR: 31, 37] at the SoV and 27 mm [IQR: 24, 33] at the AAo. Four patients underwent aortic root surgery at a median age of 20 years [IQR: 17, 21]. Operative patient details outlined in Table 1.

**Conclusion**

Patients with genetic diagnoses (MFS, LDS, TS) were started on medication at a smaller aortic diameter at the sinuses of Valsalva compared to patients without a genetic diagnosis or isolated AoD. Patients with BAV were started on medications at a larger AAo diameter compared to patients with genetic diagnoses and isolated AoD. Aortic measurements by echo and MR/CT were comparable (Table 1).
Table 1.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>N</th>
<th>r</th>
<th>Median difference (mm)</th>
<th>IQR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo-MR SoV</td>
<td>36</td>
<td>0.90</td>
<td>1.0</td>
<td>-0.25, 2.25</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Echo-CT SoV</td>
<td>10</td>
<td>0.82</td>
<td>0</td>
<td>-0.75, 1</td>
<td>0.004</td>
</tr>
<tr>
<td>Echo-MR AAo</td>
<td>18</td>
<td>0.91</td>
<td>1.0</td>
<td>0, 2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Echo-CT AAo</td>
<td>4</td>
<td>0.99</td>
<td>-0.3</td>
<td>-1, 0.55</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Operative Patient Details

<table>
<thead>
<tr>
<th>Age at surgery (years)</th>
<th>Diagnoses</th>
<th>Level of aortic dilation</th>
<th>Aortic diameters by echo (mm)</th>
<th>Surgery</th>
<th>Family History</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>BAV Moderate AI</td>
<td>Aortic root</td>
<td>SoV 53</td>
<td>Valve sparing aortic root replacement</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>MFS</td>
<td>Aortic root</td>
<td>SoV 29 (Z-score: 5.6)</td>
<td>Valve sparing aortic root replacement</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>BAV Mild AS Moderate AI</td>
<td>Aortic root</td>
<td>SoV 40 AAo 48</td>
<td>Ross procedure and replacement of ascending aorta</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>MFS</td>
<td>Aortic root</td>
<td>SoV 41 (Z-score: 9.4)</td>
<td>Valve-sparing aortic root replacement</td>
<td>-</td>
</tr>
</tbody>
</table>

AI = Aortic insufficiency; AS = Aortic stenosis; BAV = Bicuspid aortic valve; LDS=Loeys-Dietz syndrome; MFS = Marfan syndrome; TS=Turner syndrome
Abstract #56

Name: Lerraughn Morgan

Division: Pediatric Cardiology

Status: Pediatric Fellow

Research Sponsor: Matthew Ambrose, MD

Cardiac Imaging and Virtual Reality Use in Management of Thoraco-omphalopagus Conjoined Twins

Lerraughn Morgan DO, Gurumurthy Hiremath MD, Rebecca Ameduri MD, Bethany Juhnke MS, Alex Mattson BS, Davis Fay BS, Daniel Saltzman MD, PhD, Anthony Azakie MD, Eric Hoggard MD, Paul Iaizzo PhD, Arthur Erdman PhD, Gwenyth Fischer MD, Matt Ambrose MD

Congenital heart disease (CHD) occurs in almost two-thirds of conjoined twins. [1] Virtual reality (VR) has proven to be a vital augmentation to traditional imaging in CHD.[2] We report the successful separation of thoraco-omphalopagus conjoined twins utilizing multimodality imaging and VR.

A 24 year-old female was referred to maternal fetal medicine for conjoined twins at 13 weeks gestation. Fetal echocardiogram at 19 6/7 weeks gestation showed tricuspid atresia with d-TGA, outlet-region bulboventricular foramen in twin 2 and an unobstructed inter-atrial shunt. Twin 2 shared pericardium with twin 1 and the right atrial appendage extended into the thoracic cavity of twin 1.

Three-dimensional rendering and VR were utilized to plan the surgical approach. The infants were delivered at 34 weeks gestation via C-Section due to intermittent absent end diastolic flow in twin 2. Echocardiogram on DOL 0 confirmed the diagnosis. CT angiogram on DOL 25 demonstrated an abnormal fistula between the enlarged right atrial appendage of twin 2 and the right atrium of twin 1 (Image 1a). Flow was identified from the hepatic veins of twin 2 to the hepatic veins/IVC of twin 1.

At 3 months of age twin 2 had hypoxia and it was determined that her atrial septum was restrictive. She underwent successful balloon atrial septostomy. Approximately 1 week later the twins underwent separation and Twin 2 had a PA band placed. The use of 3D imaging combined with VR aided a guided cardiac surgical approach in successful surgical separation.

Image 1a. CT Angiogram sagittal view demonstrating atrial fistula between Twin 1 and Twin 2.
LA: Left atrium, LV: Left ventricle, RA: Right atrium, RAA: Right atrial appendage.
Abstract #57

Name: Lerraughn Morgan  Division: Pediatric Cardiology
Status: Pediatric Fellow  Research Sponsor: Rebecca Ameduri, MD

Giant Cell Myocarditis in a Pediatric Patient

Lerraughn Morgan DO, Eric Hoggard MD, Mark Luquette MD, Rebecca Ameduri MD,

A 17-year-old African American male was admitted at a county medical center with a diagnosis of community acquired pneumonia and SIRS. He subsequently developed hypotension and decreased cardiac output requiring dopamine and milrinone.Troponin and N-Terminal Pro BNP were elevated at 31.5 and 23,516, respectively.

At our facility, an echocardiogram showed a mildly dilated right ventricle with moderately decreased systolic function and evidence of elevated pulmonary artery pressures. His left ventricular systolic function was severely depressed with a biplane LVEF of 28%. He underwent a cardiac MRI on hospital day 2 which showed an ejection fraction of 11% on the left and 14% on the right, and abnormal late gadolinium enhancement in the septum and posterior wall suggesting myocarditis. Inotropic support was weaned off on hospital day 4 as his LVEF improved to 46%. Viral studies came back positive for coxsackievirus and he was diagnosed with viral myocarditis. He did receive IVIG and steroids during admission. He continued on milrinone until hospital day 8, and echocardiogram after discontinuing milrinone showed an LVEF of 60%. He was discharged home on hospital day 15 on carvedilol, lisinopril, furosemide, and prednisone taper.

He had elevated troponin and a decrease in cardiac function any time his steroids were weaned. Approximately 40 days following his presentation, a endomyocardial biopsy showed focal minimal mononuclear cell infiltrate without myocyte injury or fibrosis. A repeat endomyocardial biopsy performed 2.5 months following his initial presentation was positive for giant cell myocarditis (Image 1).

Giant cell myocarditis is rare in the pediatric population, with most cases resulting in mechanical circulatory support, cardiac transplantation, or death. Early identification via endomyocardial biopsy and initiation of immunosuppression is vital for preservation of cardiac function and cardiac transplant listing.

Image 1. Endomyocardial biopsy specimen demonstrating multinucleated giant cells, lymphocytes, eosinophils, histiocytes and myocyte injury.
**Abstract #59**

**Name:** Erick Jimenez  
**Division:** Pediatric Cardiology  
**Status:** Pediatric Fellow  
**Research Sponsors:** Matthew Ambrose and Daniel Cortez

**Peripartum Management of a Patient with Catecholaminergic Polymorphic Ventricular Tachycardia**

**Background**

Catecholaminergic polymorphic ventricular tachycardia (CPVT) is a rare inherited rhythm disorder causing ventricular tachycardia/fibrillation with exercise or emotional stress. Pregnancy induces several cardiovascular changes, including increased myocardial sensitivity to circulating catecholamines. Little is described regarding management of symptomatic CPVT patients during the peripartum period.

**Objective**

Describe the approach of a patient with CPVT during labor and delivery.

**Methods**

N/A

**Results**

A 28 year-old female, G2P1000 with 39 weeks of gestation has a history of CPVT type 1 and ICD placement after cardiac arrest at 23 years. She was on metoprolol 25mg daily and flecainide 25mg twice a day before and during pregnancy. Her ICD demonstrated 14 events of non-sustained VT during months prior to delivery without receiving anti-tachycardia pacing or shock therapy from her ICD. Patient’s first child died at 3 years of age with diagnosis of CPVT.

During labor, an epidural with bupivacaine was placed, sympathomimetic medication was avoided and dexmedetomidine drip was used for sympathetic suppression/anti-anxiolysis. Given increased polymorphic PVC burden (bigeminy), esmolol was started and uptitrated to 150mcg/kg/min along with increasing the pacemaker rate to VVI 100bpm, resulting in suppression of ectopy. She delivered a 2608g female without complications. Esmolol and dexmedetomidine drips were gradually weaned off within the next 12 hours after flecainide and metoprolol were given. VVI pacing was set to baseline 24 hours postpartum. Neonate was observed in the NICU for 48 hours without symptoms. Genetic testing from cord blood was obtained.

**Conclusion**

Our case provides one example of prevention and management of cardiac arrhythmias in patients with CPVT during labor/delivery. Our management included avoiding common sympathomimetics used in the peripartum period, early anesthesia and alpha 2 agonism to minimize catecholamine effects. A multidisciplinary approach including maternal fetal medicine, fetal cardiology and electrophysiology may be helpful to develop a multi-step plan during prenatal care visits.
Abstract #61

Name: Mark McGill, MD  Division: Pediatric Cardiology
Status: Pediatric Fellow  Research Sponsor: Daniel Cortez, MD

Single Deployment Implementation of a Leadless Pacemaker in a Pediatric Patient with Tetralogy of Fallot

Background

Advanced second degree atrioventricular (AV) block with RBBB and associated symptomatic bradycardia is an indication for pacemaker implantation (Class 1 indication). The relatively recent introduction of leadless implantable pacemakers offers an option for pediatric patients who might benefit from this approach, which seems to lessen complications related to pacing leads.

Objectives:

We describe successful single deployment of a leadless pacemaker into the mid-RV septum of a pediatric patient with congenital heart disease resulting in optimal pacing function post-deployment.

Results:

A 14 year old, 58kg male with history of Tetralogy of Fallot had surgical repair using a transannular patch at 6 months age and transcatheter pulmonary valve (29 mm Sapien XT valve) placement at 12 years old. He developed post-procedural complication of moderate tricuspid regurgitation and presented with a one-minute episode of sudden-onset lightheadedness while walking. Monitoring demonstrated intermittent type 1 and type 2 second degree AV block as well as intermittent, symptomatic, 2:1 AV block. After discussion regarding the risks and benefits of epicardial, transvenous, and leadless pacemaker placement, parents were in favor of Medtronic Micra leadless pacemaker placement. Deployment of the Micra into the mid-RV septal location was successfully performed on first attempt from the right femoral vein. Lead threshold was 0.88mV at 0.24ms, R-wave sensing was 12.5mV, device impedance was 610 ohms. Tug-test revealed 3 splines connected to the RV muscle. No re-captures were needed. The patient was observed overnight, and pacemaker interrogation the following day revealed threshold of 0.77mV at 0.24ms, R-wave of 13.7mV, impedance of 600ohms. See Table 1.

Conclusion:

In a subset of pediatric patients, a leadless pacemaker may be an ideal option. Deployment can be performed safely with good pacing performance. Long-term follow-up and complications in children with this device option are not known, and, thus, further studies with regards to feasibility, safety and long-term pacing performance need to be performed.

Table 1: pacing data on deployment day and subsequent interrogations was recorded as follows:

<table>
<thead>
<tr>
<th>Post-deployment day</th>
<th>R-wave (mV)</th>
<th>Impedance (Ohms)</th>
<th>Pacing threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12.5</td>
<td>610</td>
<td>0.88V @ 0.24ms</td>
</tr>
<tr>
<td>1</td>
<td>13.7</td>
<td>600</td>
<td>0.77V @ 0.24ms</td>
</tr>
<tr>
<td>11</td>
<td>17.6</td>
<td>580</td>
<td>0.66V @ 0.24ms</td>
</tr>
</tbody>
</table>
Abstract #63

Name: Janna R. Gewirtz O’Brien, MD  Division: General Pediatrics & Adolescent Health
Status: Adolescent Medicine Fellow  Research Sponsor: Annie-Laurie McRee, DrPH

Running the Risk: A Comparison of Mental Health Outcomes among Runaway, Homeless, and Stably Housed Youth

Janna R. Gewirtz O’Brien, MD, Laurel D. Edinburgh, MSN, APRN, Annie-Laurie McRee, DrPH

Background/Objectives

Runaway youth and homeless youth are at risk for adverse health outcomes, including mental health disorders. These two populations are frequently pooled together in both research and interventions, yet may have unique health needs requiring targeted services and policies. We sought to assess differences in mental health outcomes among these populations.

Methods

We conducted a secondary data analysis using responses of 9th and 11th graders in the 2016 Minnesota Student Survey (n=71,897). We compared four subgroups of youth based on their housing status in the prior year: those who: (1) had run away (“runaways”); (2) had experienced unaccompanied homelessness (“homeless”); (3) had both runaway and been homeless (“both”); and (4) had stable housing (“stably housed”). We assessed demographics and primary care utilization, then performed multivariable logistic regression to compare 4 mental health outcomes (depressed mood, self-injury, suicidal ideation, suicide attempts) between groups, controlling for demographics and abuse history.

Results

Overall, 4.8% of youth had runaway, 0.5% had been homeless, and 0.6% had been both. All 3 of these groups had poorer mental health outcomes when compared to their stably-housed peers (p<.05). For example, 21.0% of runaways, 10.9% of homeless youth, and 32.9% of youth in the both group had attempted suicide in the prior year, compared with 2.4% of stably-housed youth (aORs= 5.0, 2.2, and 6.6, respectively; Figure 1). Other outcomes showed a similar pattern. Among youth in the homeless and both groups, 58% had received well-child care in the prior year, compared with 64% of runaway and stably-housed youth (p<.05).

Conclusions

Our findings suggest that runaway and homeless youth represent unique populations with high mental health needs that would benefit from targeted interventions. Levels of well-child visits across all groups highlight the potential of primary care as a point of screening and intervention.
Figure 1. Mental health outcomes, by homeless/runaway experience.

Note. Self-injury, suicidal ideation and suicide attempt all refer to past year. Depressed mood assessed using the PHQ-2, a widely used screen for depression assessing reported symptoms over the prior 2 weeks. To increase the screen’s sensitivity, we utilized a cut-off of 4 or greater.
Abstract #65

Name: Hani Siddeek, MD  Division: Pediatric Cardiology

Status: Pediatric Fellow  Research Sponsor: Shanthi Sivanandam, MD, FASE

Pediatric VAD - A Case Series of Clinical Presentations and Imaging Modality

Background

Ventricular Assist Devices (VAD) are used to provide mechanical circulatory support in patients with heart failure (HF), myocardial injury or as a means for destination therapy. VAD are used in the adult population, it is less commonly used in children with limited imaging of the devices.

Objective

Discuss clinical presentations of HF prior to VAD placement and demonstrate VAD imaging (CXR, TEE and Transthoracic)

Results

We describe 5 cases that recently presented with HF and placement of VAD

14 year old HLHS, s/p Fontan, declining single ventricle function despite maximum medical therapy, required ECMO, transitioned to HeartMate III in RV, and subsequently had heart transplant.

4 month old coarctation of aorta s/p repair and noncompaction cardiomyopathy with chronic LV systolic failure, maintained on inotropic support, presented with decompensated HF. Placement of Berlin LVAD and subsequently had heart transplant.

10 year old dilated cardiomyopathy and HF with severe LV dysfunction requiring inotropes. Placement of HeartWare HVAD and subsequently had heart transplant.

12 year old presented with severe mitral regurgitation, HF, and pulmonary edema. Placement of LVAD Levitronix and underwent mitral valve replacement.

17 month old mitral arcade and HF with normal EF, s/p repair of arcade, on respiratory support for his HF and on maximal medical therapy. Placement of Jarvik 2015 to support LV and eventually needed Levitronix.

Conclusion

This case series describes the spectrum of VADs used at our institution for pediatric HF patients. Imaging modalities to visualize VADs includes CXR, TEE and TTE. Our case series also demonstrates that VADs can provide a bridge to transplant in pediatric HF patients.
CXR of Cases 1-5 demonstrate VAD placements
POSTER SESSION B

Pediatric Research, Education and Scholarship Symposium (PRESS) - April 5th 2019

Pediatric Post-Doctoral Fellow Abstracts
Abstract #5

Name: Maryam Ebadi, MD
Status: Post-doctoral Fellow
Division: Pediatric Hematology / Oncology
Research Sponsor: Peter Gordon, MD, PhD

Overcoming Acute Lymphoblastic Leukemia Chemoresistance Induced by the Meninges

Central nervous system (CNS) relapse is a leading cause of treatment failure in acute lymphoblastic leukemia therapy. We have shown that the meninges provide a unique leukemia niche that enhances leukemia chemoresistance. We now describe our work to leverage this knowledge of the CNS leukemia niche into novel CNS-directed leukemia therapies that 1) target vulnerabilities unique to leukemia cells in the meninges, 2) inhibit the meningeal pathways that contribute to leukemia chemoresistance, and 3) disrupt the interactions between leukemia and meningeal cells.

First, we focused on identifying and targeting vulnerabilities unique to leukemia cells in the meninges. We found that pre-treatment of leukemia cells with ruxolitinib prior to co-culture with primary meningeal cells diminished leukemia chemoresistance. We found that ruxolitinib decreases leukemia quiescence and enhances proliferation in co-culture. Also, we observed similar results in xenotransplanted mice.

Second, we identified and therapeutically targeted meningeal signaling pathways that contribute to leukemia chemoresistance. We used reverse phase protein arrays (RPPA; MD Anderson) to assess the effects of co-culture on protein expression and phosphorylation in primary meningeal cells. We identified activation of the AKT pathway in primary meningeal cells in the presence of leukemia cells. Pre-treatment of primary meningeal cells with INK128, an inhibitor that acts downstream of AKT, prior to co-culture with leukemia cells diminished leukemia chemoresistance.

Third, we tested whether disrupting meningeal-leukemia adhesion overcomes leukemia chemoresistance. Leukemia cells were dissociated from meningeal cells after co-culture, purified, and placed back into suspension. We found that these leukemia cells and those isolated from the meninges of mice, reverted back to baseline cell cycle, quiescence, and apoptosis balance characteristics. Moreover, leukemia cells removed from co-culture exhibited similar sensitivity to methotrexate and cytarabine as leukemia cells in suspension.

In summary, we have identified ways to attenuate chemoresistance induced by the meninges.
Abstract #17

Name: Luke Erber
Division: Neonatology

Status: Post-doctoral Fellow
Research Sponsor: Phu V. Tran, PhD

Global Quantification of Proteome and Phosphoproteome Revealed in Novel Cellular Signaling Mechanisms Responsive to Hypoxia and Iron Deficiency

Luke Erber, Yao Gong, Maolin Tu, Phu Tran, Yue Chen

Background

Iron and oxygen deficiencies are common features in pathophysiological conditions such as ischemia, neurological diseases and cancer. In addition to the dynamics of transcriptome and proteome, oxygen and iron availability strongly affect cellular signaling pathways. While previous studies mainly focused on the analysis of phosphoproteome after a relatively prolonged hypoxia treatment (24 and 48 hrs), the dynamics and regulation of the early oxygen and iron deficiency-induced phosphorylation signaling events remains largely unknown.

Objective

We applied a systematic proteomics analysis of neuron cells to identify and quantify the dynamics of the global proteome and phosphorylation signaling in response to acute hypoxia, chronic and acute iron deficiency.

Design/Methods

To induce oxygen starvation, SILAC labeled HT22 mouse hippocampal neuron cells were treated with 1% oxygen for 6 hours. To induce acute and chronic iron deficiency, SILAC labeled HT22 cells were treated with 100μM of the cell-permeable iron chelator desferoxamine (DFO) for 6 hours or with 10μM DFO for 24 hours. Following mass spectrometry analysis, comparative analysis of iron and oxygen-dependent phosphoproteome dynamics was performed and included gene ontology annotation enrichment and clustering analysis, gene set enrichment analysis (GSEA) and kinase-substrate enrichment.

Results

Our analysis identified over 8600 proteins in nearly 5000 protein groups and about 16000 phosphorylation sites. At least ten percent of the phosphorylation sites increased by two folds under each treatment condition.

Conclusion(s)

Our comparative analysis demonstrated that iron deficiency impacts diverse cellular pathways independent of HIF1α accumulation in neuronal cells including the homeostasis of metal ions, signaling and transcription factor activities. Moreover, chronic and acute iron deficiency showed surprisingly distinct regulation of enzymes and phosphorylation signaling. Overall, this study revealed previously unexpected complexity of the regulatory and signaling pathways in early response to the loss of oxygen and iron within the neuronal cell microenvironment.
Sex-ratio Among Childhood Cancers by Single-year of Age

The male excess in childhood cancer incidence is well-established; however, the underlying biologic mechanisms remain unknown. Examining the association between male sex and childhood cancer by single year of age and tumor type may highlight important periods of risk such as variation in growth and hormonal changes, which will inform etiologic hypotheses. Using data from the Surveillance, Epidemiology and End Results (SEER) 18 registries (2000-2015), incidence rate ratios (IRR) and 95% confidence intervals (95% CI) were estimated as the measure of association between male sex and childhood cancer by single year of age (<1-19).

Male sex was significantly associated with a majority of tumor types, with the exceptions being nephroblastoma, extracranial/extragonadal germ cell tumors (GCT), thyroid carcinoma, malignant melanoma, and salivary gland carcinoma, which were all inversely associated with male sex (Figure 1). The IRR for male cancer overall was 1.19 (95% CI: 1.18-1.20) and was similar in magnitude at nearly every year of age. Burkitt lymphoma was strongly associated with male sex (IRRs ≥2 at each year of age). Increased incidence was observed among males for acute lymphoblastic leukemia (overall IRR:1.36; 95% CI: 1.33-1.39), Hodgkin (overall IRR: 1.25; 95% CI: 1.20-1.30), and non-Hodgkin lymphoma (overall IRR: 1.80; 95% CI: 1.72-1.87) overall and for nearly all years of age. Medulloblastoma was the only central nervous system tumor with a significant male predominance at nearly every age. Osteosarcoma and Ewing sarcoma displayed male-to-female ratios that fluctuated according to pubertal timing.

Male sex was positively associated with most cancers. The higher incidence rates observed in males remained consistent over the childhood and adolescent periods suggesting that childhood and adolescent hormonal fluctuations may not be the primary driving factor for the sex disparities in most childhood cancers. The observed incidence disparities may be due to sex differences in exposures, genetics, or immune responses.
FIGURE 1. Male-to-female incidence rate ratios (IRR) and corresponding 95% confidence intervals for childhood cancer by tumor type (ICCC 3rd edition designation) for all ages combined, SEER 18 (200-2015).
Abstract #41

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Status: Post-doctoral Fellow / Researcher 6  Research Sponsor: Raghu Rao, MD

Effects of Iron Deficiency Anemia (IDA) and its Treatment on the Plasma Metabolomic Profile of Infant Monkeys

Objective

Investigate metabolomic alterations in plasma during and after IDA and assess the effects of parenteral iron treatment in a nonhuman primate model.

Design/Methods

In Study 1, blood samples were collected from rhesus infants with IDA and age-matched iron-sufficient (IS) controls at 6 and 12 months of age (N=10). In Study 2, blood samples were collected from a separate set of IDA and IS monkeys at 6 months and after 1-2 months intramuscular iron dextran treatment in the IDA group (N=12). Plasma metabolomics analysis was performed using GC/MS, LC/MS quantitative platform.

Results

IDA monkeys had lower Hb, smaller MCVs and elevated ZnPP/H than IS infants at 6 months in both studies. Hematology and iron indices normalized at 12 months in Study 1 and post iron treatment in Study 2. In Study 1, compared with IS infants, 40 metabolites were altered in the IDA monkeys at 6 months, and 48 metabolites remained differentially expressed in the formerly IDA monkeys at 12 months (p< 0.05). In Study 2, IM iron administration corrected anemia, reduced most metabolomic differences and normalized neuroactive biochemicals, dopamine 4-sulfate, tyramine O-sulfate and N-methyl-GABA. Network analysis indicated UCP1 inhibition and deficits in uracil degradation, and fatty acid metabolism during IDA (Figure 1).

Conclusion

Mass spectrometry analysis demonstrates that key metabolic pathways remain disrupted for months following the natural resolution of IDA, indicating that early supplementation is essential. Confirmation of these results in humans would suggest the clinical utility of plasma metabolomics to inform optimal timing and more targeted therapeutic approaches for those at risk for IDA.

![Figure 1: Ingenuity Pathways Analysis indicates altered UCP1 regulation, uracil degradation, and palmitate biosynthesis in IDA monkeys compared with IS controls.](image-url)
Abstract #47

Name: Michael J. Parks, PhD  Division: General Pediatrics and Adolescent Health
Status: Post-doctoral Fellow  Research Sponsor: Rebecca Shlafer, PhD, MPH

Adverse Childhood Experiences and Youth Cigarette Use between 2013 and 2016: Emerging Disparities in the Context of Declining Smoking Rates

Co-authors: Laurel Davis, PhD; John H. Kingsbury, PhD; Rebecca J. Shlafer, PhD, MPH

Cigarette use has dropped dramatically among youth since 2013, but smoking-related disparities persist. We examine who still smokes in the context of declining smoking rates. Using the Minnesota Student Survey (MSS), we examine adverse childhood experiences (ACEs) and cigarette use between 2013 and 2016. We assess how use rates changed, how ACEs relate to cigarette use, and the degree to which youth with ACEs now comprise the current smoking population.

Data came from 2013 and 2016 MSS. We assessed past 30-day any and daily cigarette use statewide and among youth with no ACEs, high cumulative ACEs, and seven separate ACEs. We used descriptive statistics and multivariate logistic regression analyses.

Cigarette use significantly declined for all groups between 2013 and 2016. Youth with no ACEs exhibited the highest percent decrease in any and daily use. Youth with ACEs were more likely to report any and daily use in 2013 and 2016, adjusting for demographics. Among youth with any 30-day use, the rate of ACEs increased between 2013 and 2016. Youth with ACEs disproportionately accounted for youth smoking populations in 2013 and 2016. For example, while 16% of all youth experienced parental incarceration, approximately 43% and 55% of youth with any and daily use experienced parental incarceration in 2016, respectively.

Cigarette use declined between 2013 and 2016 for all Minnesota youth, but the decline among youth with no ACEs was faster than among youth with ACEs. Youth with ACEs now account for an increasingly high percent of youth smokers. Youth with ACEs disproportionately account for all youth smokers, and this disproportionality has increased since 2013. Tobacco control efforts should focus on youth with ACEs, and parental incarceration is a specific ACE that warrants attention. Youth who experience parental incarceration now account for a near majority of current youth smokers.
### Table 1. Rates of Past 30-Day Cigarette Use and Daily Cigarette Use among Minnesota Adolescents across Adverse Childhood Experiences, 2013-2016

<table>
<thead>
<tr>
<th>Non-exclusive Groups</th>
<th>Type of Cigarette Use</th>
<th>Year</th>
<th>Change between 2013-2016</th>
<th>Adjusted OR for each ACE measure&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2013</td>
<td>2016</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>(95% CI)</td>
<td>Absolute Δ, % Change, AOR&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Total sample</td>
<td>Past 30-day</td>
<td>7.6</td>
<td>(7.5, 7.8)</td>
<td>-2.8* -35.5, 0.62***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>1.3</td>
<td>(1.2, 1.4)</td>
<td>-0.7* -53.8, 0.44***</td>
</tr>
<tr>
<td>No ACEs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Past 30-day</td>
<td>3.4</td>
<td>(3.3, 3.6)</td>
<td>-1.5* -43.4, 0.56***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>0.5</td>
<td>(0.4, 0.5)</td>
<td>-0.3* -64.4, 0.36***</td>
</tr>
<tr>
<td>Cumulative ACEs (&gt;=4)</td>
<td>Past 30-day</td>
<td>33.1</td>
<td>(31.6, 34.5)</td>
<td>-7.4* -22.4, 0.70***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>7.9</td>
<td>(7.1, 8.7)</td>
<td>-4.0* -50.6, 0.46***</td>
</tr>
<tr>
<td>Separate ACEs</td>
<td>Past 30-day</td>
<td>19.2</td>
<td>(18.6, 19.8)</td>
<td>-6.3* -32.9, 0.63***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>4.2</td>
<td>(3.9, 4.5)</td>
<td>-2.2* -53.2, 0.46***</td>
</tr>
<tr>
<td>Parental alcohol abuse</td>
<td>Past 30-day</td>
<td>19.8</td>
<td>(19.0, 20.5)</td>
<td>-6.2* -31.9, 0.63***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>4.2</td>
<td>(3.8, 4.6)</td>
<td>-2.2* -53.9, 0.46***</td>
</tr>
<tr>
<td>Parental drug use</td>
<td>Past 30-day</td>
<td>29.1</td>
<td>(28.0, 30.2)</td>
<td>-8.4* -28.9, 0.63***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>6.7</td>
<td>(6.1, 7.3)</td>
<td>-3.2* -47.6, 0.48***</td>
</tr>
<tr>
<td>Verbal abuse</td>
<td>Past 30-day</td>
<td>18.1</td>
<td>(17.5, 18.7)</td>
<td>-5.2* -28.5, 0.66***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>3.3</td>
<td>(3.0, 3.6)</td>
<td>-1.7* -51.5, 0.47**</td>
</tr>
<tr>
<td>Physical abuse</td>
<td>Past 30-day</td>
<td>18.4</td>
<td>(17.8, 19.1)</td>
<td>-5.4* -29.1, 0.68**</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>3.6</td>
<td>(3.2, 3.9)</td>
<td>-2.0* -56.0, 0.44**</td>
</tr>
<tr>
<td>Parental IPV&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Past 30-day</td>
<td>21.1</td>
<td>(20.2, 22.1)</td>
<td>-5.2* -24.6, 0.71***</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>4.7</td>
<td>(4.2, 5.2)</td>
<td>-2.5* -53.6, 0.45**</td>
</tr>
<tr>
<td>Familial sexual abuse</td>
<td>Past 30-day</td>
<td>29.4</td>
<td>(27.6, 31.2)</td>
<td>-8.4* -28.6, 0.64**</td>
</tr>
<tr>
<td></td>
<td>Daily</td>
<td>6.8</td>
<td>(5.8, 7.8)</td>
<td>-3.5* -51.6, 0.46**</td>
</tr>
</tbody>
</table>

Notes. * = change between 2013 and 2016 was statistically significant (p<.05); 95% confidence intervals are in parentheses. Groups of adverse childhood experiences are non-exclusive. ACE=adverse childhood experience; IPV=intimate partner violence; odds ratios are from logistic regression models predicting each smoking measure using a dummy variable for survey year (2016=1, 2013=0); odds ratio are from logistic regression models predicting each smoking measure with each ACE measure within each year, adjusting for age, sex, race/ethnicity, and poverty status. For odds ratios, p-value<.001—**. The exact wording for each ACE question were as follows: “Have any of your parents or guardians ever been in jail or prison?”; “Do you live with anyone who drinks too much alcohol?”; “Do you live with anyone who uses illegal drugs or abuses prescription drugs?”; “Does a parent or other adult in your home regularly swear at you, insult you or put you down?”; “Has a parent or other adult in your household ever hit, beat, kicked or physically hurt you in any way?”; “Have your parents or other adults in your home ever slapped, hit, kicked, or punched or beat each other up?”; and “Has any older or stronger parent or member of your family ever touched you or had you touch them sexually?”