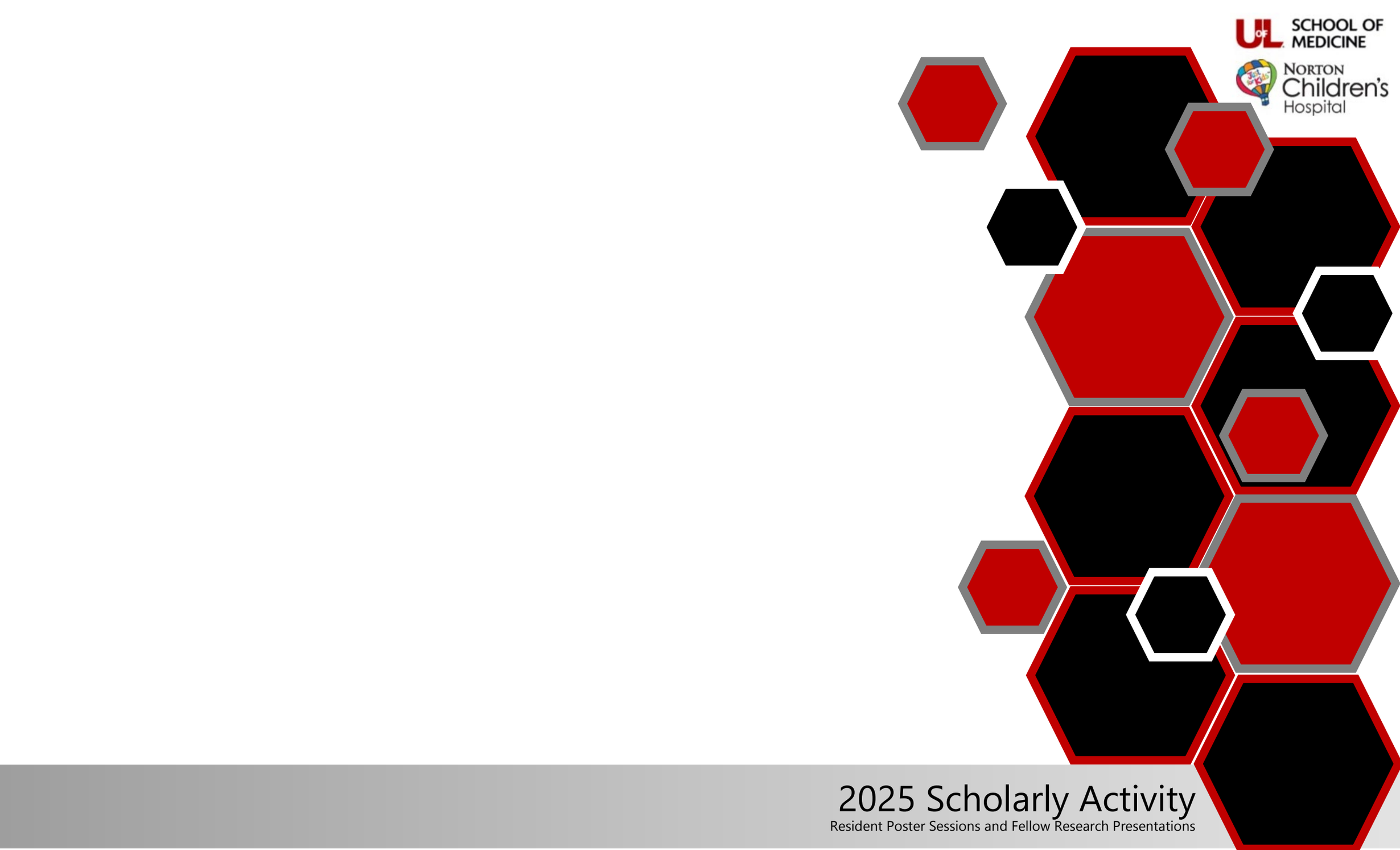
SCHOOL OF MEDICINE
NORTON Children's Hospital
2025 Scholarly Activity
Resident Poster Sessions and Fellow Research Presentations

2025 Scholarly Activity:
Resident Poster Sessions and Fellow Research Presentations

Acknowledgments

The Office of Medical Education would like to extend a special thanks to the entire faculty of the Department of Pediatrics at the University of Louisville. It takes a group of innovative and active faculty to collaborate and support resident education in the realm of scholarly activity.

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A special thank you also goes to the many mentors and leaders who have supported our residents and fellows and who will continue to work with them as professional colleagues and friends. Finally, thank you to Dr. Kimberly Boland and Dr. Mark McDonald for their support in making these endeavors possible.

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Establishing a Pediatric Trauma Curriculum via a National Modified Delphi Process

Michele Bresler, DO – Pediatric Emergency Medicine Fellow
Co-Author(s): Aaron Calhoun, MD; Adam Patterson, MD

Introduction: Trauma remains a leading cause of death in children. The American Board of Pediatrics and the Accreditation Council for Graduate Medical Education recognize that general pediatricians should be able to care for trauma patients by completion of residency. While resident curricula for trauma exist for emergency medicine (EM) and surgical residents, there is no established consensus on what pediatric residents need to know about pediatric trauma patients.

Objective: To establish learning objectives through expert consensus for a pediatric trauma curriculum for pediatric residents.

Design/Methods: A two-stage expert consensus-building approach was utilized to determine objectives for a pediatric resident trauma curriculum. First, a list of pediatric trauma topics was identified by a small expert panel of 5 pediatric emergency medicine (PEM) physicians with modification of objectives from surgery and EM trauma curricula. The second stage was a multi-round Modified Delphi process with an expert panel of 21 PEM physicians from a diverse range of pediatric hospitals nationwide, spanning 21 institutions in 18 states, Washington, D.C., and Puerto Rico. Objectives were scored, edited, and removed/added each round until an expert consensus of 80% or greater was achieved. The expert small group reviewed changes following each round.

Results: During stage one, 5 PEM physicians reviewed 19 content elements for a pediatric trauma curriculum. 15 of 19 (83%) objectives were included following 80% agreement, with 2 new objectives added. Of the 17 objectives submitted to the national expert group, 3 were eliminated (17.6%) based on < 80% approval, 3 (17.6%) were included with no edits, 11 (64.7%) were included with edits, and 7 new objectives were added. These 21 objectives were reviewed by the expert small group; of the 18 which were not yet approved, edits were made to 10 (55.6%). These 18 unapproved objectives were then returned to the expert large group for a second Delphi process; 1 (0.1%) was eliminated, 8 (44.4%) approved without edits, and 9 (50%) approved with minor edits. The expert small group added minor edits to 3 of the 20 (0.15%) objectives. The list of 20 approved objectives underwent final review by the small group with 3 additional objectives eliminated based on comments from the large group, for a final approval list of 17 learning objectives.

Conclusion: Expert consensus was reached via a national Modified Delphi process on 17 learning objectives for a pediatric trauma curriculum for pediatric residents. These identified objectives can be utilized to develop a standardized pediatric trauma curriculum.

Determining the Impact of Stress Inoculation Training on Procedural Competency and Perceived Stress of Pediatric Trainees Performing Laceration Repair During a Mannequin-Based Simulation

Sarah Grout, MD, MSHPE – Pediatric Emergency Medicine Fellow
Co-Author(s): Robin Lund, MD; Danielle Graff, MD

Introduction: Stress Inoculation Training (SIT) is an educational method that provides learners with information about the stress response, behavioral and skills training to control the stress response, and the opportunity to practice a skill under representative stressful conditions. It has been shown in the military literature to be effective for teaching high-stress, low-frequency skills. Procedures in pediatric patients are uniquely stressful, as performing a procedure on an awake and uncooperative child under parental observation is extremely different than the learning environment where procedural skills are taught. For this reason, procedural competency achieved in the classroom often does not translate to competency at the bedside. This study aims to determine if the implementation of SIT improves procedural competency and perceived stress of pediatric trainees performing laceration repair during a mannequin-based simulation compared to the current classroom-based curriculum.

Methods: Pediatric interns on their Procedure Rotation and fourth year medical students on their Practice Pediatrics rotation were randomized into the control (n=22) or intervention (n=21) groups. Both groups had baseline skills assessments. The control group received the current standard classroom-based laceration repair curriculum, and the intervention group received SIT. Both groups then underwent a mannequin-based simulated laceration repair. Data regarding suture proficiency, knot tying proficiency, and subjective stress levels were collected.

Results: Learners receiving traditional classroom training had a statistically significant improvement in suture ($p=0.035$) and knot tying ($p=0.017$) scores. Learners receiving SIT did not have a statistically significant improvement in suture and knot tying scores. There was no significant difference in performance between groups. Learners who received SIT reported feeling less threatened by the upcoming simulation task ($p=0.01$).

Conclusions: SIT was not shown to significantly improve procedural competency scores in pediatric trainees performing a simulated laceration repair compared to the traditional classroom-based curriculum. SIT may lead to a reduced perception of threat when performing a task. There were several limitations to the study. Further studies should be performed to determine if SIT has a role in medical education and procedural training.

Combating Crisis: Improving Pediatric Trainee Knowledge and Confidence with a Curriculum for the Inpatient Management of Pediatric Opioid Use Disorder

A. Noell Conley-Hamlin, DO – Pediatric Hospital Medicine Fellow
Co-Author(s): Laura Bishop, MD; Brittany Badal, MD; Becca Hart, MD, MSc

Introduction: Rates of morbidity and mortality related to opioids in adolescents have risen over the last decade. Despite this crisis, there is a disparity in education and treatment surrounding opioid use disorder (OUD) in adolescents. At our tertiary children's hospital, there is no formal education for trainees regarding inpatient management of pediatric OUD, nor a standardized protocol for care.

Methods: This project seeks to establish a curriculum using Kern's curriculum development methodology to improve pediatric trainees' knowledge and confidence in managing pediatric OUD. A didactic educational intervention was developed by a multidisciplinary team including hospital medicine, emergency medicine, and adolescent medicine. This curriculum was transitioned to a case-based curriculum after receiving trainee feedback. The intervention was administered during morning report sessions for trainees rotating through the inpatient pediatric wards.
To assess effectiveness, surveys measuring trainee confidence and knowledge were collected before and immediately after the intervention. Responses were anonymous, linked by a unique respondent-generated code. An informed consent preamble was provided, and participation was voluntary. Respondents who did not complete post-surveys were excluded from analysis. Confidence was measured using a Likert scale (1 = most confident, 5 = least confident), and a four-question test assessed knowledge. Median confidence before and after intervention was compared via Wilcoxon signed-rank test. Pre- and post-curriculum knowledge scores were analyzed using McNemar's test. Qualitative feedback of curriculum was obtained from participants.

Results: To date, 93 trainees have completed the intervention with pre- and post-surveys. This mostly consists of categorical pediatric trainees in their PGY-1 year. Trainees who participated in the initial didactic sessions had an improvement in their self-reported confidence in domains of screening for substance use disorders and comorbidities ($p = 0.023$), communication with families while maintaining confidentiality ($p = 0.006$), and counseling families about treatment options ($p = 0.007$). The proportion of correct knowledge-based questions in the didactic group improved significantly in domains of appropriate screening tools ($p = 0.004$) and medication for opioid use disorder ($p = 0.007$). The case-based group did report improved confidence in domains of recognizing withdrawal and choosing medication to treat, but significance was not achieved. The case-based group demonstrated improvement in knowledge domain of appropriate screening tools ($p < 0.001$). There were no significant differences in the amount of improvement when comparing the two curriculum styles. 10 trainees have participated in the curriculum more than once, with significant improvements in confidence domains of recognizing withdrawal ($p = 0.014$) and counseling families about treatment options ($p = 0.010$) after the participants second exposure to the curriculum.

Conclusions: The curriculum has successfully improved trainee knowledge on inpatient pediatric OUD management. Trainees found the session valuable and appropriate for their level of training, with multiple respondents requesting additional education on this topic. Limitations include minimal follow-up data to assess knowledge retention and time constraints for the intervention. Future directions include developing standardized patient case simulation to improve confidence in managing hospitalized pediatric patients with OUD. We also hope to adapt our curriculum to nursing colleagues who partner in the care of these patients.

Pediatric Intracranial Hypertension: A Multicenter Examination

Lester Maxwell Adams Gallivan, MD – Child Neurology Resident (PGY-5)
Co-Author(s): Shawn Aylward, MD

When asked to describe the typical patient with idiopathic intracranial hypertension, most physicians will describe an obese middle-aged woman of childbearing age complaining of headaches and blurred vision. However idiopathic intracranial hypertension occurs in all age groups and in both genders. The diagnosis of idiopathic intracranial hypertension is increasingly made in younger patients and the common risk factors are not applicable. This observation helps illustrate how little is known about this condition. The purpose of this study is to follow patients with this condition at different institutions looking for differences in presentation, treatment response and clinical outcomes. Demographics (age, gender, education level), diagnosis, laboratory reports, radiology reports, discharge summaries, procedures/treatments received, names of drugs and/or devices used as part of treatment, and surgical reports will be collected from electronic medical records. Data collection is still ongoing, though current trends in data from Norton Children's Hospital suggest that a majority of patients see full resolution in visual symptoms and optic disc edema at their first hospital follow up. Acetazolamide is the most prescribed medication, and only rarely do patients need repeat imaging, repeat lumbar punctures, or need invasive procedures to preserve vision. While there is still much to be done to improve this database and work to standardize care across centers, we are one step closer to achieving this goal.

To Evaluate Utility of Virtual Reality Technology in Neurology Resident Education: A Mixed Methods Study

Ayush Gupta, MBBS – Child Neurology Resident (PGY-5)
Co-Author(s): Christopher Barton, MD

Introduction: Neuroanatomical education is crucial for Neurology residents, as it aids in in-training exams scoring, neuroimaging interpretation and clinical localization. This project explores the use of virtual reality (VR) technology for neurology education, specifically in Neuroanatomy, using behaviorist approach.

Methods: Teaching sessions highlighting features of arteries, veins and ventricles of the brain on VR, were done using a devised model on Oculus Quest. Learners were walked through the anatomy with emphasis on clinical importance, live feedback and interactive tasks such as dragging each item out and putting it back in the model. A VR perception index was calculated using a rubric to evaluate the favorability of use of VR, with a target calculated score of 25 or above. Pre and post-test questionnaires, consisting of sets of 5 questions on each module, were used to assess change in level of knowledge, and analyzed using paired t-test.

Results: Twenty participants were enrolled with following characteristics: Age range 27-44 years; sex (M:F=11:9); Neurology vs Child neurology trainees (12:8). Most learners use educational videos (8/20) as predominant mode of learning followed by textbooks (7/20). The mean VR perception index was 27.4. Mean scores improved across all three domains after VR exposure: Arterial circulation (3.4 vs 3.9, p= 0.163), Veinous drainage (2.5 vs 3.3, p = 0.017) and Ventricular anatomy (3.05 vs 3.95, p = 0.0015). Lack of significant improvement scores in arterial module could be due to good baseline arterial anatomy knowledge amongst residents.

Conclusions: High VR perception index indicated engagement, immersion and positive perception. The study indicates potential usability of VR in neurology education to improve knowledge. Future studies could address efficacy of VR in long term retention of knowledge and enhanced clinical competency when compared with traditional methods.

Improving Bone Health Screening in Patients with Spinal Muscular Atrophy: A Quality Improvement Initiative

Erin McCoy, MD – Child Neurology Resident (PGY-5)
Co-Author(s): Arpita Lakhotia, MD; Amanda Rogers, MD

Introduction: Poor bone health is a recognized but poorly characterized comorbidity of neuromuscular disorders. Low bone mineral density in spinal muscular atrophy (SMA) patients is caused by reduced mobility, vitamin D deficiency, and lack of modulation of osteoclast activity by *SMN.* Up to 85% of SMA patients have low bone mineral density (BMD) yet measures to improve bone health are limited. Our objective was to conduct a review of our institution's clinical practices and implement a quality improvement initiative to optimize bone health screening in SMA patients.

Methods: A retrospective chart review was conducted of SMA patients at our pediatric neuromuscular clinic from February 2016—February 2022, assessing baseline bone health screening. A protocol including annual laboratory studies, dual-energy X-ray absorptiometry (DEXA) in patients > 5 years, vitamin D supplementation and endocrinology referrals was created. 32 months after implementation, chart review was repeated to assess patients who had undergone screening and new fractures were documented.

Results: 23 patients were included in post-implementation analysis. No patients had previously undergone complete screening comparable to the proposed guideline, which improved to six patients (26%) over the study period. The rate of vitamin D level screening improved from 42% to 91%; patients who had at least one other laboratory investigation to assess for bone turnover improved from 0 to 65%. Vitamin D levels were low in 35% of patients. Two eligible patients had previously undergone DEXA; one additional scan was performed out of 17 eligible patients. All three showed Z-scores indicative of low BMD.

Two patients had previous fractures. Over the study period, six additional patients suffered fractures. Five of these were ambulatory patients with a typical mechanism of injury for childhood fractures.

Conclusions: Low bone mineral density and fractures were common in our SMA patient population, emphasizing the importance of standardized screening protocols. A significant minority of patients had low vitamin D levels. The majority of fractures occurred in young ambulatory patients, demonstrating the changing natural history of SMA in the era of disease-modifying therapy.

Disparities in Kangaroo Care for ELBW and VLBW Neonates in Kentucky

Caroline Jackson, MD – Neonatal-Perinatal Medicine Fellow
Co-Author(s): Cindy Crabtree, DO

Kangaroo care (KC) is a developmental care practice associated with reduced morbidity and mortality, improved growth, and greater breast milk utilization in very low birth weight (VLBW) and extremely low birth weight (ELBW) infants. Despite known benefits, social inequities affect the implementation of KC. There is limited data on racial inequities in KC employment in the United States. More data is also needed to establish the impact of varying KC practices on breast feeding. This study aims to determine time to first KC for VLBW/ELBW black infants and white infants of similar clinical demographics. Secondarily we examine prematurity-related morbidity and mortality, and breast milk utilization at discharge.

This is a retrospective chart review of VLBW and ELBW patients admitted to Norton Children's Hospital NICU from January 2015 to December 2019. Patient records were analyzed for demographic and clinical outcomes data. Patients that were VLBW/ELBW of black race were matched to patients of white race with similar birth weight, gestational age, Clinical Risk Index for Babies II (CRIB II) severity score, and Distressed Communities Index (DCI) score.

A total of 353 infants were included. Demographic data (Table 1) revealed differences in DCI scores and rates of insufficient prenatal care between black and white infants. After controlling for gestational age, birth weight, CRIB II score, and DCI score, there was no significant difference in the time to first kangaroo care (KC) between the two groups. However, black infants with insufficient prenatal care faced delays in KC. Additionally, breast milk utilization at discharge was lower for black infants (Table 3). Other maternal risk factors contributing to delays in KC, after controlling for race, included insufficient prenatal care, diabetes, smoking, mental health diagnoses, and pregnancy-induced hypertension (Table 2).

Our study concludes black mothers receiving insufficient prenatal care experience significant delays in initiating KC for their infants. While there was no overall difference in time to first KC between black and white infants, our findings indicate insufficient prenatal care distinctly affects black infants. Moreover, maternal mental health diagnoses, diabetes mellitus, and certain neonatal conditions further contribute to delays. This study also underscores racial inequities in breast feeding. Addressing disparities in prenatal care and maternal health support is essential to improving timely access to KC and breast milk utilization, benefiting vulnerable infants' health outcomes.

A Quality Improvement Project Using a Factorial Design to Develop and Implement a Post-Partum Depression Screening Process in a Tertiary Level IV NICU

Shelbye Schweinhart, MD – Neonatal-Perinatal Medicine Fellow
Co-Author(s): Cindy Crabtree, DO; Shannon Evans, MD; Claire Milligan, PhD; Tamina Singh, MD

Local Problem:
Parental caregivers in the neonatal intensive care unit (NICU) have an increased risk for postpartum depression (PPD), often missing opportunities for recommended screening. Our quality improvement team aimed to increase the percentage of maternal caregivers in a tertiary level IV NICU screened for PPD with a validated screening tool by 16 days of the child's life from 0 to 90% in an 18-month period and connect those screening positive with psychosocial support.

Methods:
A factorial design was used to determine the ideal screening process in our unit, including the type of screen and method of delivery. Two levels for each factor were used. The Model for Improvement was used to study interventions including process standardization, electronic medical record (EMR) support, and data visualization. Data were displayed overtime on a control chart and stratified for race and language to ensure equitable delivery of the intervention. Sequential funnel plots by provider group were shared with team members overtime to provide feedback. Qualitative responses regarding the process were collected from frontline providers as a balancing measure.

Results:
The Patient Health Questionaire-2 administered via phone or bedside interaction by the medical provider was the most reliable screening method in our context. EMR messaging showed a negative effect on screening rate regardless of screening type. PPD screening increased from 0% to a mean of 75% during our 18-month timeline. Importantly, 90% of positive screens were referred to our unit psychologist. Screening rates were similar comparing non-English speaking and non-white groups to the total population. Providers noted screening fit within their normal workflow and did not add significant time to daily patient care responsibilities.

Conclusions:
Using a factorial design to develop a screening process for a busy tertiary NICU helped our team quickly identify the most effective screening method. The improvement in PPD screening rates was below our goal but resulted in a high percentage of patients receiving psychosocial support. Next steps include utilizing EMR prompts and other higher reliability interventions to improve our rates to >90% and screening additional caregivers.

Enhancing Pediatric Resident Trauma Informed Communication with Human Trafficking Victims

Naomi Warnick, MD, JD – Neonatal-Perinatal Medicine Fellow
Co-Author(s): Olivia Mittel, MD; Aaron Calhoun, MD

Background: Human trafficking (HT) is the fastest growing and one of the largest organized crimes in the world, earning about 32 billion dollars annually. In the United States, there are estimated to be at least 60,000 trafficking incidents. Approximately 80% of trafficked youth seek medical care within a year of identification. Using trauma informed communication (TIC) when caring for this patient population improves short- and long-term health outcomes and is a skill that should be developed during residency training. Rapid cycle deliberate practice (RCDP) uses micro-debriefing interspersed throughout a simulation to enhance learner skill acquisition. While this method has been shown effective for clinical skills, little is known about its effect on teaching non-technical skills such as TIC.

Objective: This study aimed to determine if a RCDP-based simulation program designed to teach TIC in the setting of human trafficking enhances resident skill when compared with a video-based curriculum.

Design/Methods: Subjects, pediatric residents, were divided into two groups, control (video-based) or intervention (RCDP activity). Both groups watched an introductory video and then participated in a simulation with a standardized patient acting as a victim of human trafficking (Sim 1). The control group then watched a video designed to teach TIC using real patient experiences. The intervention group participated in a RCDP activity using a standardized scenario intended to teach the same skills that were presented in control video. Both groups then participated in a second, similar simulation (Sim 2). Sims 1 and 2 were recorded and scored by trained raters using the Gap-Kalamazoo Communication Skills Assessment Form-Trauma Informed Care (GKCSAF-TIC), a recently validated TIC oriented scoring tool. Raters were blinded to the subject's group and whether they were scoring Sim 1 or Sim 2. The Sim 2 data for each group were compared using an analysis of covariance test with rank transform, with Sim 1 data incorporated as a covariate to control for initial skill. Inter-rater reliability of the assessment tool was assessed using intra-class correlations (ICC).

Results: Thirty-four residents participated. The RCDP group Sim 2 median score was 3.6 (IQR 2.9- 3.7). Control group Sim 2 median score was 3.5 (IQR 3.25-3.8). No statistically significant difference between the two groups ($p = 0.46$) was detected by ANCOVA. Analysis showed excellent inter-rater reliability, with a single-rater ICC of 0.93 based on a two-way random effect, absolute score model.

Conclusions: This pilot study was unable to demonstrate improvement in TIC skills after RCDP, raising questions as to whether this is the optimal modality to teach these important communication skills. Further studies are needed to determine the best ways to teach TIC, especially as it relates to human trafficking.

Exploring the Use of Combined Terbutaline/Aminophylline in Management of Pediatric Status Asthmaticus

Kelly McIntyre, MD – Critical Care Medicine Fellow
Co-Author(s): Kelly Lyons, DO; John Berkenbosch, MD; Katherine Potter, MD

Introduction:
Asthma is one of the most common respiratory illnesses leading to hospitalization within the pediatric population. During severe asthma exacerbations, otherwise known as "status asthmaticus", children often require both admission to the pediatric intensive care unit (PICU) and escalation beyond first line bronchodilator therapy (i.e. albuterol). In these cases, medications considered second and third line agents such as additional beta two agonists (i.e. terbutaline) and methylxanthines (i.e. aminophylline) have been utilized. Guidelines on how to escalate therapies for status asthmaticus, including which second and third line medications to utilize, has been limited within the PICU setting and led to variations in practice. Further, there is limited data describing the safety and efficacy of these third line agents when used in combination versus separately for status asthmaticus.

Objective:
Describe the outcomes of combined intravenous terbutaline/aminophylline (TB/AM) for third line management of pediatric status asthmaticus as compared to conventional non-combination therapy including impact on length of stay and maximal respiratory support. We secondarily aim to investigate adverse patient events related to the combined medications.

Methods:
We conducted a retrospective chart review of pediatric patients with a history of asthma admitted to the PICU at our tertiary children's hospital for status asthmaticus. All study participants met the following inclusion criteria: age 2- 18 years and had to receive TB/AM third line therapy. Patients were excluded if they had a tracheostomy, were on home respiratory support, or did not have prior diagnosis of asthma. Our study was approved by the Institutional Review Board at our tertiary children's hospital. Demographic and clinical data were collected including length of stay, duration of medication, adverse events, and maximal needed respiratory support included were compared to a matched control group.

Results:
Patients who were on both medications were more likely to be sicker, they had a longer length of PICU stay and were more likely to be on either mechanical ventilation or ECMO support.

Conclusions:
While this descriptive data was useful, there remains much to be discovered in regard to best third line asthma therapy.

Comparing Outcomes of Centrifugal Versus Membrane Therapeutic Plasma Exchange in Pediatrics

Samantha Wirkowski, DO – Critical Care Medicine Fellow
Co-Author(s): Therese Kluthe, MS; Jamie Furlong-Dillard, DO

INTRODUCTION

Therapeutic plasma exchange (TPE) is an extracorporeal process that removes large harmful molecules in a variety of disease processes in critically ill children. There are two conventional modalities used to perform TPE: centrifugal (cTPE) and membrane (mTPE). Little data exists to compare their outcomes and complication rates in pediatrics, particularly for patients weighing less than 20 kilograms (kg). Our study aims to compare outcomes and complications between cTPE versus mTPE in critically ill pediatric patients.

METHODS

We conducted a retrospective chart review of all children admitted to our tertiary academic center who received TPE from January 2017-December 2022. Demographic data, reason for TPE, and clinical data to evaluate study aims were collected. Quantitative analysis was performed including but not limited to Fisher's exact and Kruskal Wallis tests as well as multivariate Poisson and Cox regressions.

RESULTS

61 patients met inclusion criteria with 259 TPE sessions performed (n=33/61 cTPE, n=27/61 mTPE). Those receiving cTPE had a significantly lower severity of illness compared to mTPE patients using the Pediatric Risk of Mortality (PRISM) III score (p=0.005). While accounting for these differences in illness severity, we found no differences in duration of mechanical ventilation, need for extracorporeal membrane oxygenation, and survival between the two groups. However, patients receiving cTPE did have a significantly lower length of intensive care unit stay (IRR=1.41, 95% CI 1.30-1.53, $p < 0.001$). Total complication rate for both modalities was 5% (n = 13/259), with significantly more in the mTPE (n=10) versus cTPE (n=3) group (p=0.021). For patients weighing less than 20kg, there were no significant differences in outcomes and complication rates.

CONCLUSIONS

Our study demonstrates minimal differences in outcomes between cTPE and mTPE with an overall low complication rate. While limited by our sample size and differences in severity of illness, we are hopeful that our findings, especially with respect to patients under 20kg, can aid in the consideration of TPE modalities for the pediatric population. Future studies with similar severity of illness scores and larger sample size are needed.

Assessing Prevalence of Anticipatory Guidance Regarding Appropriate Milk Intake

Kelly Antoine MD and Shelby Reese MD – Pediatric Residents (PGY-3)
Co-Author(s): Jennifer Thomspon MD

Background: Iron deficiency is the most common cause of anemia in children, and the American Academy of Pediatric recommends universal screening for anemia at approximately 12 months of age. Previous studies have established excessive cow's milk intake as the most common risk factor for iron deficiency anemia (IDA), creating a responsibility for pediatric physicians to educate families and patients on the risks of excessive cow's milk intake. To our knowledge, there is minimal research that documents these counseling conversations regarding prevention of iron deficiency anemia.

Aims: To assess the prevalence of anemia and documented anticipatory guidance (AG) regarding appropriate milk intake in young children, and to determine if documented anemia at the 12-month visit was associated with documentation of AG at subsequent visits.

Methods: Data was collected through retrospective chart review from two general pediatric academic clinics and limited to patients seen by pediatric residents. Age, gender, race, and hemoglobin at 12-month well child checks were obtained from Jan 1 - December 31, 2021. In addition, presence or absence of documented AG at subsequent 24-month, 30-month, and 36-month well child checks were evaluated. Documented AG was defined by an opt-in dot phrase in the assessment and plan portion of the resident's note that stated appropriate cow's milk intake was discussed with the family during the visit. Proportion of included children with documented anemia and documented AG are reported using standard descriptive statistics. Chi-Square analyses compared the presence of anemia with the presence of documented AG, as well as presence of anemia and/or AG based on patient gender and race/ethnicity.

Results: Out of 136 eligible patients presenting for 12-month well child check visits, anemia was found in 5 patients (3.7%; Hemoglobin range 9.7-10.5 g/dL). Of the patients found to have anemia, 4 were female and 1 was male; 4 of the patients with anemia were Black, 1 was Hispanic, 0 were White, Asian, or other/unknown race. Overall, there was no statistical difference in rates of anemia by race or gender. When looking at 24-month, 30-month, and 36-month well child check visits, AG was documented for 213 patients out of 403 eligible patients (52.9%). Having known anemia at the 12-month screening did not increase likelihood of receiving anticipatory guidance at subsequent visits (OR = 0.883 (0.557-1.400), p = 0.617).

Conclusions: The prevalence of anemia in this single-center sample was consistent with the published national rates of 0.9% to 4.4%, but AG documentation was not significantly different in anemic vs. non-anemic patients. This may be explained by several reasons including inaccurate documentation, improved dietary habits, lack of awareness of prior anemia, or personal provider preference. There is room for improvement to increase documenting anticipatory guidance in resident academic clinics.

Assessing Prevalence of Iron-Deficiency Anemia and Anticipatory Guidance Regarding Appropriate Milk Intake in Toddlers

Kelly Antoine MD, Shelby Reese MD, Jennifer Thompson MD
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BACKGROUND

- Iron deficiency is the most common cause of anemia in children. The AAP recommends universal screening for anemia at ~12 months of age.
- Excessive cow's milk intake is the most common risk factor for iron deficiency anemia (IDA), creating a responsibility for pediatric physicians to educate families and patients on the risks of excessive cow's milk intake.

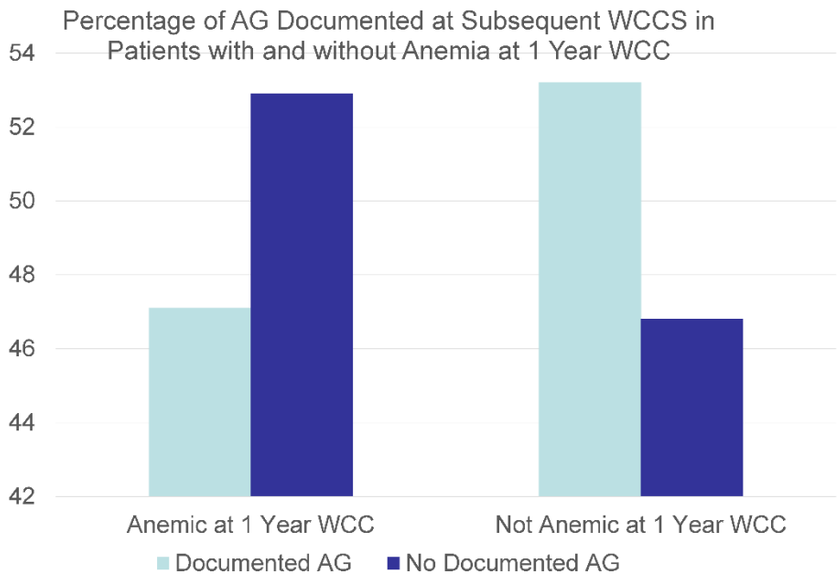
AIM

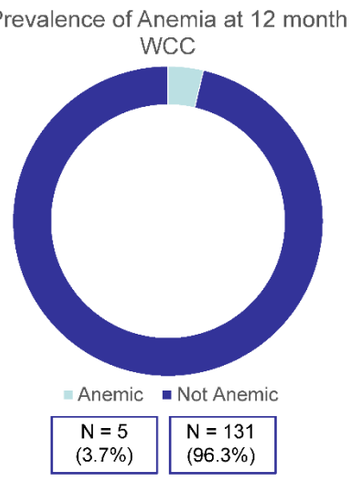
To assess the prevalence of anemia and documented anticipatory guidance (AG) regarding appropriate milk intake in young children, and to determine if documented anemia at 12 mo was associated with documentation of AG at subsequent visits.

METHODS

- Retrospective chart review from two general pediatric academic clinics
- Inclusion criteria: Patients age 11-14 months seen by pediatric residents in two general pediatric academic clinics for 12 mo well-child checks (WCC) between Jan 1 – Dec 31, 2021.
- Data collected:
  - Demographics: Age, gender, race/ethnicity
  - Hb level at 12 mo well child check
  - Documentation of AG at subsequent 24 month, 30 month, and 36 month well child checks
- Data Analysis:
  - Chi-Square analyses compared the presence of anemia with the presence of documented AG, as well as presence of anemia and/or AG based on patient gender and race/ethnicity.

RESULTS





Known anemia at one year screening did not increase likelihood of receiving anticipatory guidance at subsequent visits (OR = 0.883, p = 0.617).

Example of Documentation of AG

CONCLUSIONS

- The prevalence of anemia in this single-center sample was consistent with the published national rates of 0.9% to 4.4%
- AG documentation was not significantly different in anemic vs. non-anemic patients. This may be a result of inaccurate documentation, improved dietary habits or improved hemoglobin, lack of awareness of prior anemia, or personal provider preference.
- Future efforts to increase documentation of AG in resident academic clinics, with focus on educating residents on the importance of AG discussions/documentation, are needed.

Preferential Learning-Based Curriculum Satisfaction of Medical Students on a Pediatric Rotation

Tiffany Brooks, MD – Pediatric Resident (PGY-3)
Co-Author(s): Kelly Lyons, DO; Sarah Korte, MD

Background: Medical school training historically has focused on learning through lecture-based didactics, literature review, and clinical experience. Despite recent increases in asynchronous learning, most medical education still relies on traditional didactic methods, which do not typically accommodate various individual learning styles. Learning styles can be defined as: visual, aural, read/write, and kinesthetic (VARK). To date, no studies have investigated the use of individualized learning style approaches to enhance pediatric medical student education.

Objectives: We aim to investigate whether preferential learning, using identified learning styles by the VARK questionnaire©, improves pediatric rotation curriculum satisfaction for rotating medical students.

Design/Method: We conducted a prospective mixed-methods study evaluating third-year medical students during their pediatric rotation at our tertiary children's hospital from September 2024 to February 2025. Participants completed a pre-survey and validated VARK questionnaire© to determine their preferred learning style at the beginning of the rotation. The surveys explored students' prior experience with preferential learning, the perceived benefits and barriers of using learning-style-based educational materials, and their views on the needs of such materials in medical training. Specific questions addressed included whether students felt their medical school materials aligned with their learning preferences and how often they needed to adapt those materials to fit their style. Participants were provided weekly study materials tailored to their VARK result via an online educational platform and completed weekly surveys assessing their satisfaction with and utilization of the materials. Following the completion of the rotation, participants completed a post-intervention satisfaction survey.

Results: Our pilot study demonstrates the application of a preferential learning curriculum for medical students within a pediatric rotation. Our data shows that 74% of participants (N=45) believe it is important to have educational materials that match their learning style, 48% reported they sometimes have to alter school-provided materials to suit their needs, while 22% often have to. Pre-intervention 84% of respondents agreed/strongly agreed and post intervention the majority were neutral in their response (69%.) Similar trends were observed for if the students found the tailored learning materials beneficial, with pre-intervention showing 84% agree/strongly agree and post interventions showed 64% neutral. Weekly survey showed initial utilization was 54%, however by Quiz 4 utilization decreased to 17%.

Conclusion: Our pilot study demonstrates the application of a preferential learning curriculum for medical students within a pediatric rotation, and highlights that while students initially emphasized the importance and perceived benefits of tailored materials, post-intervention responses suggest a shift in perception—possibly due to barriers to implementation and utilization. During our pilot study medical students appreciated the variety of tailored educational materials provided via preferential learning. The provided resources were frequently noted to be helpful for knowledge retention, indicating that personalized materials may support diverse learning needs. Barriers to implementation and utilization (e.g. time constraints and comfortability with material) were noted. Ongoing incorporation and development of preferential learning curricula for medical students and long-term studies evaluating improvements in confidence and test scores are planned.

Preferential Learning-Based Curriculum Satisfaction of Medical Students on a Pediatric Rotation

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Background

Medical school training historically has focused on learning through lecture-based didactics and clinical experience.[1-3] Despite a recent move towards more asynchronous learning, most education curricula continues to rely on traditional didactic methods which do not always consider individual learning styles.[4] Learning styles can be defined as: visual, aural, read/write, and kinesthetic (VARK). To date, no studies have investigated a preferential learning-based style approach to enhance pediatric rotation learning for medical students and evaluate their perceived need for preferential materials.

Objectives

1. Determine if a preferential learning-based curriculum improves pediatric rotation curriculum satisfaction for third medical students.
2. Describe aspects of the preferential learning-based model that are beneficial for learning as perceived by pediatric rotation medical students.
3. Describe utility/ease of use of preferential learning-based materials within a pediatric medical student rotation.

Methods

- We conducted a prospective mixed-methods study evaluating rotating medical students during their pediatric rotation at our tertiary children's hospital.
- At the beginning of their rotation, enrolled participants completed a pre-survey and validated VARK questionnaire©.[5-6] The VARK© questionnaire is a validated tool that determines individual learning styles as described above.
- Participants were provided weekly study materials tailored to their VARK style via an online educational platform.
- In addition to the pre-survey, participants completed weekly assessments of VARK materials and a post-survey at completion of their rotation.
- Demographic data was collected, and quantitative data was assessed using appropriate parametric and non-parametric testing.

RESULTS

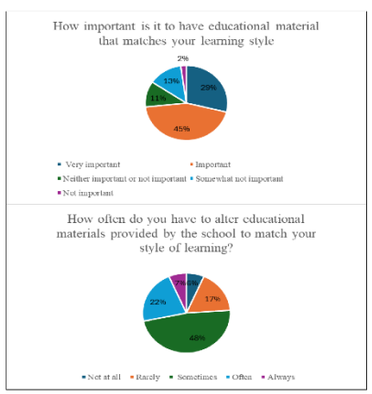
Demographic and Clinical Characteristics

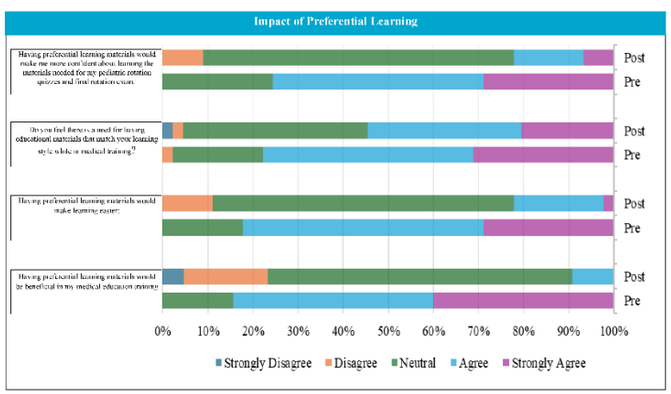
Characteristics	Category	Participants (N=15)
Gender (N,%)	Female	35 (72)
	Male	11 (24)
	Transgender Male	1 (2)
	Transgender Female	0
	Nonbinary	0
	Other	0
Age (N,%)	20-25	22 (48)
	26-30	22 (48)
	30-35	1
	40-50	0
	50+	0
Race (N,%)	White	24 (53)
	Black or African-American	4(9)
	Asian	12 (26)
	Native Hawaiian or Pacific Islander	0
	Other	5 (11)
Learning Style (N,%)	Visual	7 (15)
	Aural/Auditory	5 (11)
	Reading/Writing	6 (1)
	Kinesthetic	15 (32)
	Multimodal	12 (26)

Weekly Assessment

Total Participates: 29

Quiz Number		1	2	3	4
Utilization of Material (N,%)		15 (51.7)	6 (20.6)	7 (24.1)	5 (17.2)
Time Spent (minutes) (N,%)	0 - 15	6 (40)	1 (16.6)	4 (57.1)	2 (40)
	15 - 30	3 (20)	3 (50)	1 (14.3)	1 (20)
	30 - 45	3 (20)	1 (16.6)	0	1 (20)
	45 - 60	0	0	1 (14.3)	0
	60+	3 (20)	1(16.6)	1 (14.3)	1
Having the preferential learning style tools was beneficial to my learning (N,%)	Strongly Disagree	0	0	0	0
	Disagree	0	0	0	0
	Neutral	8 (53.3)	3 (50)	1 (14.3)	3 (60)
	Agree	3 (20)	3 (50)	5 (71.4)	1 (20)
	Strongly Agree	4 (26.6)	0	1 (14.3)	1 (20)





CONCLUSIONS

- Our pilot study demonstrates medical students appreciate the variety of tailored educational materials that come with preferential learning, with some reporting that these resources were helpful for retention, indicating that personalized materials may support diverse learning needs.
- While the materials were tailored to individual styles and overall, well received by students, there were barriers to implementation and utilization specifically related to time constraints and comfortability with material.
- We look forward to ongoing incorporation and development of our preferential learning curricula for the pediatric rotation for medical students at our university and hope to have future long term studies evaluating improvements in confidence with material and objectively with testing scores.

Discussion

- Our pilot study demonstrates the application of a preferential learning curriculum for medical students within a pediatric rotation.
- A majority of students not only emphasized the importance of having educational materials tailored to their preferential learning styles, but that preferential learning materials would be beneficial in making learning easier and improve their confidence with the pediatric material.
- Barriers to integration of the tools included:
  - Students expressing a preference for having tailored materials integrated directly into the curriculum, rather than offered as supplementary resources that required additional effort to engage with.
  - Limited study time over the course of the rotation was frequently mentioned as a barrier.
- Future directions include:
  - Ongoing incorporation of preferential learning tools within our university-wide pediatric clerkship rotation for medical students.
  - Potential opportunities to incorporate preferential learning earlier into medical school education curricula, given the positive perception for earlier introduction by students.

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Does Making an RT-Driven Pediatric Asthma Pathway More Efficient Affect Outcomes?

Phillip Chuong, MD – Pediatric Resident (PGY-3)
Co-Author(s): Ronald Morton, MD; Adrian O'Hagan, MD; Melanie Hess, BSN RN; Scott Bickel, MD

Introduction: Asthma is a leading cause of pediatric hospital admission in the United States. There is no published consensus on the optimal treatment algorithm for admissions for status asthmaticus, though corticosteroids and bronchodilators make up the cornerstones of therapy. We implemented changes to our institution's inpatient Respiratory Therapist (RT)-driven asthma protocol in August 2023, including transitioning to the exclusive use of metered dose inhalers (MDI) except continuous albuterol is needed and adjusting our albuterol weaning strategy such that treatments are either given continuously, every 2 hours, or every 4 hours (a prior phase using treatments every 3 hour was eliminated).

Objectives: To assess differences in hospital length of stay (LOS), escalation of care from hospital floor to ICU, and readmission rates between the pre-intervention and post-intervention periods.

Methods: A retrospective chart review was performed as part of a quality improvement project comparing data from 1 year prior to protocol modification to 1 year post. Afterwards, a quality improvement assessment was then completed monitoring month over month changes. Run charts were completed to variably establish trends. Paired student T-tests were used to assess for significant differences in outcomes in pre vs post protocol modification time periods.

Results: The average LOS prior to the protocol changes was 2.1 days and increased to 2.3 days post-intervention (p=0.32). In the year prior to the protocol change, an average 2.75 patients were readmitted (within 30 days of discharge) per quarter; post-intervention, there have been no 30-day readmissions. Pre-intervention, there was 0.67 transfers from the floor to the PICU per month. While transfers increased to 1.6 transfers/month (p=0.10) in the post-intervention year, these have decreased more recently back to 0.67 transfers/month over the last 3 months assessed.

Conclusion: Implementation of changes to the current asthma protocol did not result in statistically significant changes in LOS or floor to PICU transfers. Readmission rates appeared to decrease. Larger, multi-center studies are needed to determine optimal asthma treatment protocols.

Does Making an RT-Driven Pediatric Asthma Pathway More Efficient Affect Outcomes?

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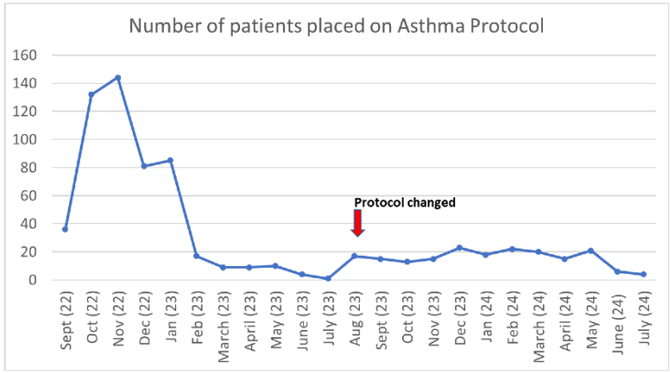
BACKGROUND

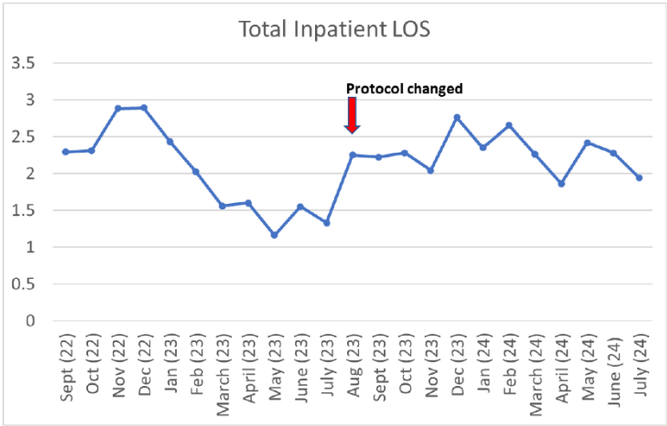
- Asthma is a leading cause of pediatric hospital admission in the United States.[1] Corticosteroids and bronchodilators are cornerstones of therapy, but no published consensus on optimal treatment algorithms exist.
- We implemented changes to our inpatient asthma protocol in August 2023, including: eliminating q3h albuterol treatments, preferring MDIs instead of nebulizers, and switching from a center-specific respiratory scoring system to the validated Pediatric Respiratory Assessment Measure (PRAM) system.

METHODS

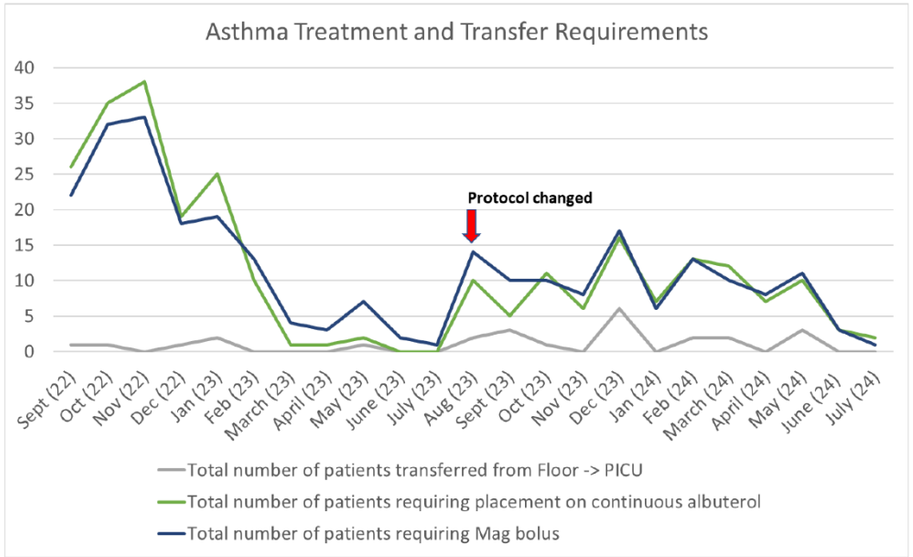
- Retrospective chart review was performed as part of a quality improvement project comparing data 1 year prior to protocol modification vs 1 year post
- QI methodology was used to monitor month to month changes in key variables including: LOS, floor to ICU transfers, and readmission rates
- LOS, transfer rates, and readmission rates were compared using paired T-tests

RESULTS





- Average LOS pre-intervention = 2.1 days, post = 2.3 days (p=0.32)
- Floor to PICU transfers/month pre-intervention = 0.67, post = 1.6 (p=0.10)
- Last 3 months: floor to PICU transfers trending downward, 0.67/month
- 30-day readmission rates: Pre-intervention = 2.75 patients per quarter, post = zero 30-day readmissions



CONCLUSIONS

- Implementation of changes to the asthma protocol did not result in statistically significant changes in LOS or floor to PICU transfers
- Readmission rates were lower in the time period after protocol changes
- Larger, multi-center studies are needed to determine optimal asthma treatment protocols.

Recombinant Activated Factor VIIa: A life-saving strategy in the management of acute neonatal pulmonary hemorrhage

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Cindy Crabtree, DO

Background: Neonatal pulmonary hemorrhage (PH) is a well described condition that typically occurs in the first several days of life. While it is more common in very-low-birthweight (VLBW, < 1500g) and extremely-low-birthweight (ELBW, < 1250g) neonates, the etiology of PH is unknown. Various management strategies exist, but no clear protective interventions have been identified. Recombinant activated factor VIIa (rFVIIa) has FDA approval for the treatment of acute hemorrhage in pediatric and adult patients with hemophilia A and B, and use of rFVIIa in neonatal PH has been reported to decrease time to hemorrhage cessation in small case studies.

Objective: To evaluate the efficacy of rFVIIa for the treatment of acute PH in VLBW neonates. Secondary objectives are to evaluate the clinical outcomes of neonates treated with rFVIIa after PH in comparison to neonates treated with conventional therapy.

Design/Methods: This retrospective study was reviewed and approved through our institutional IRB. Patients (n=98) admitted to a single center neonatal intensive care unit with PH between January 2012-December 2016 and patients with PH treated with rFVIIa between January 2017-December 2022. Exclusion criteria included patients > 30 days of age and if rFVIIa was needed for other indications or evidence of underlying bleeding disorder. Statistical analysis was performed utilizing parametric and non-parametric testing.

Results: There was no statistically significant difference observed when comparing demographics between patients treated with rFVIIa and those who did not receive treatment. However, in the 22 to 25-week cohort, we identified a statistically significant difference in the time for PH cessation. Otherwise, there were no statistically significant differences in pulmonary hemorrhage characteristics between the groups.

Conclusions: The retrospective nature of the study limited our ability to assess how long PH lasted with and without treatment with rFVIIa. However, as stated, there were no differences in major morbidities and mortalities. Given the substantial cost of rFVIIa, careful consideration needs to be given to its efficacy in routine use for PH, although extremely premature patients may demonstrate the most benefit.

Recombinant Activated Factor VIIa: A life-saving strategy in the management of acute neonatal pulmonary hemorrhage

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BACKGROUND

Neonatal pulmonary hemorrhage (PH) is a well described condition with increased risk in very-low-birthweight (VLBW, <1500g) and extremely-low-birthweight (ELBW, <1250g) infants, but no clear protective interventions exist.

Recombinant activated factor VIIa (rFVIIa) has FDA approval for the treatment of acute hemorrhage in pediatric and adult patients with hemophilia, and has be described in case reports as improving outcomes in neonatal pulmonary hemorrhage.

OBJECTIVES

1. Evaluate the efficacy of rFVIIa for the treatment of acute pulmonary hemorrhage in VLBW neonates.
2. Evaluate the outcomes of neonates treated with rFVIIa after pulmonary hemorrhage in comparison to neonates treated with conventional therapy.

METHODS

Retrospective chart review of 98 infants admitted to Norton Children's Hospital and Norton Women's and Children's Hospital NICU's with diagnosed PH between Jan 2012 and Dec 2016 (pre-rFVIIa availability) and between Jan 2017 and Dec 2022 (post-rFVIIa availability).

Exclusion criteria: age > 30 days at time of PH, < 22 weeks GA, known bleeding disorder, use of rFVIIa for non-PH indications.

Outcomes assessed: pt demographics, severity of PH, need for/duration of intubation, time to PH cessation, PH recurrence, median Hb and Plt levels before and after treatment, presence of other bleeding (IVH), and rates of development/severity of BPD or death.

Outcomes were compared among pts who did and did not receive rFVIIa and analyzed using Wilcoxon Rank Sum and Chi-Squar tests.

RESULTS

Table 1: Demographics

Birth Data	Treated with Novo7	Not Treated with NOVO7	P
BW (g), median (Q1, Q3)	860 (640, 1,620)	979 (695, 2,910)	0.282[a]
GA (wks), median (Q1, Q3)	26.0 (24.0, 30.0)	27.0 (24.0, 37.0)	0.170[a]
AGA (>10percetile) by weight, n (%)	30 (96.8%)	55 (84.6%)	0.080[b]
HC (cm), median (Q1, Q3)	24.0 (21.5, 27.5)	24.0 (22.0, 33.5)	0.257[a]
Male, n (%)	19 (61.3%)	33 (48.5%)	0.238[b]
Multiple, n (%)	4 (12.9%)	12 (17.9%)	0.533[b]
Vaginal Birth, n (%)	10 (32.3%)	26 (38.8%)	0.532[b]
Vit K given at delivery	30 (96.8%)	67 (100.0%)	0.140[b]
Antenatal Steroids, n (%)	13 (41.9%)	20 (29.9%)	0.239[b]
Antibiotics prior to Delivery, n (%)	16 (51.6%)	21 (31.3%)	0.054[b]
Chorioamnionitis, n (%)	0 (0.0%)	5 (7.5%)	0.118[b]
Pre-eclampsia, n (%)	3 (9.7%)	5 (7.5%)	0.710[b]
HELLP, n (%)	1 (3.2%)	0 (0.0%)	0.140[b]

[a]P-value of Wilcoxon rank-sum test; [b]P-value of Chi-square test.

Table 2: Pulmonary Hemorrhage Characteristics

	Treated with Novo7	Not Treated with Novo7	P
Days Intubated Prior), median (Q1, Q3)	2 (1, 5)	2 (1, 3)	0.297[a]
Hospitalization Day Onset), median (Q1, Q3)	3 (2, 7)	2 (1, 5)	0.115[a]
PDA Present, n (%)	23 (82.1%)	59 (89.4%)	0.333[c]
PDA Treated, n (%)	13 (48.2%)	27 (40.9%)	0.522[b]
PH Cessation in First Hr, n (%)	17 (54.8%)	22 (33.9%)	0.050[b]
PH re-occurrence in first 24hrs, n (%)	6 (19.4%)	17 (26.2%)	0.466[b]
PH re-occurrence >24hrs, n (%)	2 (6.5%)	12 (18.5%)	0.214[c]
Hgb prior to PH (g/dL), median (Q1, Q3)	12 (11, 14)	13 (12, 15)	0.049[a]
Hgb post PH (g/dL), median (Q1, Q3)	11 (10, 13)	12 (10, 14)	0.177[a]
PLT pre PH (10*3/uL), median (Q1, Q3)	153 (108, 181)	147 (99, 200)	0.867[a]
PLT post PH (10*/uL), median (Q1, Q3)	124 (103, 165)	139 (84, 186)	0.850[a]
PT post PH, median (Q1, Q3)	14 (9, 20)	17 (14, 21)	0.033[a]
PTT post PH, median (Q1, Q3)	50 (45, 84)	53 (40, 65)	0.541[a]
INR post PH, median (Q1, Q3)	1 (1, 2)	2 (1, 2)	0.534[a]
Fibrinogen post PH (mg/dL), median (Q1, Q3)	177 (81, 255)	198 (128, 237)	0.009[a]
Mortality due to PH, n (%)	2 (6.5%)	6 (9.2%)	1.000[c]

[a]P-value of Wilcoxon rank-sum test; [b]P-value of Chi-square test; [c]P-value of Fisher's Exact test.

Table 4: Clinical Outcomes

	Treated with Novo7	Not Treated with Novo7	p
IVH (Grade 1,2)	8 (25.8%)	18 (26.9%)	0.912[b]
IVH (Grade 3,4)	11 (35.5%)	17 (25.4%)	0.324[b]
Sepsis	7 (22.6%)	13 (19.4%)	0.717[b]
Retinopathy of Prematurity	13 (41.9%)	18 (26.9%)	0.136[b]
NEC	3 (9.7%)	7 (10.6%)	1.000[c]
BPD (Mild)	9 (29.0%)	17 (25.4%)	0.703[b]
BPD (Severe)	1 (3.2%)	3 (4.5%)	1.000[c]
Death prior to Discharge	7 (22.6%)	18 (26.9%)	0.651[b]

[b]P-value of Chi-square test; [c]P-value of Fisher's Exact test.

CONCLUSIONS/DISCUSSION

In this cohort, pts with PH who were treated with rFVIIa did not demonstrate significant improvement compared with those not receiving rFVIIa treatment in any outcome, including: number of days intubated, time to PH cessation, PH recurrence, coagulation lab results, development of IVH, sepsis, retinopathy of prematurity, NEC, BPD, or death prior to discharge.

Given the substantial cost of rFVIIa, further evaluation of routine use of rFVIIa in pulmonary hehmorrhage may be warranted.

Efficiency and Effectiveness of Communication with Non-English-Speaking Patients and Families in the PICU at NCH

Heidi Gorbandt, MD – Pediatric Resident (PGY-3)
Co-Author(s): Chelsea Sizemore BSN, CCRN; Mary Sandquist, MD

Introduction: Children of limited English proficiency (LEP) families are known to experience healthcare disparities in the hospital setting, including decreased quality of healthcare, poorer overall health status, and increased risk of serious medical events during a hospitalization. While access to interpreters is known to improve these outcomes, little is known about family preferences or the efficiency of interpreter communication in the Pediatric Intensive Care Unit (PICU). The primary aim of this study was to evaluate family preferences and compare the efficiency and effectiveness of in-person vs telehealth or phone interpreters for communication with families in the PICU.

Methods: This was a non-randomized cross-sectional study including patients admitted to the PICU at our tertiary children's hospital from March 2024 to February 2025 whose families were primarily Spanish speaking and who required an interpreter. Patients were excluded if family members were not present for morning rounds. Providers recorded the amount of time spent with each Spanish-speaking patient during daily morning rounds in the PICU, as well as the type of interpreter used (in-person or telehealth/phone). After rounds were complete, a Spanish-language survey was administered to families to assess perceived understanding of messages delivered, preference of interpreter type and, overall impression of morning rounds that day. Proportion of interpreted discussion utilizing in-person and telehealth interpretation, family's perceived understanding of information discussed on rounds, and family preference of which type of interpreter was used were all reported with standard descriptive statistics. Duration of rounding time could not be compared due to limited population size and lack of statistical power.

Results: There were 38 total timed encounters across 16 different patients. There were only 10 collected survey responses. Interpreter usage consisted of 7 encounters (18%) utilizing an in-person interpreter and 31 encounters (82%) utilizing an electronic interpreter. There was not a large enough patient population to perform any inferential statistics. However, the median time spent on rounds with an electronic interpreter was 10 minutes (IQR: 6.5). Median time spent on rounds with an in-person interpreter was 17.5 minutes (IQR: 14). Patients universally agreed on the survey that they understood the plan of care for the day and that the care team spent enough time with them on rounds. Of the survey respondents, 5 had a preference for in-person interpreters, 2 had a preference for electronic interpreters, and 3 had no preference.

Conclusions: Daily morning rounds in the NCH PICU are more frequently assisted with electronic interpreters as opposed to in-person interpreters. However, of families surveyed, there does seem to be a preference for in-person interpreter usage. No definitive statement regarding efficiency of interpreter types can be made at this time as this study's sample size was too small. However, this does serve as a good starting point to begin making assessments about interpreter usage and patient preferences in regard to communicating in their native languages.

Efficiency and Effectiveness of Communication With Non-English-Speaking Patients and Families in the PICU at NCH

Heidi Gorbandt MD, Chelsea Sizemore BSN, CCRN, Mary Sandquist MD

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BACKGROUND

- Children of limited English proficiency (LEP) families are known to experience healthcare disparities.
- While interpreter use for admitted patients is associated with decreased rate of ICU transfer, little is known about family preferences or efficiency of communication with intepreters in the ICU setting.

METHODS

- Spanish-speaking patients (requiring interpreter use) admitted to the Pediatric ICU March 2024– February 2025 were included.
- Data collected: duration of time on rounds, interpreter type used.
- Families surveyed (in Spanish) after rounds about perceptions and preferences
- Rounding time, family satisfaction with interpretation, family self-rated understanding of medical plan compared based on interpreter type. Time on rounds stratified by PRISM illness severity score to account for differences based on illness.

RESULTS

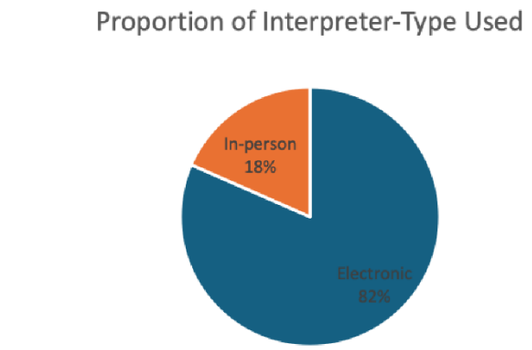


Figure 1. 82% utilized electronic interpreter services, and only 18% utilized in-person interpreter services.

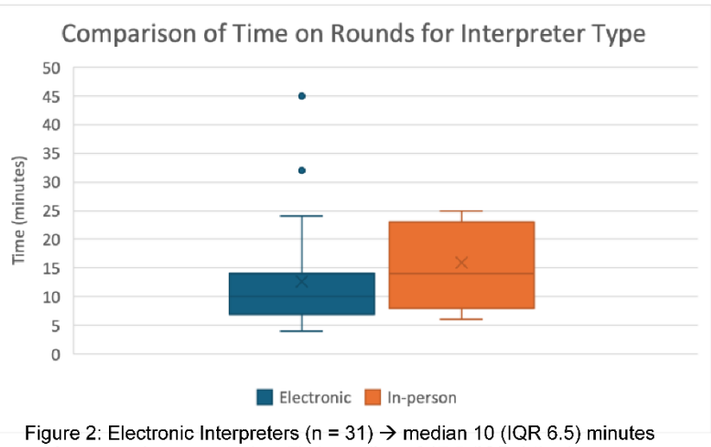


Figure 2: Electronic Interpreters (n = 31) → median 10 (IQR 6.5) minutes
In-person interpreters (n = 7) → median of 17.5 (IQR 14) minutes.

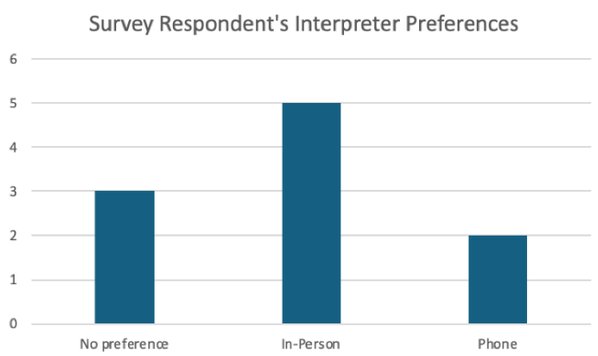
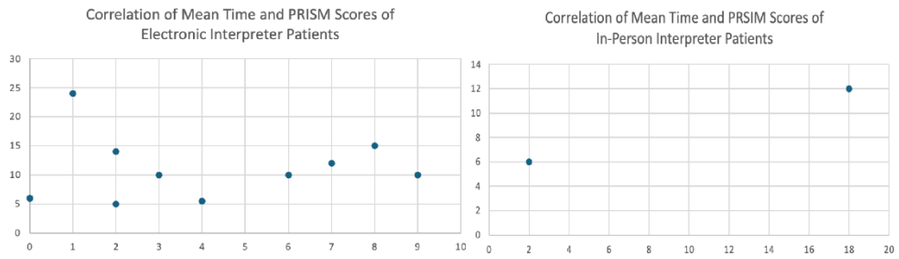


Figure 3. Five of ten survey respondents preferred in-person interpreter services as opposed to electronic services or having no preference.



Figures 4 and 5. Comparison of time spent on rounds to patient PRISM score depending on interpreter type.

CONCLUSIONS

- Daily morning rounds in the PICU at NCH are more frequently assisted with electronic interpreters than in-person interpreters.
- Of the families surveyed, more preferred in-person interpreter services.
- No significant difference identified for rounds duration based on interpreter type

Antibiotic Stewardship in Tracheitis: A Quality Improvement Project

Taylor Kavanaugh, DO – Pediatric Resident (PGY-3)
Co-Author(s): Sara Multerer, MD; Colin Stone, MD; Navjyot Vidwan, MD; James Stahl, Pharm D; Vicki Montgomery, MD

Introduction: Tracheitis is a common reason for antibiotic therapy in medically fragile pediatric patients. Given rising concerns about antibiotic resistance, decreasing over-utilization of antibiotics in this population is critical. A quality improvement group was formed to assess duration and regimen of antibiotic therapy children received for presumed diagnosis of bacterial tracheitis, with an aim to reduce exposure to antibiotics.

Methods: We assessed sputum cultures (collect/labeled as "trach culture" or "tracheal aspirate") for patients admitted to Norton Children's hospital between January 2021 – December 2022. Data collected included collecting department, type of sputum culture, culture results (type of bacteria grown, number of colony-forming unit [CFU]), and patient demographics. Clinical criteria for bacterial tracheitis was determined using published guidelines, including standard criteria: fever, increased sputum production, hypoxia, many white blood cells (WBC) on gram stain, and bacterial growth on sputum culture. A retrospective chart review determined whether/how many clinical criteria were met for tracheitis at time of sputum culture collection, and duration and type of antimicrobial therapy received. After initial review of date, an educational session was held to discuss the most evidence-based treatment for bacterial tracheitis and review hospital antimicrobial guidelines. We aimed to decrease the average days of antibiotic therapy in tracheostomy patients admitted to the hospitalist service during a 4-month time period. Post-intervention data were then collected from October 2023 to January 2024. The primary outcome was comparison of the mean duration of antibiotics before and after the education intervention.

Results: In the pre-intervention time period, 221 sputum cultures from 81 unique patients were included. 177 (80.1%) cultures were collected form patients who met at least 2 clinical criteria for tracheitis. Those patients received an average of 4.77 days of antibiotic therapy, but 39 (21%) did not receive any antibiotics. Of cultures obtained from patient with 2+ clinical criteria 56 (31%) resulted as final no growth; those patients received a mean of 5.6 (+/-3.56) days of antibiotics. In the post-intervention periods, then hospitalized patients on the hospitalist service had sputum cultures collected with no growth or normal respiratory flora, and these patients received a mean 1.11 (+/-1.26) days of antibiotic therapy.

Discussion: After providing increased education to providers, we saw a reduction in the duration of antibiotics therapy in patients who did not have growth on sputum culture. Targeted education of providers may improve antibiotic stewardship and has potential to decrease adverse effects antibiotic over-utilization in a medically fragile population.

Antibiotic Stewardship in Tracheitis: A Quality Improvement Project

Taylor Kavanaugh DO, Sara Multerer MD, Colin Stone MD, Navjyot Vidwan MD, James Stahl Pharm.D, Vicki Montgomery MD

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Tracheitis is a common reason for antibiotic therapy in medically fragile pediatric patients.

Given rising concerns about antibiotic resistance, decreasing over-utilization of antibiotics in this population is critical.

A QI group was formed to assess duration and regimen of antibiotic therapy among children with presumed diagnosis of bacterial tracheitis, with an aim to reduce exposure to antibiotics.

METHODS

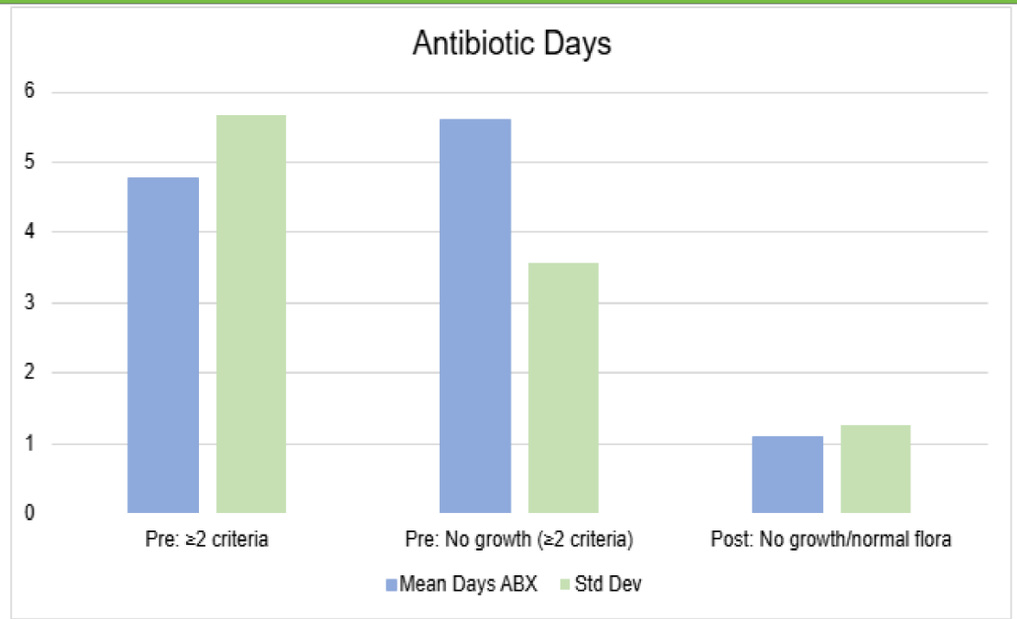
Retrospective chart review of patients with sputum cultures obtained as either "trach culture" or "tracheal aspirate" between January 2021 - December 2022 (baseline) and October 2023 - January 2024 (post-intervention)

Intervention: education session reviewing antimicrobial guidelines for tracheitis

Data obtained: collecting department, type of sputum culture, culture results, patient demographics, clinical signs/sxs of tracheitis (fever, increased sputum production, hypoxia, many WBCs/bacterial growth on culture)

Pre- and post-intervention data compared using standard descriptive statistics

RESULTS



221 sputum cultures (81 pts)

177 (80.1%) met ≥2 clinical criteria for tracheitis, mean 4.77 days antibiotics

56 (31%) resulted as final no growth (mean 5.6 (+/-3.6) days of antibiotics

Hospitalist service patients (n=10) with no growth (mean 1.11 (+/- 1.26) days of antibiotics

CONCLUSIONS

- There was a reduction in the duration of antibiotic therapy in the post-intervention subset
- Targeted education can aid in antibiotic stewardship and has potential to decrease adverse effects in medically fragile population

Improving Verbal Lead Risk Assessment in an Academic Pediatric Practice

Jessica Mutters-Morales, DO – Pediatric Resident (PGY-3)
Co-Author(s): Corey Moran; Matthew Kinney, MD; Kristina Bryant, MD

Background: Lead is an environmental neurotoxin. Exposure in childhood can result in cognitive impairment and poor academic achievement. The American Academy of Pediatrics recommends risk assessments for environmental sources of lead at each well child visit between 6 months and 6 years of age. In a large, urban academic pediatric practice that routinely performs blood level levels (BLL) at 12 and 24 months of age, early screening for environmental risk factors was inconsistent.

Objective: Within 12 months, improve verbal lead risk assessment completion for 6-month-olds in an academic pediatric clinic that serves children at increased risk for lead exposures from 0% to 90%.

Methods: A 6-question verbal lead risk assessment (VLRA) tool was embedded in the 6- month well child template. Resident physicians received spaced education that incorporated storytelling, local data about lead poisoning and evidence-based recommendations as part of a quality improvement project. Reliability with VLRA use, the number of abnormal screens, pattern of positive common risk factors, total BLLs completed, and BLL results were abstracted from the electronic health record monthly.

Results: Between 3/14/2024 and 2/28/2025, 403 6-month-olds were seen for well-child visits. Overall, resident use of the VLRA increased from 0% to 25.1% while overall utilization increased to 36.6%. Living close to a major highway was the most common risk factor identified (33/160; 20.6%). BLL were recommended for 46/160 patients based on abnormal VLRAs. Of those tested, 2/27 patients had levels ≥ 3.5 ug/dL (4.3% of those recommended for screening & 7.4% of those screened with POCT BLL).

Conclusions: VLRA utilization improved lead risk assessment at the 6-month well child visit, leading to earlier identification of elevated BLL in two children. Wide variability of VLRA utilization occurred with temporary increases noted in relation to plan-do-study-act cycles in relation to the nature of our interventions being more passive or more interactive, such as the barrier survey and RGR presentation. The ambulatory practice that implemented the intervention is located near the zip codes most at risk for lead exposure. Moving forward, broadening the VLRA utilization beyond only the 6-month well child visit and diversifying clinic involvement will improve regional screening for lead exposure to help the Louisville Metro Department of Public Health and Wellness target their preventive efforts and interventions.

Improving Verbal Lead Risk Assessment in an Academic Pediatric Practice

Jessica Mutters-Morales, DO | Corey Moran | Matthew Kinney, MD | Kristina Bryant, MD

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

• Childhood exposure to lead can result in cognitive impairment and poor academic achievement.

• The American Academy of Pediatrics recommends regular risk assessments for environmental sources of lead, but screening at our academic primary care clinic has been inconsistent.

METHODS

QI project using PDSA cycles

Primary aim: improve VLRA utilization from 0% to 90% between 3/14/24 and 3/31/25

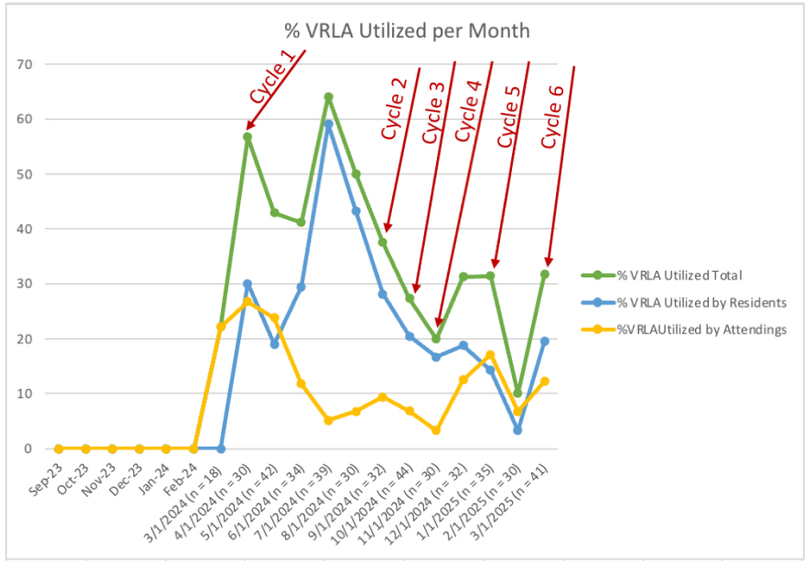
Interventions: Incorporation of VLSA into 6-month well-child visit note template, spaced education on environmental exposure screening for pediatrics residents (see below)

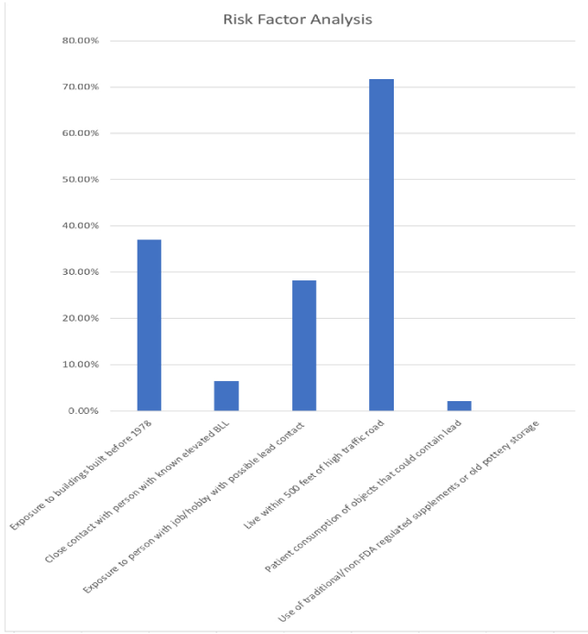
Primary outcome: % of 6-month well-child visits with documented VLRA use

Secondary outcomes: number of abnormal screens, total BLLs completed, common identified risk factors, and BLL results

Cycle	Interventions
Cycle 0	Baseline
Cycle 1 (3/18/2024)	First added VLRA into 6 month WCC template used by all residents. Would send email to all residents rotating through Novak clinic at the start of each block.
Cycle 2 (9/18/24)	Encouraged VLRA use by providing Novak residents with Hersey's milk chocolate bar that had an example of negative sequelae of elevated BLL caught at 12 month check.
Cycle 3 (10/21 - 12/13/24)	Lead Kahoot available for residents in clinic
Cycle 4 (11/25 - 12/18/24)	Survey about barriers to utilization of VLRA and/or AAP recommendations for Tri-Resident Cup. 10 points to the class who completed the most surveys with clinics & specialties divided among the classes.
Cycle 5 (1/24/25)	Changes made to VLRA based upon survey feedback.
Cycle 6 (3/13/25)	Advocacy Track RGR presentation providing information regarding lead exposure in Louisville and QI objectives

RESULTS





- 403 6-month-olds were seen for well-child visits during the study period.
- Resident VLRA use increased from 0% to 25.1%, Overall use from 0 % to 36.6%.
- Living close to a major highway was the most common risk factor identified (33/160; 20.6%).
- BLL were recommended for 46/160 patients based on abnormal VLRAs - 27 tested, 2 (4.3%) with BLL ≥ 3.5 ug/dL

CONCLUSIONS

- VLRA utilization improved lead risk assessment at 6-month well child visits, leading to earlier identification of elevated BLL in two children.
- Wide variability of VLRA utilization occurred, with variable temporary increases associated with more active interventions
- Moving forward, broadening VLRA utilization beyond only the 6-month well child visit and diversifying clinic involvement will improve regional screening for lead exposure to help the Louisville Metro Department of Public Health and Wellness target their preventive efforts and interventions.

Nutritional Factors Affecting Bronchopulmonary Dysplasia in Extremely Low Birthweight Infants

Mehma Singh, DO – Pediatric Resident (PGY-3)
Co-Author(s): Theresa Kluthe, MS; Scott Duncan, MD

Background: Bronchopulmonary dysplasia (BPD) represents a severe sequela of prematurity in neonates and is the most common neonatal lung disease leading to long term adverse outcomes. Nutrition plays a significant role in the risk of developing and treatment of BPD, but limited data is available assessing the implementation and progression of enteral feeds in infants with BPD. The aim of this study is to assess factors affecting advancement of feeds in neonates who develop BPD.

Methods: We performed a retrospective chart review of neonates < 32 weeks gestation admitted to the University of Louisville Hospital neonatal intensive care unit (NICU) between January 1, 2022, and December 31, 2023, divided into two groups: patients with/without diagnosis of BPD. Infants with identified chromosomal anomalies, congenital anomalies that impact enteral feeding, growth or development, and infants who expired prior to 36 weeks postmenstrual age were excluded. Data collected included birth/admission date, gestational age, birth weight, sex, ethnicity, mode of delivery, administration of maternal steroids, respiratory assistance after NICU admission, development of respiratory distress syndrome, and diagnosis/severity of BPD. Nutritional data included initiation of vanilla TPN (standardized premixed parenteral nutrition without electrolytes/additives), TPN (specialized parenteral nutrition per patient's needs based on electrolytes) and trophic feeds (nutrition through the gastrointestinal system), time to reach full enteral feeds, steroids within first 30 days of life, and weight at 30 days of life. We also documented any disruptions in feeding advancements and why, and growth in 30 days measured by change in z score on day of life 30. Standard statistical approaches assessed differences between the groups, including Chi Squared test for categorical data and ordinal regression to predict factors associated with severity and diagnosis of BPD.

Results: Our patient population included 30 neonates with the diagnosis of BPD and 70 without. Patients with BPD had a lower birth weight (754 g vs 1388g, $p<0.001$) and gestational age (26 weeks vs 30 weeks, $p<0.001$) than those without BPD, and took longer to initiate trophic feeds (DOL 4 vs. DOL 1, $p<0.001$) and reach full feeds (18.5d vs 9d, $p<0.001$). Patients with sepsis, code events, or who required increased oxygen support were more likely to have delays in advancement of feeds. While the cohort with BPD weighed less at 30 days of life (1063g vs. 1857g, $p<0.001$), the change in growth measured by the z score was not significant ($p=0.311$), confirmed by ordinal regression.

Conclusions: Despite the differences in the sampled patient populations, patients with BPD in this cohort weighed less at 30 days of life, initiated enteral feeds later, and took longer to reach full feeds than those who did not develop BPD, but did not have significant differences in growth change over time as reflected by z-scores. These findings provide insight into identifying patients who may be at risk for developing BPD and re-iterates the importance of optimizing nutrition as early as possible for these neonates.

Nutritional factors affecting bronchopulmonary dysplasia in extremely low birthweight infants

Mehma Singh, DO, Theresa Kluthe, MS, Scott Duncan, MD, FAAP
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- Bronchopulmonary dysplasia (BPD) represents a severe sequela of prematurity in neonates and is the most common neonatal lung disease
- Nutrition plays a significant role in the risk of developing and treatment of BPD, but limited data is available assessing the implementation and progression of enteral feeds in infants with BPD.

AIMS

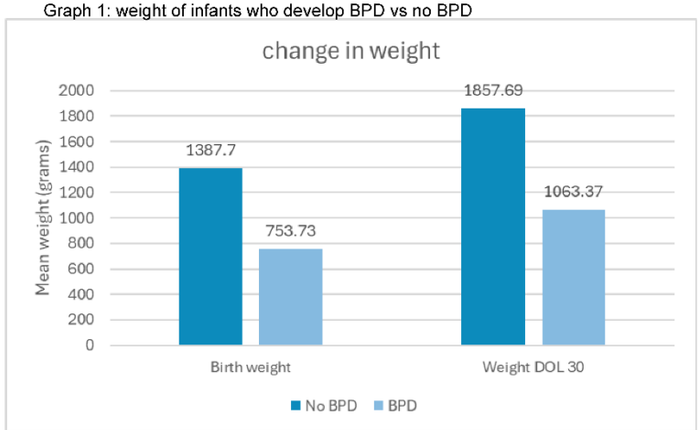
- To compare nutritional outcomes including time to initiation of enteral feeds, reach full feeds, and weight at 30 days of life among patients with and without BPD.

METHODS

- Retrospective chart review of neonates admitted to the University of Louisville Hospital NICU January 1, 2022 - December 31, 2023
- Inclusion criteria: < 32 weeks gestation
- Exclusion criteria: chromosomal anomalies, congenital anomalies that impact enteral feeding, growth or development, and infants who expired prior to 36 weeks postmenstrual age were excluded
- Data collected: birth/admission date, gestational age, birth weight, sex, ethnicity, mode of delivery, administration of maternal steroids, respiratory assistance after NICU admission, development of respiratory distress syndrome, and diagnosis/severity of BPD.
- Nutritional data: date/time of initiation of vanilla TPN, TPN, and/or trophic feeds; time to reach full enteral feeds; steroids within first 30 days of life, and weight at 30 days of life
- Standard statistical approaches assessed differences between the groups, ordinal regression to predict factors associated with severity and diagnosis of BPD.

RESULTS

Graph 1: weight of infants who develop BPD vs no BPD



Graph 2: nutritional data

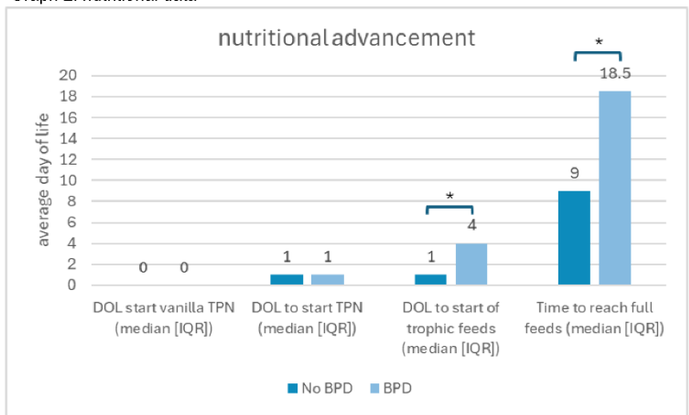
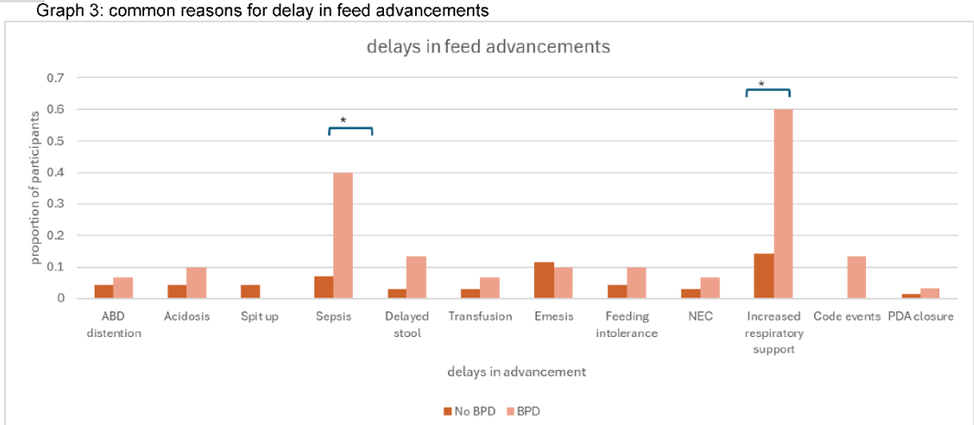


Table 1: Demographic information

	level	No BPD	BPD	p
n		70	30	
Gestational age (median [IQR])		30.00 [28.00, 31.00]	26.00 [24.00, 26.75]	<0.001
Birth weight (mean (SD))		1387.70 (368.00)	753.73 (259.79)	<0.001
Sex (%)	female	39 (55.7)	17 (56.7)	>0.999
	male	31 (44.3)	13 (43.3)	
Ethnicity (%	NH White	34 (48.6)	13 (43.3)	0.63
	NH Black or African American	23 (32.9)	9 (30.0)	
	Hispanic	10 (14.3)	5 (16.7)	
	NH Asian	2 (2.9)	3 (10.0)	
	NH other race	1 (1.4)	0 (0.0)	

Graph 3: common reasons for delay in feed advancements



CONCLUSIONS

- Enteral feeds were initiated later and took longer to reach full feeds in patients who developed BPD.
- While BPD patients weighed less at 30 days of life compared to those who did not develop BPD, the differences in growth were not reflected within the z scores.
- Sepsis and increasing respiratory support were commonly sited reasons for delaying feed advancement in infants who developed BPD vs those who did not

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Antibiotic Stewardship and Local Prescribing Patterns for Community Acquired Pneumonia Among Pediatric Providers

Morgan Robinson, MD – Pediatric Resident (PGY-3)
Co-Author(s): Becca Hart, MD; Sara Multerer, MD

Background: Recent guidelines for treatment of community acquired pneumonia (CAP) in children recommend a 5-to-7-day amoxicillin course, but prescribing patterns are often inconsistent. We sought to assess prescribing patterns of antibiotics for CAP among all provider types in Norton Healthcare pediatric outpatient settings.

Methods: This was a cross-sectional observational study of outpatient pediatric visits with CAP diagnosis from January to December 2023. Patients age 6 months-18 years old were included; those who were hospitalized, had chronic underlying illness, allergy to or recent course of amoxicillin, or a concurrent diagnosis (otitis media, group A strep) that may change antibiotic duration were excluded. We documented demographic information, medical history, drug allergies, pediatric office type (academic or non-academic), if a Chest XR (CXR) or viral testing was obtained and results, type/duration of antibiotic prescribed, repeat visits and antibiotic changes in a subsequent 2-week period, and prescriber type (MD/ NP/ PA). Number and proportion of encounters with/without 5–7-day amoxicillin prescriptions were documented and compared based on prescriber type and testing obtained using standard descriptive statistics.

Results: Of 977 screened charts, 540 (55.3%) met inclusion criteria. Only 315 (58.3%) patients were correctly prescribed Amoxicillin for initial treatment; 48/315 (15.2%) of these received the correct duration. Overall, 48/540 (8.9%) of patients received both correct type and duration of antibiotic. Prescribing patterns were similar based on provider type: 58.8% of MD/DOs and 56.9% of APRN/PAs correctly prescribed amoxicillin. Among these, MD/DOs were more likely to correctly choose 5–7-day treatment than APRN/PAs (17.3% vs. 5.2%, OR 3.84, $p = 0.02$). APRN/PAs were also more likely to order CXRs vs MD/DOs (OR 2.39, 95% CI 1.70-3.35, $p < 0.001$). Neither receipt of a CXR, radiologic pneumonia, nor performance/results of viral testing were associated with increased odds of correct antibiotic choice or duration. Of 173 patients with a return visit within 2 weeks, only 17.3% had a medication change. Those who were originally prescribed Augmentin were more likely to return (OR 3.21, 95% CI 1.72-5.98, $p < 0.001$), but CXR ($p = 0.304$), viral swab ($p = 0.586$), provider type ($p = 0.682$), and other original antibiotic prescribed were not associated with returns or medication changes.

Conclusion: In this cohort, treatment for pediatric patients with uncomplicated CAP varied significantly and often diverged from recommendations for antibiotic type and duration. Future efforts to improve adherence to guidelines and standardize care across locations, settings, and provider types are needed.

Antibiotic Stewardship and Local Prescribing Patterns for Community Acquired Pneumonia Among Pediatric Providers

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Norton Children's and the University of Louisville School of Medicine
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BACKGROUND

Recent guidelines for treatment of uncomplicated Community Acquired Pneumonia (CAP) in children recommend 5-7 days of amoxicillin as opposed to the previous 10-day course.

Prescribing patterns vary and may lag behind published recommendations or guidelines.

AIMS

To describe antibiotic prescribing patterns and adherence to guidelines among pediatric patients with uncomplicated CAP

METHODS

Cross-sectional observational study of all children age 6 months to 18 years old with a diagnosis code of pneumonia presenting to Norton pediatric outpatient clinics between January 2023 – December 2023.

Exclusion criteria: Recent course of amoxicillin, PCN allergy, concurrent diagnosis (AOM, Group A strep), underlying illness (CHD, BPD, sickle cell), prematurity, trach/vent dependence, admission

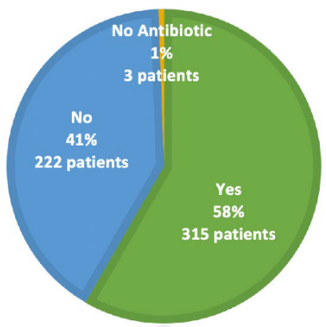
Data obtained: demographics, health history, visit location/type, diagnosis, antibiotic type/duration, CXR or viral testing performed/results, prescriber type (MD/DO vs. APRN/PA)

Outcomes:

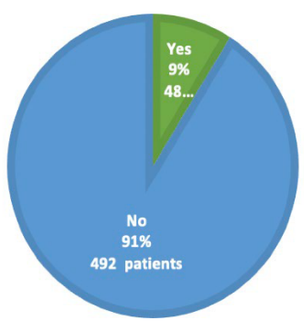
- Correct antibiotic prescribed
- Correct duration described
- Number and proportion presented and compared based on demographic or prescriber factors using chi-square analysis

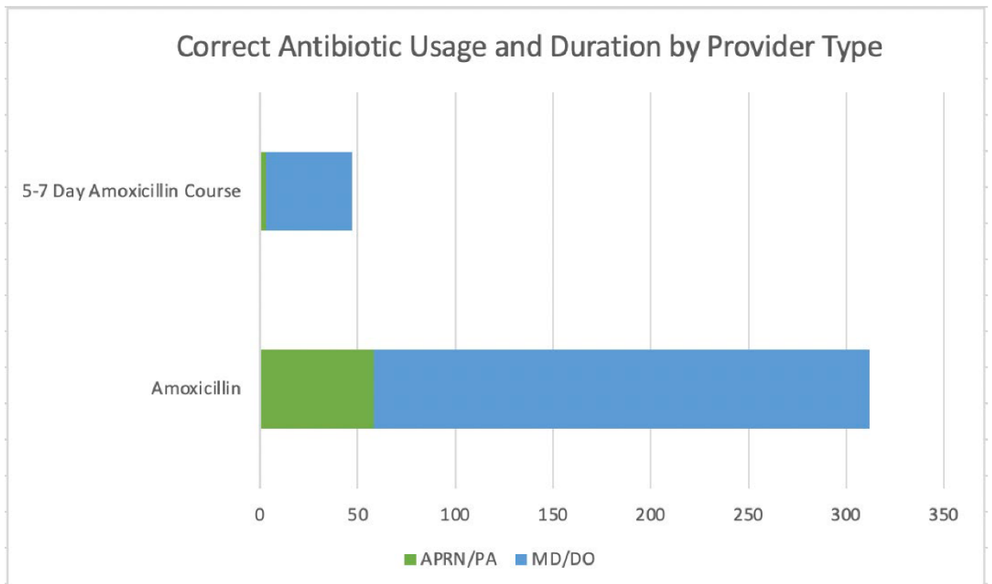
RESULTS

CORRECT ANTIBIOTIC
TOTAL PATIENTS = 540



CORRECT ANTIBIOTIC AND DURATION
TOTAL PATIENTS = 540





No differences in correct antibiotic choice based on provider type, CXR, or viral swab results.

Among those correctly prescribing Amoxicillin, MD/DOs were more likely to provide 5-7 day duration than APRN/PAs.

CONCLUSIONS

Prescribers do not regularly adhere to antibiotic type and duration guidelines for children with uncomplicated CAP, and efforts to standardize antibiotic treatments and duration among all provider types are warranted.

Future projects focused on educational interventions to improve awareness of and adherence to antibiotic stewardship guidelines for CAP in the outpatient setting are needed, as are further investigation into prescribing patterns in other settings such as inpatient, ED, and Immediate Care Centers.

Assessment of Acceptability of an Emergency Department Food Pantry

L. Savannah Schneider, DO – Pediatric Resident (PGY-3)
Co-Author(s): Brit Anderson, MD; Alexandra Howard, MD; Elizabeth Lehto, DO; Nicole Greenwell, RN

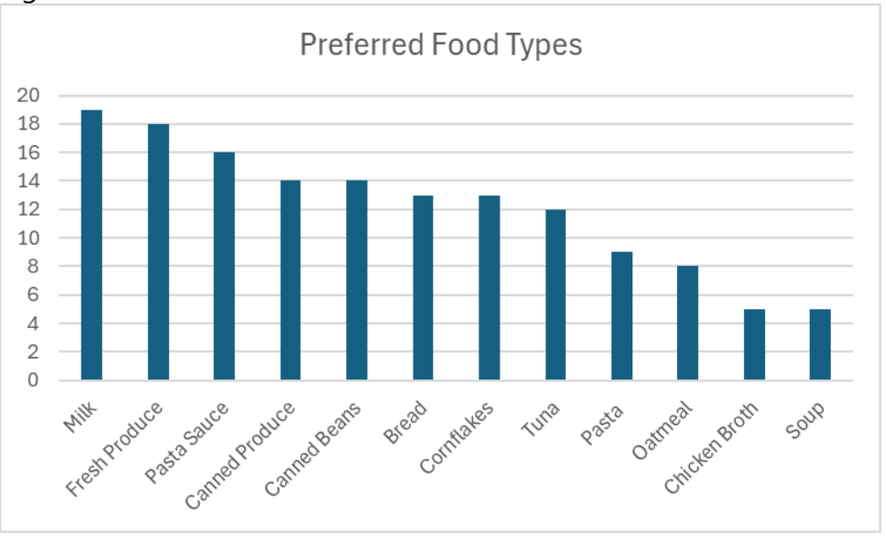
Background: Food insecurity (FI) impacts families across the United States and leads to negative health impacts in children including vitamin deficiencies, developmental, and behavior problems. Kentucky's rates of FI are higher than the national average. Norton Children's Emergency Department food pantry, established in 2020, has served more than 12,000 people experiencing FI. This project sought to understand the experience of using the pantry from a caregiver perspective.

Methods: A survey, developed by the study team, was distributed in bags of food provided to families and/or administered in person. Participation was voluntary and did not impact the ability to access food. Survey questions included preferences/satisfaction with foods offered, what proportion of the food received families used or planned to use, and satisfaction with the process of receiving food/resources in the ED, along with reported use of additional provided resources and any barriers to food pantry use. Results are reported using standard descriptive statistics, with open-ended question answers evaluated for common themes.

Results: Between December 2023 and February 2025, 42 families completed the survey. The mean number of children per household was 2.7 (SD 1.1) and mean age of children was 6.2 years (SD 4.6). The top three categories of food families preferred included in bags were milk (19, 45.2%), fresh produce (18, 42.9%), and pasta sauce (16, 38.1%) (Figure 1). Forty-one families (97.7%) agreed or strongly agreed that they are satisfied with the current foods offered. Forty (95.2%) families reported they used or plan to use at least 75% of the contents of the bag they received; 38 (90.5%) agreed or strongly agreed that they were satisfied with the current process of receiving food and that the resources provided were beneficial. Only 14 (33.3%) reported using the community resources provided, most often the Supplemental Nutrition Assistance Program and Women Infants and Children Program. Barriers to using the food pantry included feeling of embarrassment or judgement (20%) and difficulty carrying or transporting food (12.5%).

Conclusion: The Norton Children's emergency department food pantry has been positively impacting its community since 2020. By gaining qualitative data from the caregiver's perspective, the food pantry can now better tailor its groceries and resources to combat food insecurity. Combined efforts amongst the healthcare team and the patients and caregivers are essential to continued success.

Figure 1:



Assessment of Acceptability of an Emergency Department Food Pantry

L. Savannah Schneider DO, Brit Anderson MD, Alexandra Howard MD, Elizabeth Lehto DO, Nicole Greenwell RN
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

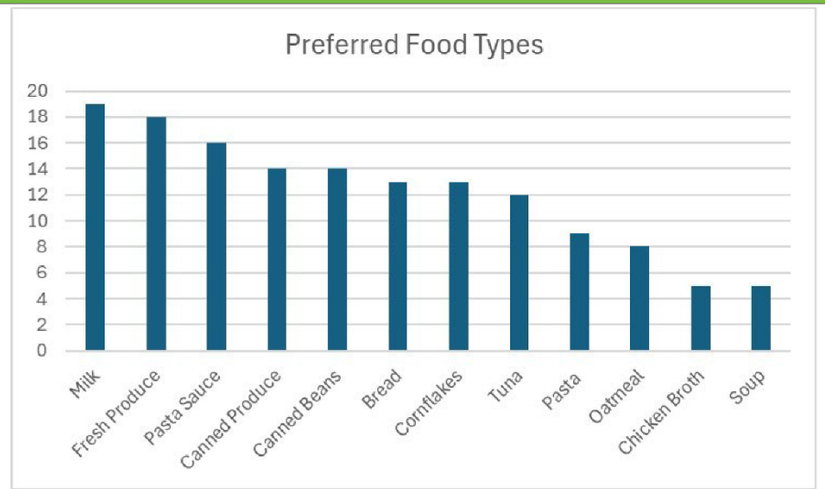
BACKGROUND

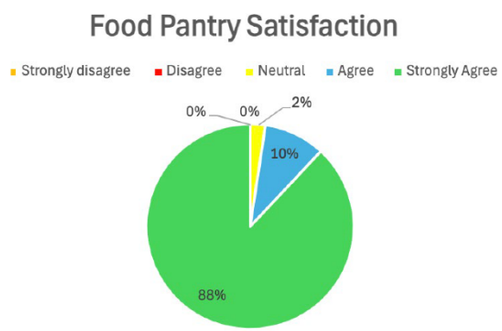
- Food insecurity (FI) impacts families across the United States and leads to negative health impacts in children including vitamin deficiencies, developmental, and behavior problems.
- Norton Children's Emergency Department food pantry, established in 2020, has served more than 12,000 people experiencing FI. We sought to describe the experiences of families who have been served through this intervention.

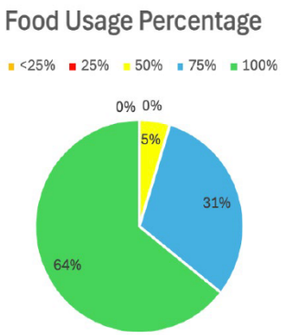
METHODS

- A survey was distributed in bags of food provided to families and/or administered in person for any families receiving food December 2023-February 2025
- Survey questions included preferences/satisfaction with foods offered, what proportion of the food received families used or planned to use, satisfaction with the process of receiving food/resources in the ED, reported use of additional provided resources and barriers to food pantry use.
- Results are reported using standard descriptive statistics, with open-ended question answers evaluated for common themes.

RESULTS







- 42 families completed the survey: Mean 2.7 children/household, mean child age 6.2 yrs
- Top preferred foods:
  - Milk (19, 45.2%)
  - Fresh produce (18, 42.9%)
  - Pasta sauce (16, 38.1%)
- 38 (90.5%) agreed or strongly agreed that they were satisfied with the current process of receiving food and that the resources provided were beneficial
- Only 14 (33.3%) reported using the community resources provided, most often the Supplemental Nutrition Assistance Program and Women Infants and Children Program
- Barriers to using the food pantry included feeling of embarrassment or judgement (20%) and difficulty carrying or transporting food (12.5%).

CONCLUSIONS

The Norton Children's emergency department food pantry has been positively impacting its community since 2020. By gaining qualitative data from the caregiver's perspective, the food pantry can now better tailor its groceries and resources to combat food insecurity. Combined efforts amongst the healthcare team and the patients and caregivers are essential to continued success.

Reducing Length of Stay and Hours of High-Flow Nasal Cannula Use in Bronchiolitis by Implementation of Updated Hospital Protocols at a Tertiary Children's Hospital

Natalie Shipley, MD – Pediatric Resident (PGY-3)
Co-Author(s): Klint Schwenk, MD, MBA

Introduction: Viral bronchiolitis is a leading cause of pediatric hospital admission, with increasing rates of heated high flow nasal cannula (HFNC) use for admitted patients. Our institution is an over-utilizer of HFNC compared to other children's hospitals, as evidenced through our participation in the HIFLO VIP QI initiative. Our institution has routinely used HFNC on medical surgical units for many years, a likely contributor of its overuse.

Objective: To compare length of stay (LOS) and length of HFNC use pre- and post-implementation of a new hospital bronchiolitis protocol and admission order set for the medical surgical units. The order set outlines updated HFNC initiation parameters, interventions designed to reduce inappropriate initiation, HFNC weaning procedures, and more frequent opportunities for high-flow holidays.

Methods: We evaluated patients ages 1-23 months admitted to the general medicine service with a diagnosis of bronchiolitis between Oct 2022-Apr 2023 (pre-implementation) and Oct 2023-Dec 2023 (post-implementation). Exclusion criteria included patients with cardiac disease requiring medication, chronic lung disease requiring home oxygen, neuromuscular disease, and <32 weeks gestational age. We collected data including LOS (in hours), length of HFNC use (in hours), proportion of patients for whom HFNC was initiated, and proportion of patients with a documented deterioration (defined as replacement of HFNC within 1 hour of "high flow holiday"). We compared the mean LOS and mean HFNC duration between patients in the pre- and post-implementation groups using *t-test*. Data was examined to identify changes pre- and post-implementation of the new hospital protocol.

Results: Data was collected from over 900 subjects, 440 pre-implementation and 550 post-implementation of the new bronchiolitis protocol. The mean LOS was 60.3 hours pre-implementation, and 53.3 hours post-implementation. The mean duration of HFNC use was 33.4 hours pre-implementation, and 24.9 hours post-implementation. Analysis of data demonstrated reduction in LOS by 11% ($p=0.0026$) and reduction in duration of HFNC use by 25% ($p=0.0001$). HFNC was initiated in 68% of patients pre-implementation vs 57% post-implementation, an 11% reduction. We did not find there to be an increase in deterioration after high flow holiday when comparing pre- and post-implementation data, despite more frequent opportunities for holiday.

Discussion/Conclusion: Implementation of a bronchiolitis protocol with emphasis on a high-flow nasal cannula initiation pause and high-flow holiday reduced length of stay and duration of time on HFNC at our institution, a traditional over-utilizer of HFNC for bronchiolitis.

Reducing Length of Stay and Hours of High-Flow Nasal Cannula Use in Bronchiolitis by Implementation of Updated Hospital Protocols at a Tertiary Children's Hospital

Natalie Shipley, MD; Klint Schwenk, MD, MBA
University of Louisville School of Medicine, Department of Pediatrics

Introduction

Viral bronchiolitis is a leading cause of pediatric hospital admission.

Heated high flow nasal cannula (HFNC) use, the mainstay for supportive therapy, is often over-utilized for admitted patients with viral bronchiolitis.

Prior QI initiatives reveal that our institution is an over-utilizer of HFNC compared to other children's hospitals, potentially due to HFNC use on medical surgical units for many years.

Objective

Compare length of stay and length of HFNC use pre- and post-implementation of a new hospital bronchiolitis protocol and admission order sets.

Methods

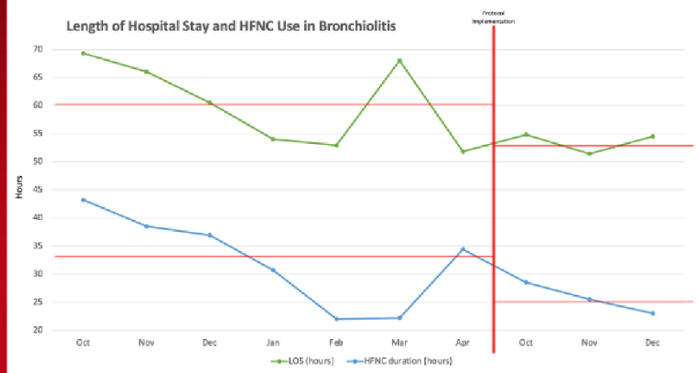
Chart review of pts age <2 with bronchiolitis diagnoses between October 2022 – April 2023 (pre-intervention), October 2023– December 2023 (post-intervention)

-Exclusion criteria: chronic lung/heart disease, immunodeficiency, neuro disorder/developmental delay impairing management of secretions, PICU admission

Data collected: LOS (hours), length of HFNC use (hours), +/- HFNC initiated, deterioration (replacement of HFNC within 1 hour) after high-flow holiday

Data analysis: Mean LOS and mean HFNC duration compared between pre- and post-implementation groups using t-test

Results



Graph 1: Run chart comparing length of hospital stay and length of HFNC use in patients with bronchiolitis pre- and post-implementation of a new hospital order set

LOS decreased 11%
-60.3 hours to **53.3 hours**
(95% CI [2.5, 12.0], p=0.0026)

HFNC duration decreased 25%
-33.4 hours to **24.9 hours**
(95% CI [4.5, 12.8], p=0.0001)

HFNC initiation decreased 11%
-68% vs 57%

No increase in deterioration after high flow holiday, despite more frequent opportunities for holiday

Bronchiolitis Score (BrS)

Variable	0	1	2	3
Respirations 2-12 mo		≤ 50	51-59	60 or above
Respirations 1-2yr		≤ 40	41-44	45 or above
Retractions	None	Subcostal or intercostal	2 of the following: subcostal, intercostal, substernal, OR nasal flaring (infant)	3 of the following: subcostal, intercostal, substernal, suprasternal, supraclavicular OR nasal flaring / head bobbing (infant)
Auscultation	Normal, no wheezing	End-expiratory wheeze	Expiratory wheeze (greater than end-expiratory)	Inspiratory and expiratory wheeze, or decreased breath sounds, or both
Activity	Normal feeding, vocalizations and activity	1 of the following: difficulty feeding, decreased vocalization or agitated	2 of the following: difficulty feeding, decreased vocalization or agitated	Stops feeding or has order for NPO, no vocalization or drowsy and confused

Acute Bronchiolitis Severity Classification Based on Bronchiolitis Score (BrS)
- Mild: BrS= 1 – 4 and no supplemental oxygen
- Moderate: BrS= 1 – 4 and supplemental oxygen OR BrS= 5 – 8
- Severe: BrS= 9 - 12

Mild: BrS 1-4
- Spot pulse oximetry checks
- Nasal suctioning prn
- PO ad lib or home regimen

Moderate: BrS 1-4 AND on oxygen OR BrS = 5-8
- Spot pulse oximetry checks every 4 hours if no supplemental oxygen; continuous pulse oximetry if on supplemental oxygen
- OP/Nasal suctioning

Severe: BrS 9-12
- Continuous pulse oximetry
- OP/Nasal suctioning
- NP suctioning
- Consider albuterol trial
- Consider high flow nasal cannula oxygen(HFNC) if failed pause

Inclusion Criteria for Initiating HFNC for acute bronchiolitis in a General Medical-Surgical Unit
- Respiratory distress manifested as deep retractions, grunting, head bobbing
- Oxygen saturation < 90% despite standard nasal cannula therapy
- Failure of HFNC pause

Evidence does NOT support routinely using
- Antibiotics
- Albuterol
- Chest X-rays
- Chest physiotherapy
- Hypertonic saline
- Laboratory tests, including testing for viral pathogens
- Racemic epinephrine
- Steroids

High Flow Holiday
- Once per shift if meets criteria
- First holiday potential is shift after admission
- At settings of 1 L/kg/min
- Heart Rate in normal limits for age
- Sats 92% or higher on FIO2 <40%
- Place on nasal cannula if unable to maintain saturations >90%, titrate as appropriate
- Reassess 2 hours later (RT)
- If BrS 6 or greater, restart HFNC at previous settings
- If BrS less than 6, continue off HFNC – remove HFNC orders

Recommended Discharge Criteria (generally patient will meet most or all of these criteria)
- Improving bronchiolitis scores
- Oxygen saturation > 90% on RA
- No recent apnea
- Feeding adequately by mouth or tolerating home regimen
- No clinical signs of dehydration
- Parent education completed
- Family has any needed prescriptions
- Family/guardian able to comply with any outpatient follow up

Hospital Protocol and Order Sets

- Bronchiolitis scoring: standardized bronchiolitis scoring system to classify patients based on severity (mild, moderate, severe)

- Emergency Department management:
  - Initial suctioning, hydration, and low flow oxygen use
  - Criteria for initiating HFNC

- Admission order sets: Bronchiolitis admission order set and HFNC order set
  - Continued emphasis on suctioning
  - Encouraging oral intake
  - Routine respiratory evaluation with bronchiolitis scoring
  - Criteria for initiating HFNC
  - Standardization for weaning oxygen support and "high-flow holiday"

Conclusion

Implementation of a bronchiolitis protocol with emphasis on a high-flow nasal cannula initiation pause and high-flow holiday reduced length of stay and duration of time on HFNC at our institution, a traditional over-utilizer of HFNC for bronchiolitis.

Implementing Routine Postpartum Depression Screenings in Fathers with Infants with a Prenatal Diagnosis of Congenital Heart Defect

Ashley Dean, MD – Pediatric Resident (PGY-3)
Co-Author(s): Juan Gallegos, MD; MaryLou Dryer, MD; John Gallehr, MD; Stacie Hartlage, RN; Erin Herstine, MD; Deborah Kozik, MD; Joshua Kurtz, MD; Claire Milligan, PhD; Ashley Rhinehart APRN; Adam Skaff, MD; Lauren Talley, MD; Allison Black, MD

Introduction: The American Academy of Pediatrics (AAP) advocates for paternal involvement in pediatric care. Despite this, the recognized standard for maternal PPD has not translated to paternal screening. Studies suggest that about 25% of fathers suffer from PPD symptoms and the risk increases with combined maternal PPD. Paternal PPD increases childhood emotional instability and leads to poorer outcomes in development. Our center recently implemented a maternal PPD screening pathway for mothers of congenital heart disease (CHD) infants. Alarmingly, nearly half of mothers screened positive for PPD, but we currently have no process for screening fathers. Consequently, it is imperative to better determine the need for paternal PPD screening in CHD and include fathers in post-partum care.

Methods: The global aim of this quality improvement initiative was to initiate paternal PPD screening and connect fathers to resources. The SMART aim was to increase paternal screening from a baseline of 0% to a goal of 80% from January 2024 through December 2024. Inclusion criteria included primary paternal guardian of a child with prenatal diagnosis of CHD admitted to the ICU during the postpartum period. Fathers with fetal or infant demise or who were not involved with the child were excluded. Needs assessment interviews to assess voice of the customer (Figure 1), were created at a $<8^{th}$ grade reading level, included five yes/no and subjective response questions regarding mental health screening and support provided during their infant's admission. The interview was conducted by the cardiology team via phone. We utilized this data to identify key stakeholders/partners in paternal PPD identification and develop a process map for paternal PPD screening (figure 2).

Fathers were subsequently screened using the Edinburg Postpartum Depression Screening (EDPS) tool at AAP recommended intervals in person or via phone by cardiology team members. Fathers who screened positive were referred to community mental health resources. Percent of eligible fathers screened was tracked via run chart.

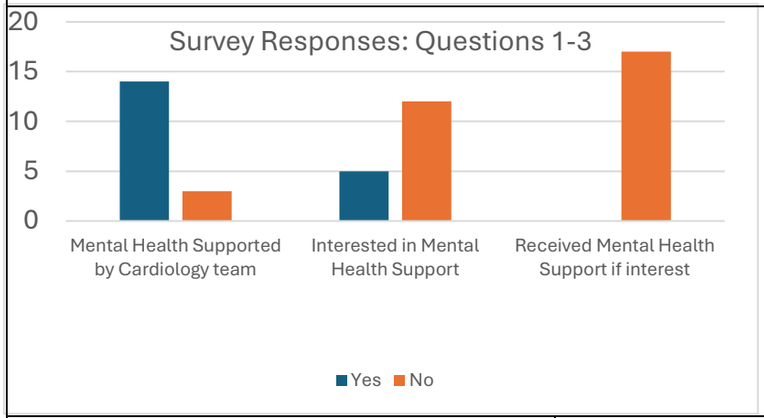
Results: 29 fathers were identified meeting interview inclusion criteria, 17 completed the survey. 17.6% reported their mental health was not supported by our cardiology team, 0% reported they were screened for PPD during their child's admission. 29% were interested in mental health support, 100% of which reported not receiving support. 60% of those who were interested in mental health support had partners with positive maternal PPD screens. (Figure 1). A total of 18 patients met the screening inclusion criteria. 4 out of 18 fathers had a positive EPDS. Of those 4 fathers, 100% of them were referred to community mental health resources. 78% of screens were completed by phone (figure 3). Data was tracked on an annotated run chart and a centerline shift occurred following screening implementation increasing percentage of fathers screened for PPD at AAP recommended intervals from a baseline of 0% to 91% (figure 4).

Conclusion: Despite the changing societal realities with fathers playing increasingly involved roles, pediatric care remains centered around mothers. This focus often leaves fathers unsupported which can add to long-term morbidity. Identifying inpatient paternal PPD and connecting fathers to mental health resources has potential to improve both infant and paternal health outcomes.

Survey Questions:

Regarding your child with heart disease who spent time in the hospital 2022-23:

1. Did you feel your mental health needs were supported by our cardiology team? Yes/No
2. Were you screened for post-partum depression following your child's delivery? Yes/No
3. Were you interested in mental health support? If yes, did you receive support?
4. What ways could we improve mental health support for parents?
5. Any other comments or questions regarding mental health support?



Survey Response Themes to Questions 4 & 5:	Parent Comments:
Psychosocial Impacts of Paternal Involvement	**Maternal Focus:** - "When you enter a children's hospital, it becomes a Mom's world." - "They are always asking questions and explaining care to Mom." - "They would look at Mom to make sure they answer was 'correct.'" - "Mom was much more present than me." - "[Dads] should get the same resources the [Moms] get." - "The focus is really on the Moms." **Emotional Impact for Dads:** - "Felt hard to be all-in when they don't look [at dads]."
Psychosocial Impacts of Paternal Involvement (continued)	- "May be difficult for them to take time to take care of themselves during that time period." - "It is really stressful when the kids are in the hospital." - "Not sure if I would have said 'yes' to mental health questions in front of doctors and Mom." - "I had to go to Ronald McDonald house to cry, it really was very traumatic." **Societal Barriers:** - "Maybe more financial support, if possible." - "I felt the immediate need to be an emotional barrier." - "I am supposed to be the backbone because that's how societies feel Dads should be."
Interventions	**Suggestions for Center Improvements:** - "More one-on-one with Dads." - "Maybe more one-on-one counseling sessions with the team to check in on the Dads." - "It would have been nice to be a little more prepared [prenatally]." - "Not having to disrupt every 5 minutes." - "Get out of the room and get around people in a similar station. It would be nice to develop friends in similar situations." - "Something similar to the Brave Heart's Program for Moms." **Improved Paternal Involvement:** - "Doctors should make more eye contact with Dads." - "Something more for Dads." - "Screening [for post-partum depression] for Dads." - "Give resources to Dads on the side." - "Dad's group for inpatient…such as donuts with Dads, etc."

Figure 1. Analysis of quantitative and qualitative paternal responses to survey questions.

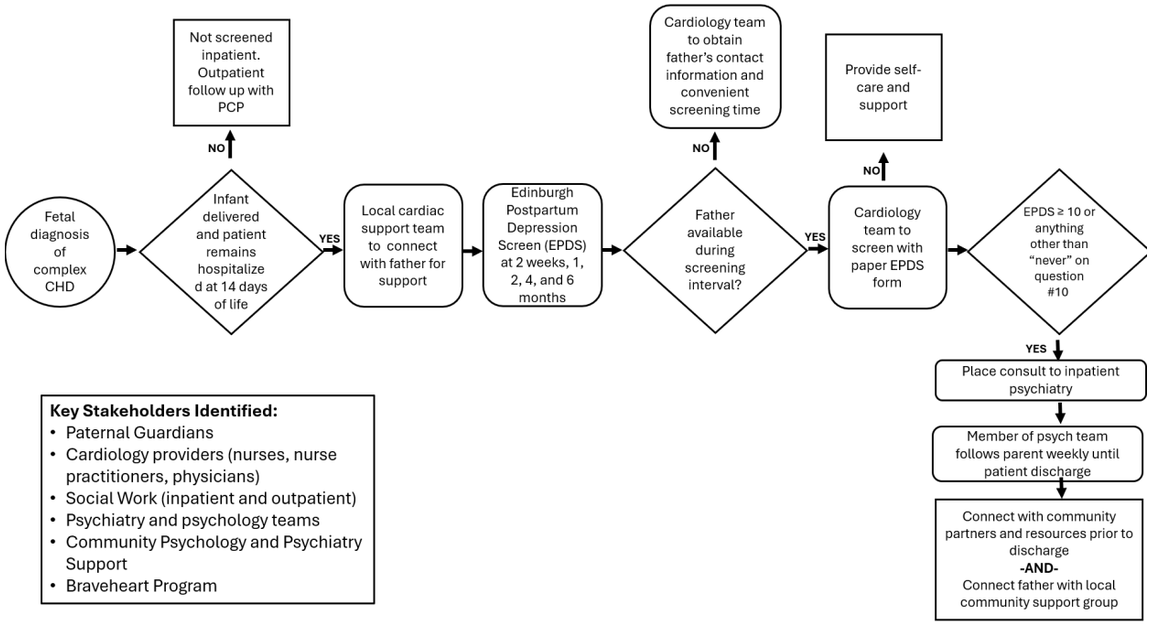


Figure 2. Process map for paternal PPD screening in infants with CHD.

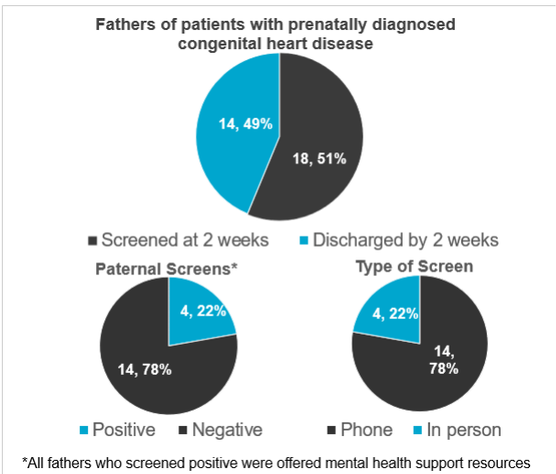


Figure 3. Paternal PPD screens completed via EPDS tool.

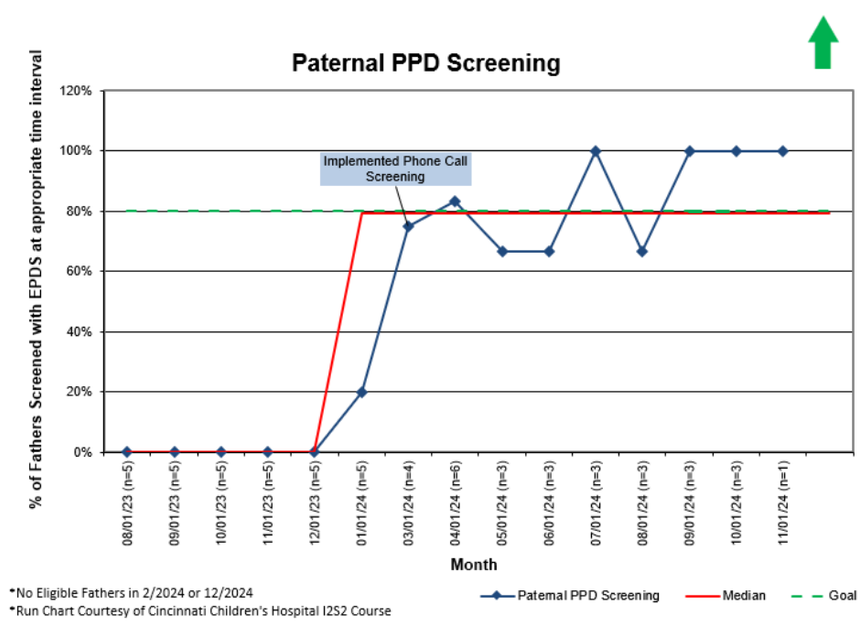


Figure 4. Run chart of paternal post-partum depression screens from August 2023 – December 2024.

Implementing Routine Postpartum Depression Screening in Fathers with Infants with a Prenatal Diagnosis of Congenital Heart Defect

Ashley Dean MD; Juan Gallegos MD; ; MaryLou Dryer MD; John Gallehr MD; Jasmine Grier MD; Stacie Hartlage RN; Erin Herstine MD; Deborah Kozik MD, Joshua Kurtz MD; Claire Milligan PhD; Ashley Rhinehart APRN; Adam Skaff MD; Lauren Talley MD; Allison Black MD

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- While 25% of fathers suffer from paternal post-partum depression (PPD), no standard screening protocol for paternal PPD exists and fathers are not routinely screened during inpatient hospitalizations of children.
- Congenital heart disease (CHD) is the most common congenital malformation, and parents of children with CHD are at increased risk for PPD with equal risk in mothers and fathers.
- Paternal PPD affects the pediatric population
  - Childhood emotional stability
  - Developmental outcomes
  - Parent-child dyad
- Edinburgh Postpartum Depression Screening (EPDS) tool is effective tool for fathers

AIMS

- Primary Aim: Increase paternal screening from a baseline of 0% to a goal of 80% from January 2024 through December 2024.
- Secondary Aim: Improve involvement of fathers and paternal PPD screening in the care of CHD infants

METHODS

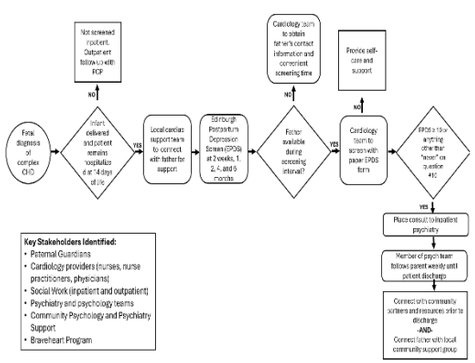
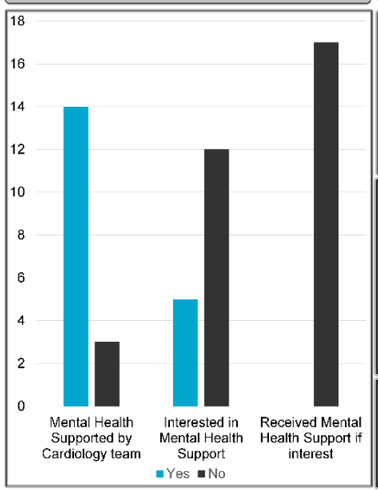


Figure 1: Process map for paternal PPD screening in infants with CHD

RESULTS

Needs Assessment

Availability of Mental Health Support



Themes impacting psychosocial paternal involvement

Maternal Focus
- *"When you enter a children's hospital, it becomes a Mom's world."*
- *"They are always asking questions and explaining care to Mom.*
- *"They would look at Mom to make sure the answer was 'correct.'"*
- *"Mom was much more present than me."*
- *"[Dads should get the same resources the [Moms] get."*
- *"The focus is really on the Moms."*

Emotional Impact for Dads
- *"Felt hard to be all in when they don't look [at dads]."*
- *"May be difficult for them to take time to take care of themselves during that time period."*
- *"It is really stressful when the kids are in the hospital."*
- *"Not sure if I would have said 'yes' to mental health questions in front of doctors and Mom."*
- *"I had to go to Ronald McDonald house to cry, it really was very traumatic."*

Societal Barriers
- *"Maybe more financial support, if possible."*
- *"I felt the immediate need to be an emotional barrier."*
- *"I am supposed the be the backbone because that's how societies feel Dads should be."*

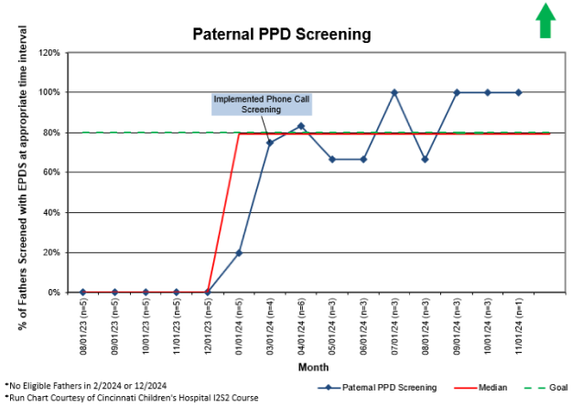
Themes impacting potential interventions

Suggestions for Center Improvement
- *"More one-on-one with Dads."*
- *"Maybe more one-on-one counseling sessions with the team to check in on the Dads."*
- *"It would have been nice to be a little more prepared [prenatally]."*
- *"Not having to disrupt every 5 minutes."*
- *"Get out of the room and get around people in a similar station. It would be nice to develop friends in similar situations."*
- *"Something similar to the [local support group] program for Moms."*

Improved Paternal Involvement
- *"Doctors should make more eye contact with Dads."*
- *"Something more for Dads."*
- *"Screening [for post-partum depression] for Dads."*
- *"Give resources to Dads on the side."*
- *"Dad's group for inpatient…such as donuts with Dads, etc."*

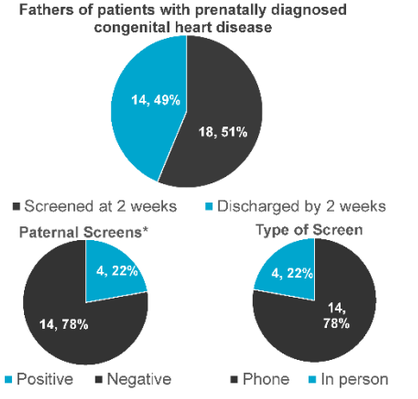
Figure 2: Voice of the customer responses from five question interview prior to screening initiation. Summative content analysis of paternal interviews completed to identify themes.

PATERNAL POST-PARTUM DEPRESSION SCREENING



*No Eligible Fathers in 2/2024 or 12/2024
*Run Chart Courtesy of Cincinnati Children's Hospital I252 Course

Figure 3: Run chart of paternal post partum depression screens from August 2023 – December 2024.



*All fathers who screened positive were offered mental health support resources

Figure 4: Paternal PPD screens completed via EPDS tool.

DISCUSSION

- Demonstrated clear need for paternal PPD screening
- Fathers desire inclusion in screening and pediatric care environments
- Process for inpatient screening of fathers was developed that can be expanded
- Fathers needing mental health support should be connected with community resources
- Identifying paternal PPD and supporting fathers has potential to improve infant and paternal health outcomes

CONCLUSIONS

- PPD screening among fathers of CHD patients improved from 0% to up to 100%, with one center line shift towards our goal of 80%
- Paternal screenings took place more often via phone call in our patient population
- Identifying paternal PPD and supporting fathers has potential to improve infant and paternal health outcomes
- **Future plans:**
  - Implementation of PPD in other care areas and with broader inclusion criteria
  - Involvement of care teams
  - EMR alert flag for screening intervals
  - Provision of group settings for fathers to interact and advocate for involvement in pediatric are

Assessing the Difference in Time to Administer Antibiotics Among Patients with Febrile Neutropenia who Initially Present to Primary Access Hospitals vs. Outlying Facilities

Trace Kimler, MD – Pediatrics Resident (PGY-3)
Co-Author(s): Adam Isacoff, MD

Background: Timely administration of antibiotics is critical in pediatric patients with febrile neutropenia to prevent sepsis and other complications. Little is known on differences in outcomes for patients presenting to critical access or other non-tertiary care facilities vs large pediatric-specific referral centers. We present a pilot educational intervention for outlying/referring non-children's hospitals on febrile neutropenia, emphasizing the importance of time to antibiotics.

Methods: This was a cross-sectional study of patients presenting to Norton Children's Hospital (NCH) with febrile neutropenia (Absolute Neutrophil Count [ANC] < 500 with a fever of 100.4 F or greater) from June 1, 2023 – December 31, 2023. We documented patient demographics (underlying diagnosis, ANC, time to antibiotics [TTA], antibiotic type, length of admission, whether they were currently undergoing cancer treatment or not) for those presenting to both NCH and outlying facilities during the study period. We then completed an educational intervention in which NCH transport teams provided outlying hospitals with updated febrile neutropenia treatment algorithm (Appendix A), along with contact information for sub-specialists and transfer information. Post-intervention, we repeated assessment of TTA for febrile neutropenic patients presenting to the NCH ED from June 1 – December 31, 2024. Descriptive statistics are presented for demographics and TTA for both the 2023 and 2024 data pools to compare overall TTA between NCH ED and other outlying facilities before and after the intervention.

Results: Pre-intervention, median TTA for patients who initially presented at NCH (n=41) was 55 minutes vs 101 minutes for those presenting to outlying facilities (n=5) (p=0.015). Post-intervention, median TTA for patients who initially presented at NCH (n=32) was 51.5 minutes. Only one febrile neutropenic patient presented initially to an outlying facility during the post-intervention period, with a TTA of 184 minutes (p=0.104). Subanalysis of patients with a known history of cancer at the time of presentation were similar, with pre-intervention median TTA at NCH (n=35) of 55 minutes vs 101 minutes at outlying facilities; post-intervention medians were 51 minutes (NCH) and 184 minutes (outlying). Across both time periods, median TTA at NCH was 53 minutes vs 142.5 minutes at outlying facilities (p=0.002).

Discussions: Patients with febrile neutropenia who initially presented to a tertiary-care pediatric hospital had overall faster TTA than those who initially presented to an outlying facility. The limited number of outlying facility patients seen, particularly within the post-intervention group, prevented us from successfully comparing post-intervention TTA in patients presenting to outlying facilities; ongoing monitoring and additional interventions are planned for the future.

Appendix A:

Febrile Neutropenia (White Hot) Protocol

Definition: Fever (temperature 38.3 C or greater) with lower than normal WBC count, or fever in a patient who is immunosuppressed (example: **Patient undergoing chemotherapy**)

Treatment Guidelines:

1. Obtain central line blood cultures and attempt a peripheral blood culture. If no success in peripheral blood culture X 1, proceed with further management. **The goal is to begin antibiotic therapy within 60 minutes of arrival**
2. Further workup includes:
    a. Blood work including CBC with differential, CMP, CRP
    b. Urine studies with UA and urine culture **(do NOT attempt catheterization if concerns for neutropenia)**
    c. Viral respiratory swab for testing
    d. Chest X ray if concerns for pneumonia
    e. Other labs and testing based on clinical guidance
3. Antibiotic Coverage:
    a. STAT Cefepime: 50 mg/kg/dose IV every 8 hours (max 6000 mg/24 hours
    b. If allergic to cefepime, use meropenem
    c. If clinically ill appearing, add stat vancomycin at 15 mg/kg IV every 8 hours

ANC Count to Assess for Neutropenia:

- ANC = (WBC x 1000) x ([%segs + %bands]/100)
- ANC < 500 - Severe Neutropenia and definite admission to hospita
- ANC 500-1000 - Moderate Neutropenia, other factors decide into disposition.
- ANC 1000-1500 - Mild Neutropenia, other factors decide into disposition.

Neupogen - discuss with heme/onc provider prior to dosing, especially for AML patient

When these patients present, please call the following number for the Norton Access Center to get contact information for the **Pediatric Hematologist/Oncologist Provider on call: (888) 486-6786 Or (888) 4-U-Norton**

Assessing the Difference in Time to Administer Antibiotics Among Patients with Febrile Neutropenia Presenting to Primary Access Hospitals vs. Outlying Facilities

Trace Kimler MD, Adam Isacoff MD

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Febrile neutropenia is a potentially life-threatening presentation in the emergency department (ED). Timely administration of antibiotics can be critical to avoid the development of sepsis and other complications.

We sought to evaluate the impact of an intervention providing education to outlying/referring non-children's hospitals in our region on time to antibiotics (TTA) in children presenting with febrile neutropenia.

METHODS

Cross-sectional study of patients presenting to Norton Children's Hospital (NCH) with febrile neutropenia before and after implementation of an educational intervention providing febrile neutropenia protocols to outside facilities.

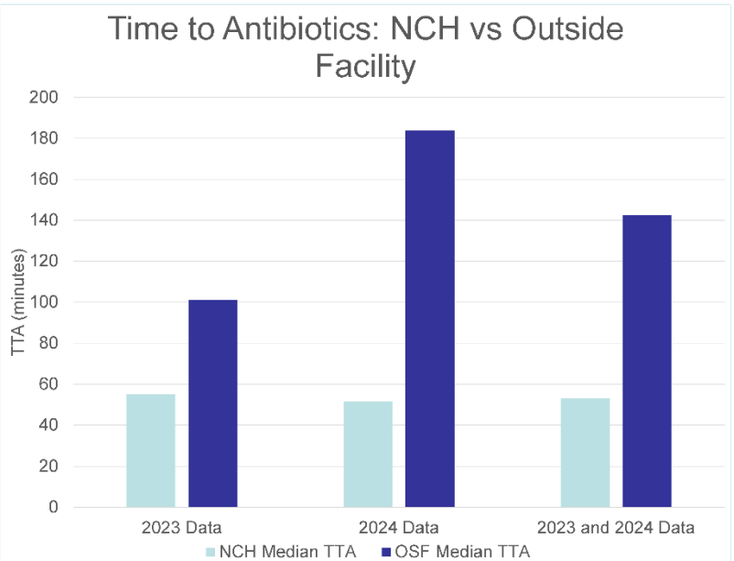
Inclusion: Patient presenting with febrile neutropenia Pre 6/1/23-12/1/23 (pre-intervention) and 6/1/24-12/1/24 (post-intervention).

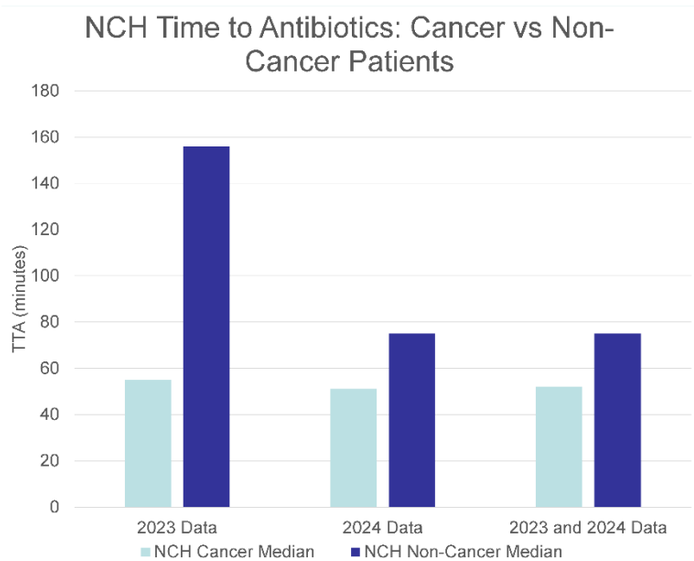
Data collected: Pt demographics, diagnosis, TTA, antibiotic used, whether cultures were obtained (central or peripheral), length of stay

Intervention: febrile neutropenia treatment algorithm, subspecialist contact information and transfer information. Handouts were distributed by Just For Kids (JFK) Transport Team.

Number of presenting patients, patient diagnoses,and mean/median TTA were compared pre and post intervention.

RESULTS





CONCLUSIONS

Patients initially presenting to a tertiary care primary pediatric facility (NCH) had significantly shorter TTA than outside facilities. No patients that initially presented to OSF had antibiotics given within the goal timeline of 60 minutes.

Future studies expanding on these results are needed. Further interventions may include providing families with the patient treatment algorithm directly, allowing providers to access the information needed to care for these patients regardless of initial hospital site.

Improving Resident Comfort with Transitions of Care from Pediatric to Adult Medicine through an Interactive Case-based Workshop

Allison Etling, MD; Jared Young, MD; Shelby Meshinski, MD – Internal Medicine/Pediatrics Residents (PGY-4)
Co-Author(s): Laura Bishop, MD; Laura Workman, MD

Introduction: Advancements in medical care have prolonged the lifespan of youth with special healthcare needs (YSCHN), necessitating the need to transition from pediatric to adult healthcare models. However, medical training has not adapted to educate physicians on the transition of care (TOC) process. The aim of this study is to assess University of Louisville Internal Medicine & Pediatrics (Med-Peds) residents' perceptions about transitions of care training and if case-based discussion would improve resident comfort with this topic.

Methods: This study was carried out with Med-Peds residents during a dedicated Med-Peds elective held twice yearly. We created several fictional cases with discussion points to target different transitions learning objectives. We delivered an anonymous digital survey assessing resident perception of comfort with various transition of care topics using a 5-point Likert scale and knowledge-based questions. We then led a transitions workshop, in which we reviewed a case and facilitated discussions about transitions of care and provided resources for cultivating a successful transition from pediatric to adult care. Following the workshop, residents again completed the digital survey to assess for improvement in their comfort and knowledge. Changes in comfort scores and knowledge-based question responses were compared using standard descriptive statistics.

Results: We had 47 residents respond to our pre-survey and 21 who completed the post-workshop survey. Of respondents, there was a balanced representation between all four years of residency, and most had received some form of TOC education during medical school or residency (96%). Answers were compiled and compared using Kruskall-Wallis tests. Our results show statistical significance in improvement with resident comfort with most TOC topics.

Conclusions: This pilot study assessing residents' perceptions about a novel transitional care curricular intervention found that resident comfort with TOC topics was improved with case-based discussion. The next steps in this project would be to conduct case-based workshops and education with a larger group, including pediatric and internal medicine residents. This case-based format could also be disseminated to other Med-Peds programs to see if this could be incorporated to other curriculums.

Improving Resident Comfort with Transitions of Care from Pediatric to Adult Medicine through an Interactive Case-based Workshop

Laura Bishop, MD; Allison Etling, MD, Jared Young, MD, Shelby Meshinski, MD, Laura Workman, MD
Department of Medicine-Pediatrics, University of Louisville School of Medicine

University of Louisville
MED-PEDS RESIDENCY PROGRAM

Background

Advancements in medical care have prolonged the lifespan of youth with special healthcare needs (YSHCN), necessitating the need to transition from pediatriac to adult healthcare models.

Medical training for resident physicians on the transition of care (TOC) process is limited.

Objectives

Primary: to assess UofL Internal Medicine & Pediatrics (Med-Peds) resident perceived comfort with TOC topics, and whether case-based discussion would improve comfort and knowledge.

Secondary: to assess whether current UofL pediatric, internal medicine, and med-peds residents receive adequate training on transitional care to be comfortable managing these issues as an independent provider.

Methods

TOC curriculum designed and implemented during a dedicated Med-Peds elective held twice yearly.

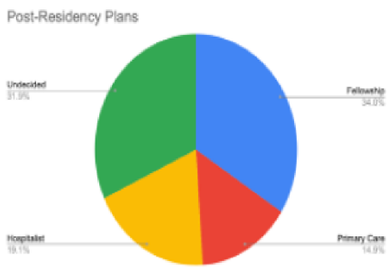
Residents completed a survey assessing perception of comfort with transitions of care topics (5-point Likert scale) and knowledge-based questions.

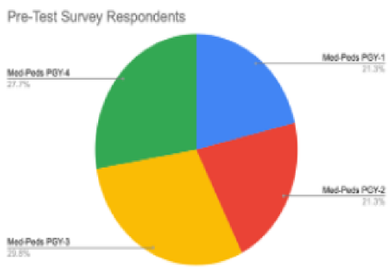
Intervention: Workshop with case review and discussion on TOC.

Post-intervention survey again assessed for comfort and knowledge. Responses were compared using standard descriptive statistics.

Results

PARTICIPANT DEMOGRAPHICS

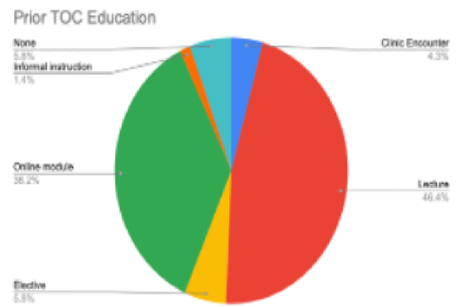




QUANTITATIVE DATA INTERPRETATION

Goals	Sub-goals	χ^2_1	p-value
Overall		305.684	<0.001
Goal 1: Knowledge and skills of the issues around the transition from pediatric to adult care for YSHCN	Complete history and physical	13.127	<0.001
	Differences between adult and pediatric	3.556	0.059
	Elements of transition preparation	16.816	<0.001
	Inter-professional team	5.347	0.021
Goal 2: Understanding the development and psychosocial aspects of transitioning to adulthood for YSHCN	Caregivers for YYA	8.897	0.003
	Collaborate with YYA and families	12.065	0.001
	Counseling to increase adherence	15.578	<0.001
	Developmental considerations	6.945	0.008
	Diversity of YYA	4.509	0.034
	Impact of having a special health care need	10.140	0.001
	Medical-legal and financial aspects	17.431	<0.001
	Mental health needs	13.916	<0.001
	Psychosocial assessment of YSHCN	18.271	<0.001
Goal 3: Understanding how YSHCN and their families are impacted by insurance policies and social services as they age from childhood to adulthood	Government income support programs	13.991	<0.001
	Home care services and DME	19.736	<0.001
	Housing and residential services	25.764	<0.001
	Insurance types and eligibility	17.539	<0.001
Goal 4: Understanding and addressing the educational and vocational needs of YYA with special health care needs	Access education resources	19.590	<0.001
	Legal acts	23.340	<0.001
Goal 5: Applying knowledge of health care systems to practice environment and beyond, to improve patient care and policies for YSHCN	Advocating for the needs of YSHCN	10.713	0.0
	Transfer package	19.938	<0.001
	Transition-related policies	16.401	<0.001
	Transition readiness assessments	16.619	<0.001

Prior Transitions of Care Education



Conclusions

This pilot study assessing residents' perceptions about a novel transitional care curriculum found that resident comfort with TOC topics was improved with case-based discussion.

Future dissemination of the curriculum and expansion of case-based workshops and education with a larger group, including pediatric and internal medicine residents, are planned.

Acknowledgements

Sincere thanks to Drs' Bishop and Workman for aid in project design, development, and support of this curriculum implementation. Thanks to Theresa Kluthe and Stephen Furmanek for data interpretation. Thanks to Dr. Rebecca Hart for abstract and poster review.

Improving Resident Proficiency with Using Medical Interpreters to Communicate with Language Other than English Patients: A Workshop

Josephine Gilkeson, DO – Pediatrics Resident (PGY-3)
Co-Author(s): Abigail Williams, MD

Background: Patients who primarily use a language other than English (LOE) are at significantly higher risk of experiencing medical errors and poor outcomes due to communication barriers. Studies have consistently shown that the use of professional medical interpreters results in improved communication. However, over half of pediatric residents who care for LOE patients report never receiving any educational sessions on interpreter use. This project investigated whether a brief workshop was an effective method to improve residents perceived proficiency utilizing medical interpreters to communicate with LOE patients.

Methods: We designed a one-hour, in-person workshop comprised of an educational lecture followed by brief role-playing scenarios utilizing medical interpreters who provided feedback. We conducted a pre-intervention and post-intervention survey consisting of Likert-scale questions (1-5, from "not at all confident" to "extremely confident") to assess self-perceived proficiency with interpreter use. Pre- and post-survey median (IQR) scores were compared using Wilcoxon Signed-Rank tests. We also assessed a knowledge-based question on appropriate interpreter use pre- and post-workshop, and responses were compared using McNemar test.

Results: Of 14 residents receiving initial surveys, 14 (100%) completed them. Most participants (9, 64.3%) were PGY-1 residents; all spoke English as their first language, and none were fluent in another language. Only 8 participants (57.1%) reported receiving formal education regarding interpreter use. Prior to the workshop, most residents reported feeling either "very confident" or "extremely confident" communicating with LOE patients using in-person (13, 92.9%) and telephone-based (12, 85.7%) medical interpreters. All 14 (100%) of residents completed the post-survey, with no significant differences in the proportions feeling "very/extremely confident" using in-person (13, 92%, $p = 0.102$), telephone based (13, 92%, $p = 0.07$), and video chat-based (11, 78%, $p = 0.132$) interpreters vs. the initial survey. Only 2 (14.3%) residents answered the knowledge-based question correctly pre-workshop, improving to 9 (64.3%) post-workshop ($p = 0.008$).

Conclusions: Overall, this brief, one-hour workshop incorporating role-play scenarios and feedback effectively improved residents' knowledge regarding interpreter use. While reported confidence levels in using interpreters did not significantly increase, this may be due to the small sample size and high initial confidence levels. In the future, we hope to expand the workshop across the entire pediatric residency program.

Improving Resident Proficiency with Using Medical Interpreters to Communicate with Language Other than English Patients: A Workshop

Josephine Gilkeson, DO
Abigail Williams, MD
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Patients who primarily use a language other than English (LOE) are at significantly higher risk of experiencing medical errors and poor outcomes due to communication barriers.

While medical interpreters are known to improve communication, many pediatric residents who care for LOE patients report never receiving education on interpreter use.

METHODS

Educational Intervention:
- One-hour, in-person workshop
- Lecture followed by brief role-playing scenarios
- Medical interpreters provided feedback

Assessment:
Pre-intervention and post-intervention survey

Likert-scale questions to assess confidence on:
- Determining when an interpreter is needed
- Ability to communicate effectively using an in-person, phone-based, and/or video chat-based medical interpreter

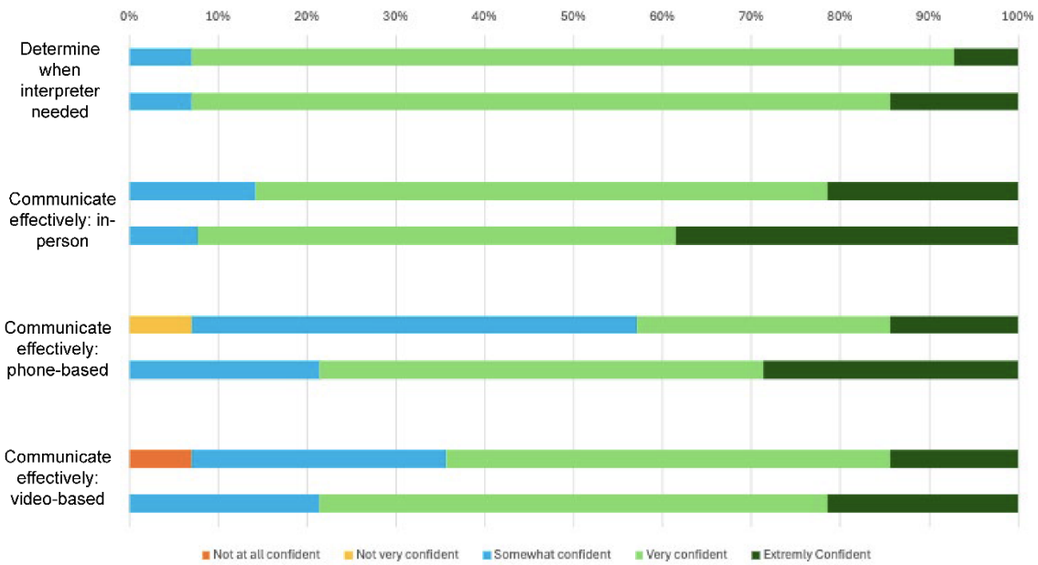
Knowledge-based question on interpreter use

Analysis:
Median (IQR) scores were compared using Wilcoxon Signed-Rank tests.

Proportion of respondents with correct answer on knowledge-based question compared using McNemar test.

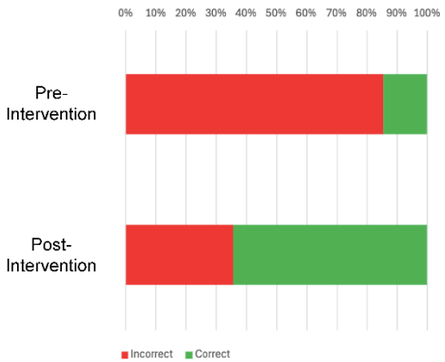
RESULTS

Pre-and Post Survey Confidence Levels



No significant differences in confidence using in-person (p = 0.102), telephone based (p = 0.07), and video chat-based (p = 0.132) interpreters post-intervention.

Knowledge-Based Question



Statically significant difference (p = 0.008) in correctly answering knowledge-based question post-intervention.

14 participants:
- 9 (64.3%) PGY-1
- 14 (100%) primarily spoke English
- 0 fluent in another language
- 8 (57.1%) had prior formal education on interpreter use

CONCLUSIONS

This brief, one-hour workshop incorporating role-play scenarios and feedback effectively improved residents' knowledge regarding interpreter use.

While reported confidence levels in using interpreters did not significantly increase, this may be due to the small sample size and high initial confidence levels. In the future, we hope to expand the workshop across the entire pediatric residency program

Implementation of a Hybrid Neonatal Curriculum for Pediatric Residents

Ryan Morales, DO – Pediatrics Resident (PGY-3)
Co-Author(s): Cindy Crabtree, DO; Amanda Farris, MD; Angela Cox, MD

Background: The challenges of high patient acuity and volume, complex multidisciplinary teams, and other academic demands often limit the time available for educating residents in the NICU. In addition, the new ACGME requirements will reduce the time residents spend in the NICU further decreasing exposure to essential aspects of neonatal medicine. We developed a hybrid educational curriculum to standardize the delivery of core neonatal topics to residents during their required NICU rotations.

Methods: A 4 for pediatric residents was created, integrating online and in-person lectures over a four-week NICU rotation. Each week has an educational focus and covers gastrointestinal, cardiovascular, respiratory, and neurology topics. The online component includes 2–3 pre-recorded lectures per week, given by faculty and fellows, complemented by 1–2 in-person lectures. This hybrid educational curriculum has been utilized since July 2022, and completion of the mandatory online lectures was tracked over time. To maintain a high rate of resident completion, bi-monthly email reminders were sent starting July 2023, and resident and faculty feedback regarding this new curriculum was elicited at the end of the academic year using an online survey.

Results: From July 2022 to June 2024, 72 categorical pediatric residents rotated through the NICU. In the first year, 51% completed all online modules; this increased to 96% after implementing reminders. A survey (43% response rate, n=31) revealed that 83% found the online modules effective, and 88% considered them concise. While all residents experienced bedside teaching, 43% felt it was “too little.” Regarding teaching quality, 65% rated it as “good or great.” Preferred content delivery methods included bedside teaching (60%), in-person lectures (23%), and online modules (17%). Faculty feedback (44% response rate, n=15) indicated 47% taught at the bedside regularly, but 33% did not provide in-person lectures. The primary barrier cited was “high patient census and acuity” (93%). While 60% of faculty felt the online curriculum was adequate, many emphasized the importance of supplementing this with in-person teaching.

Conclusions: A hybrid curriculum can effectively deliver core neonatal content to pediatric residents. Residents prefer bedside or in-person teaching to online modules, and faculty continue to agree that, despite the challenges, in-person and bedside teaching is critical to resident education.

Implementation of a Hybrid Neonatal Curriculum for Pediatric Residents

Ryan Morales, DO | Cindy Crabtree, DO | Amanda Farris, MD | Angela Cox, MD
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- High patient acuity and volume, complex multidisciplinary teams, and other academic demands often limit available time for educating residents in the NICU.
- New ACGME requirements will reduce trainee time in the NICU, further decreasing exposure to essential aspects of neonatal medicine.

AIMS

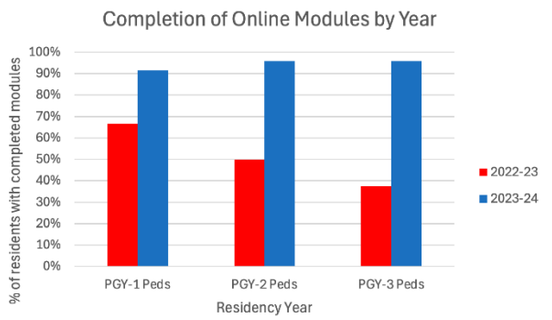
- Use hybrid educational curriculum to increase the delivery of neonatal topics to categorical pediatric residents during their 4-week NICU rotation.

METHODS

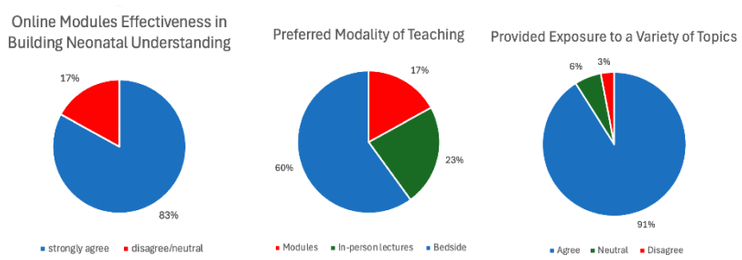
- Integrated online lectures with quizzes and in-person lectures during the rotation.
- Online component includes 2-3 pre-recorded lectures per week complemented by 1-2 in-person lectures.
- Tracked completion of mandatory online lectures over time from July 2022-June 2024.
- Bi-monthly email reminders were sent starting July 2023.
- Resident and faculty feedback regarding this new curriculum was elicited at the end of the academic year using an online survey.

RESULTS

PGY1 (ULH)							
		Online			**In Person**		
Week 1	**FEN/GI**	Hyperbilirubinemia	Nutrition Basics		TPN	Nutrition	
Week 2	**Respiratory**	RDS	TTN		Vent Demo	Intro to ventilation	
Week 3	**CV**	PDA	SVT	Equity/Inclusion/Diversity 1	Basic CHD	Hypoglycemia/IDM	
Week 4	**Neuro**	NAS	AOP	Neonatal Follow up	IVH	Feedback	
PGY2 (NCH)							
		Online			**In Person**		
Week 1	**FEN/GI**	NEC	Abd Wall Defects	NB Lecture	TPN	Nutrition	D/c planning/lactation
Week 2	**Respiratory**	CMV/NAVA	Cong Lung Malforations		CMV/NAVA Demo	Simulation w/ Fellows	
Week 3	**CV**	CHD 1 (5 T's)	Sepsis	Equity/Inclusion/Diversity 2	Hypotension/Shock	Radiology	
Week 4	**Neuro**	HIE	ROP		Jeopardy	Feedback	
PGY3 (NCH)							
		Online			**In Person**		
Week 1	**FEN/GI**	CDH	Intestinal atresias		TPN	Nutrition	D/c planning/lactation
Week 2	**Respiratory**	HFV	PPHN		CMV/NAVA Demo	Simulation w/ Fellows	
Week 3	**CV**	CHD 2	Equity/Inclusion/Diversity 3		Hypotension/Shock	Radiology	
Week 4	**Neuro**	Hypotonia	Cerebral Palsy		Jeopardy	Feedback	
Advanced NICU (NCH/NWC)							
		Online			**In Person**		
Week 1		ECMO			Clinic Day	Nights at NWC	
Week 2		Periviability			Days at NCH	Feedback	

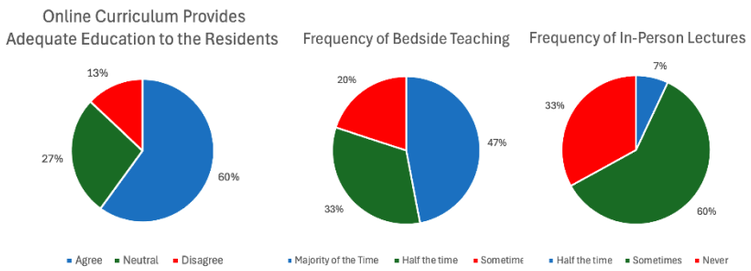


RESIDENT SURVEY RESULTS



Resident Survey Comments
"The online lectures were helpful, but I received minimal bedside teaching/in person education."
The online lectures were helpful, but I received minimal bedside teaching/in person education

FACULTY SURVEY RESULTS



Faculty Survey Comments
"Online is great but in person allows to ask questions and be more engaging."
"Online curriculum is the best way to effectively ensure all learners receive the basic education, but bedside teaching is critical to relate learning to a particular patient to better retain the knowledge."

CONCLUSIONS

- A hybrid curriculum can effectively deliver core neonatal content to pediatric residents.
- Residents prefer bedside or in-person teaching to online modules, and faculty continue to agree that, despite the challenges, in-person and bedside teaching is critical to resident education.

Development of a Longitudinal Educational Training Program for the Pediatric Medical-Students-as-Teachers Elective at the ULSOM

Kyle McQuaide, MD – Pediatric Resident (PGY-3)
Co-Author(s): Sarah Korte, MD; Adam Patterson, MD

Initial History/Presentation: A 14-year-old male immigrant from Tanzania presented with fever, inability to bear weight on the left leg, and limited range of motion of the left shoulder. Initial physical exam revealed a slim, 41 kg male with prominent swelling, warmth, and tenderness to palpation of the left calf. The left glenohumeral joint was also exquisitely tender to palpation. Diagnostic evaluation was significant for elevated inflammatory markers (CRP and ESR), but a normal WBC count. X-ray of the left lower extremity was insignificant, but MRI revealed fibular osteomyelitis with subperiosteal abscess and humeral osteomyelitis. Blood culture ultimately grew *Staphylococcus aureus*, and he was started on vancomycin empirically. Following surgical incision and drainage, wound cultures from both sites grew methicillin-sensitive *Staphylococcus aureus* susceptible to cefazolin. Despite appropriate treatment, he remained persistently bacteremic with elevated inflammatory markers. Due to concern for inadequate source control, repeat MRI of the left upper/lower extremities was obtained and showed no evidence of abscess re-accumulation or new osteomyelitis. Transthoracic echocardiogram (TTE) was performed and revealed no vegetations concerning for endocarditis. Due to high clinical suspicion, a transesophageal echocardiogram (TEE) was subsequently obtained and showed a small, mobile, mitral valve vegetation. Per Pediatric Infectious Diseases recommendations, he completed four weeks of cefazolin for Methicillin-sensitive *Staphylococcus aureus* infective endocarditis (IE) complicated by humeral and fibular osteomyelitis with an index date of the first negative blood culture.

Discussion: Medical literature and expert opinion suggest TTE can be as sensitive as TEE in patients less than 60kg. As TTE is readily available and noninvasive, most institutions initially elect to perform a TTE when assessing for IE. However, this case highlights potential limitations of TTE as it failed to diagnose IE in a child less than 60kg with normal cardiac anatomy. Arguably, if there is persistent bacteremia despite appropriate antibiotic treatment, continued fever, or steadily up-trending inflammatory markers, this should push the provider towards high clinical suspicion for endocarditis, and TEE should be considered even in the setting of a negative TTE.

Conclusion: In summary, pediatric IE is a rare but serious diagnosis requiring prompt identification. Our case challenges the current diagnostic paradigm and stresses the importance of maintaining an index of suspicion for IE even when a TTE is negative.

Development of a Longitudinal Educational Training Program for the Pediatric Medical-Students-as-Teachers Elective at the ULSOM

Kyle McQuaide, M.D., Sarah Korte, M.D., Adam Patterson, M.D.
Norton Children's and the University of Louisville School of Medicine Louisville, Kentucky

BACKGROUND

- Medical students interested in pediatrics can participate in a medical-students-as-teacher elective during their fourth year, known as PALP (Peer-assisted Learning Program)
- Currently, ULSOM has no formal education training for these students
- Anecdotal retrospective data suggests PALP leaders feel unprepared for their role as educators
- This project sought to bridge this curricular gap and provide formal education training to the PALP leaders
- Our project utilized didactics followed by simulated teaching exercises for PALP leaders to practice their teaching skills

STUDY DESIGN

Pre-intervention Simulated Teaching Exercises → Educational Symposium → Post-intervention Simulated Teaching Exercises → Improved Teaching Skills?

- Our intervention was an interactive **Educational Symposium** with medical education experts, focusing on core topics needed to succeed as a near-peer educator
- The PALP leaders then practiced their teaching skills during **simulated teaching exercises** with standardized learners from the SP lab at ULSOM

The PALP Leader	Level 1 (weak): Makes learning unpredictable	Level 2 (good): Good teaching skills to enhance learning	Level 3 (excellent): Has excellent teaching skills to enhance learning
Step 1: Organizes the supervision			
1. Welcomes the learner	- Does not put the learner at ease and concentrates on the clinical problem	- Welcome the learner and expresses his/her availability	- Assures adequate time and space OR suggests arrangements to put at ease
2. Drives the supervision according to the student's needs	- Listen to the case presentation without asking the learner's own questions or needs to drive the supervision	- Let the learner express the problem that prevents him/her to solve the case (before or just after case presentation)	- Clarifies/reflects what prevents the learner from solving the case (learning needs) OR discusses the case aiming explicitly at the learner's needs

Figure 1: Example section of the standardized assessment tool

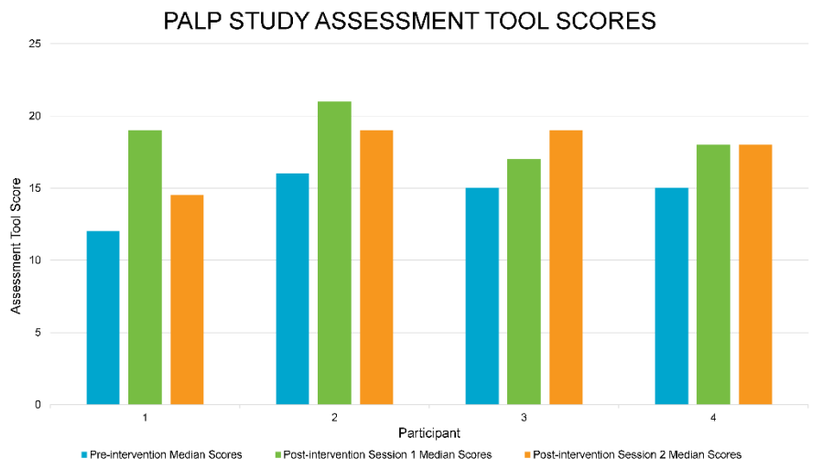
- For the outcome measure, we used a **standardized assessment tool**
- Faculty evaluators scored the PALP leaders during each simulated teaching exercise providing a numerical representation of their teaching performance
- We also collected survey data from the PALP leaders throughout the study

RESULTS

- Survey data showed **all PALP leaders** felt the Educational Symposium and Simulated Teaching Exercises were helpful in their growth as educators
- With the limited n = 4, we were unable to accurately determine interrater reliability of the assessment tool

Participant	Session 1	Session 2	Session 3	All Sessions
A	0.0126 *(-0.114 – 0.365)*	-0.004 *(-0.205 – 0.197)*	0.057 *(-0.140 – 0.254)*	0.097 *(-0.012 – 0.206)*
B	0.239 *(0.042 – 0.436)*	0.051 *(-0.152 – 0.254)*	0.043 *(-0.177 – 0.263)*	0.160 *(0.045 – 0.275)*
C	0.196 *(-0.011 – 0.402)*	0.150 *(-0.057 – 0.356)*	0.259 *(0.017 – 0.502)*	0.223 *(0.105 – 0.341)*
D	0.264 *(0.044 – 0.483)*	-0.043 *(-0.270 – 0.185)*	-0.020 *(-0.257 – 0.217)*	0.091 *(-0.031 – 0.212)*

Figure 2: Fleiss' Kappa Data across the three faculty evaluators



Friedman Analysis showed a statistically significant improvement in the
*- median scores for 5 of 8 assessment tool items **AND***
- the overall scores for all PALP leaders

CONCLUSIONS

- This pilot study was a novel project geared toward developing an educational curriculum that addressed a learning gap for fourth-year medical students
- We developed a new curriculum, generated standardized teaching exercises, and utilized an assessment tool to provide an objective outcome measure for the effectiveness of the educational intervention
- In the end, we were able to show that our intervention resulted in a statistically significant improvement in teaching skills based on a standardized assessment tool
- With more data, our hope is that we can validate the tool in this context for widespread use
- Our main limitations were the population size (*n = 4*) and the reliance on faculty evaluators
- Moving forward, we are excited to expand this curriculum to other disciplines and potentially partner with other institutions for a multi-site project with much higher study population size

ACKNOWLEDGEMENTS

- Many thanks to my collaborative team: Drs. Saner, Rabalais, Kurtz, Weingartner, Farris, Bohnert

Scoping Review of Pediatric Palliative Care and Limited English Proficiency

Ana Alvarez, MD – Pediatrics Resident (PGY-3)
Co-Author(s): Bethany Selby, MS2; Kelly Lyons, DO; William Johansen, MD; Gina Genova, MS; Brit Anderson, MD

BACKGROUND: Around 68.3 million people living in the United States (US) speak a language other than English at home. While the linguistic landscape in the US is rich and diverse, it can present challenges in healthcare settings where families with Limited English Proficiency (LEP) may struggle to communicate, especially within the life-limiting scenarios associated with pediatric palliative care (PPC). As both PPC and patients/families with LEP grow in the US, it is important to understand what is known regarding delivery of PPC care to LEP patients and what knowledge gaps are present so that these processes can be improved on both patient and systems-based levels.

METHODS: We conducted a scoping review exploring the current state of PPC for LEP pediatric patients and their families. A comprehensive literature search was conducted in PubMed, Cochrane CENTRAL, EMBASE, CINAHL, PsycINFO, and grey literature sources from 2000 to the present. Both controlled vocabulary subject headings and keywords were searched for the concepts of palliative care ("palliative care", hospice, "end of life", etc.), LEP ("limited English proficiency" interpreter*, specific minority languages, etc.), and pediatrics (pediatric*, child*, PICU*, NICU*, etc.). The search was limited to English-language articles published in Anglosphere countries. Articles were first screened at the abstract level and then the full text by two researchers. Inclusion and exclusion criteria are shown in Figure 1. Three researchers performed data extraction with final descriptive analysis and mapping to describe the current evidence. Analysis was reviewed by all research members.

RESULTS: After de-duplication of search results, 701 articles were reviewed, of which 21 met inclusion criteria. The most common LEP patient population studied was Spanish speaking. The majority of studies focused on perceptions of PPC for LEP patients among the following populations: healthcare professionals (i.e. nurses, physicians), patient/families, and interpreters. These varied perspectives highlighted barriers in PPC delivery for LEP patients related to symptom management, advanced care planning, and patient advocacy, and reflected the impact of specific cultural factors. There were no randomized control or prospective studies found in our scoping review.

CONCLUSION: Our scoping review is the first to evaluate the current state of PPC for LEP pediatric patients and families. Current literature focuses on exploring perspectives on PPC for LEP families from healthcare professionals, interpreters, and patients/families illustrating potential areas for improvement. However, there is a significant lack of objective healthcare outcomes research and randomized and prospective studies evaluating improvements and potential barriers for LEP families related to PPC. Future research investigating these areas is warranted to provide high quality PPC for LEP pediatric patients and families.

Scoping Review of Pediatric Palliative Care and Limited English Proficiency

Alvarez, Ana MD; Selby, Bethany MS2; Lyons, Kelly DO;
Johansen, William MD, Genova, Gina MS, Anderson, Brit MD;

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

Around 68.3 million people living in the United States (US) speak a language other than English at home.

Families with Limited English Proficiency (LEP) may struggle to communicate with healthcare workers, especially within the life-limiting scenarios associated with pediatric palliative care (PPC).

Reviewing literature on delivery of PPC care to LEP patients is needed to understand knowledge gaps and improved patient and systems-level processes.

METHODS

A comprehensive literature search of English-language articles published in Anglosphere countries was conducted in PubMed, Cochrane CENTRAL, EMBASE, CINAHL, PsycINFO, and grey literature sources from 2000 to the present.

Controlled vocabulary subject headings and keywords were searched for the concepts of:

- Palliative care ("palliative care", hospice, "end of life", etc.)
- LEP ("limited English proficiency" interpreter*, specific minority languages, etc.)
- Pediatrics (pediatric*, child*, PICU*, NICU*, etc.).

Articles were screened at the abstract level, then full text by two researchers. Three researchers performed data extraction with final descriptive analysis and mapping to describe the current evidence.

References

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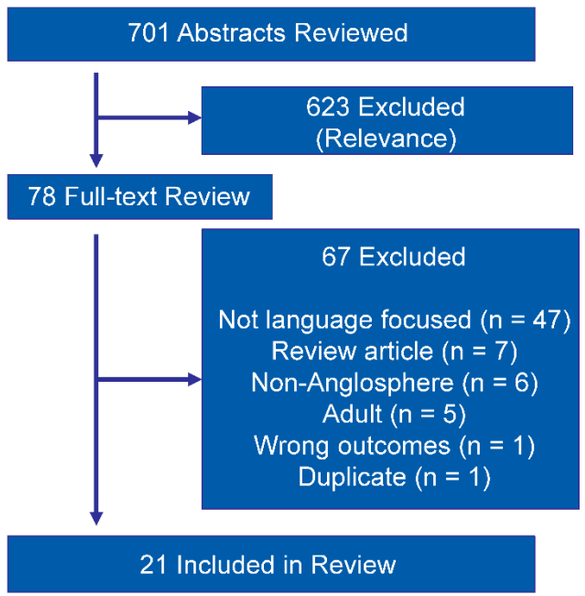
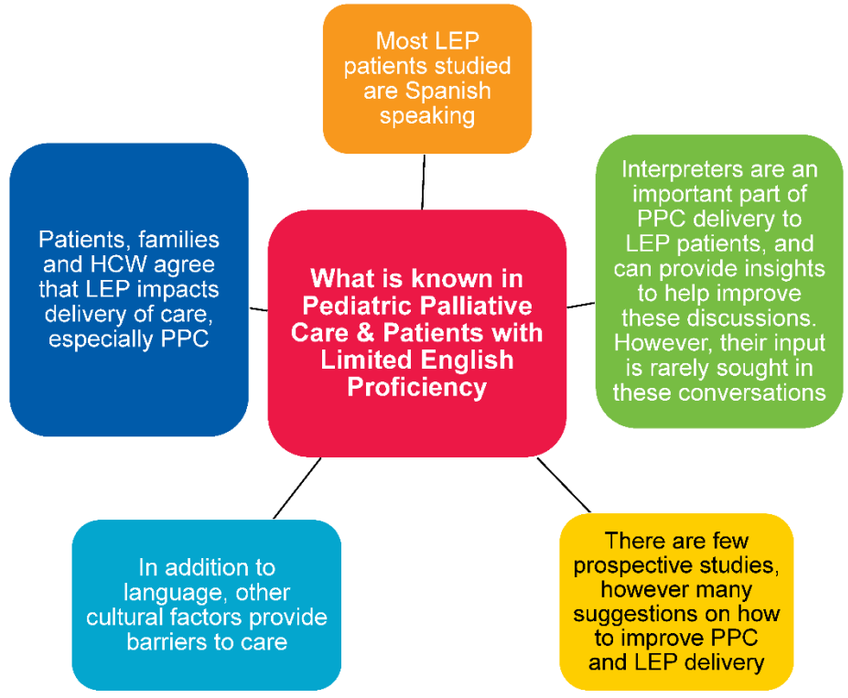
RESULTS





CONCLUSIONS

- Our scoping review is the first to evaluate the current state of PPC for LEP pediatric patients and families.
- Current literature focuses on exploring perspectives on PPC for LEP families from healthcare professionals, interpreters, and patients/families illustrating potential areas for improvement.
- Objective healthcare outcomes research and randomized/prospective studies evaluating improvements and potential barriers for LEP families related to PPC are lacking. Future research investigating these areas is warranted to provide high quality PPC for LEP pediatric patients and families.

Pain for a Preemie: Uncommon Presentation of a Common Pathogen

Megan Bath, DO – Pediatrics Resident (PGY-3)
Co-Author(s): Francesca Kingery, MD

Background: Late-onset group B strep (GBS) disease typically presents as bacteremia or meningitis, but less commonly it can present as focal disease such as pneumonia, UTI, and joint infections. We present a case of focal GBS septic arthritis of the hip in a 23-day-old male.

Case: A 23-day-old former 35w6d twin male presented with fussiness. Three days prior, he became difficult to console. Symptoms progressed to worsening irritability with manipulation of the right leg, especially with diaper changes. Associated symptoms included congestion and one elevated temperature of 100.9F. Pregnancy was complicated by twin gestation, polyhydramnios, and breech positioning. On initial exam, the infant was sleeping with right leg held mildly flexed, externally rotated and abducted. He cried with manipulation of the right leg, especially with palpation of the anterior hip, but Ortolani and Barlow maneuvers were negative. There was no joint edema, overlying erythema, or warmth. The right knee had full range of motion without difficulty, and there was no bony tenderness of the rest of the right lower extremity. Preliminary viral, blood, urine and CSF studies, as well as x-rays of the bilateral hips and right femur, were unremarkable (See figure 1). While ultrasound demonstrated only a small right hip joint effusion, pelvic MRI was notable for a moderate right hip effusion with synovial enhancement concerning for septic joint, as well as right upper thigh and right gluteal myositis. The patient underwent right hip incision, drainage, and washout. Synovial fluid culture was finalized without growth, but Karius universal PCR was positive for *Streptococcus agalactiae*, consistent with the diagnosis of late-onset GBS septic arthritis.

Discussion/Conclusions: Late-onset GBS disease (LOGBS) typically presents as bacteremia or meningitis. Focal infections such as seen in this case are less common. While septic arthritis is an uncommon presentation of LOBGS disease, the most common pathogens causing septic arthritis in neonates are GBS and gram-negative bacilli. The knee is the most commonly infected site but when the hip is involved, neonates often hold the affected hip abducted, flexed, and externally rotated in an attempt to limit intraarticular pressure, as seen in this patient. Systemic symptoms of septic arthritis are less apparent in neonates. Nearly 35% of synovial cultures are negative, but PCR tests can be diagnostic. MRI is the imaging of choice due to its sensitivity in early detection. Surgical intervention and antibiotics are the mainstay of treatment. Delay in surgical intervention can lead to avascular necrosis and long-term joint damage. Despite the uncommon nature of focal LOGBS, providers should maintain suspicion for septic arthritis in neonates with apparent leg pain, especially when accompanied by preferred positioning, even in the absence of systemic symptoms or negative synovial cultures.

Pain for a Preemie: Uncommon Presentation of a Common Pathogen

Megan Bath, DO; Francesca Kingery, MD

Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

CASE

23-day-old male former 35w6d, twin, pregnancy complicated by polyhydramnios and breech positioning

Chief complaint: fussiness

- 3 days of fussiness and irritability with manipulation of the R leg with associated congestion and fever 100.9F

Physical exam:

- Sleeping with right leg mildly flexed, externally rotated, and abducted, cries with palpation of anterior hip
- Negative Ortolani and Barlow maneuvers
- Full passive ROM of the R knee
- No joint edema, erythema, or warmth
- No body tenderness

Hospital course:

- Right hip incision, debridement, and washout x2
- Synovial fluid culture no growth.
- Karius universal PCR positive for *Streptococcus agalactiae*

Final diagnosis: Late-onset group B strep septic arthritis of the right hip

WORK-UP

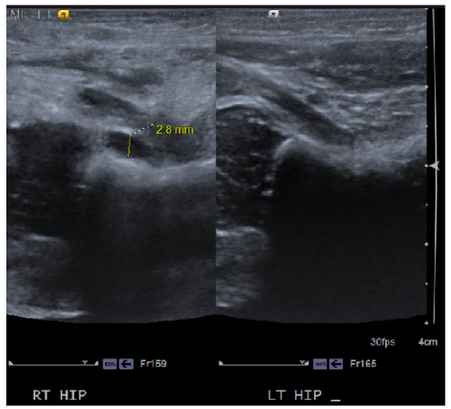


Figure 1
Bilateral hip ultrasound demonstrating a 2.8 mm effusion of the R hip

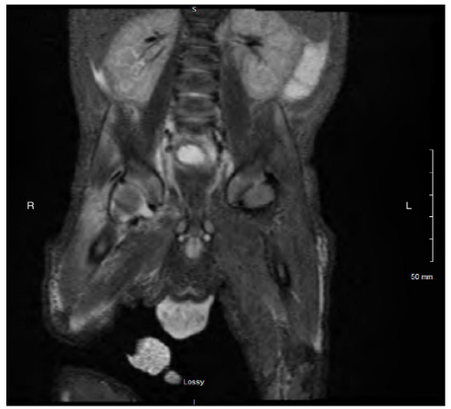


Figure 2
T2 contrasted MRI coronal view demonstrating effusion and right upper thigh/gluteal myositis

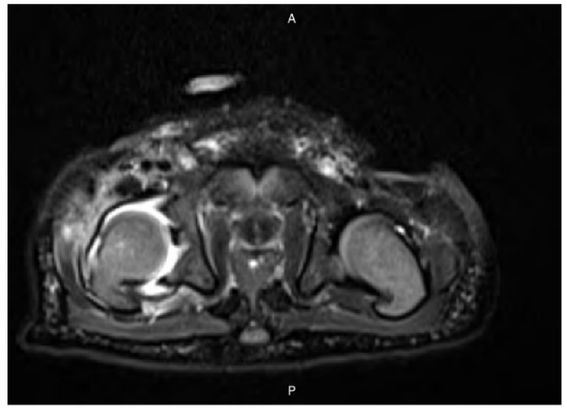


Figure 3
T2 contrasted MRI axial view demonstrating effusion and synovial enhancement

Parameter	Result (Normal Range)
Serum WBC (x10*3/uL)	9.88 (5 – 19.5)
CRP (mg/dL)	2 (<0.5)
ESR (mm/Hr)	21 (0 – 20)
Procalcitonin (ng/mL)	1.27 (0.1 – 0.5)
CSF glucose (mg/dL)	44 (40 – 70)
CSF protein (mg/dL)	84 (15 – 45)
CSF WBC (per uL)	6 (0 – 30)
CSF Pathogen Panel	Negative
CSF culture	No growth final
Urinalysis	Negative ketones, negative bilirubin, negative leukocyte esterase, negative WBC, no bacteria seen
Respiratory Pathogen Panel	Positive for human rhino/enterovirus
Blood culture	No growth final
Urine culture	No growth final

CONCLUSIONS

Late-onset group B strep (GBS) disease typically presents between 7-89 days of life and most commonly as a systemic infection. Focal infections (UTI, PNA, septic arthritis) are less common. Associated factors include preterm delivery, maternal GBS infection, and multiple gestations. Infection occurs via vertical transmission.

While septic arthritis is an uncommon presentation of late-onset GBS disease, the most common pathogens causing septic arthritis in neonates are GBS and gram-negative bacilli.

Neonates with septic arthritis of the hip classically hold affected leg mildly flexed, abducted, and externally rotated and less commonly have systemic symptoms.

More than 1/3 of synovial cultures will be negative but fluid PCRs can be diagnostic.

Imaging of choice is MRI due to sensitivity early in illness course.

Septic arthritis is considered a surgical emergency as delay in intervention can cause AVN and long-term joint damage.

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MRSA-ing the signs: A rare case of cellulitis in a lymphatic malformation syndrome

Emily Granger, MD – Pediatrics Resident (PGY-3)
Co-Author(s): Laura Bishop, MD

Introduction: CLOVES syndrome, characterized by Congenital Lipomatous Overgrowth, Vascular malformations, Epidermal nevi, and Skeletal abnormalities, is a rare syndrome that has been recently characterized as a new type of PIK3CA-related overgrowth syndrome. As a newer entity, many complications are still being explored and documented, but thus far has been noted to have severe complications such as pulmonary embolism, paraspinal hemorrhage, intracranial malformations, seizures, and bilateral Wilms tumors.

Case: Our case focuses on a 3-month-old male with a presumed diagnosis of CLOVES syndrome who presented with fevers and increased swelling and erythema of the large lymphatic overgrowth on his left chest wall. Lab evaluation was showed elevated inflammatory markers, and his Respiratory Pathogen Panel (RPP) was also positive for rhino/enterovirus. Imaging of the malformation demonstrated debris within the cystic components of the lymphatic malformation in addition to overlying subcutaneous thickening/edema, consistent with cellulitis/abscess. The patient was treated with broad spectrum antibiotics including ceftriaxone and vancomycin without improvement in symptoms, including fevers, for 7 days. Eventually, he required surgical drainage of the area with placement of a pigtail catheter, from which a culture grew MRSA susceptible to clindamycin. His drain was left in place for 3 days, and his fever curve and symptoms finally improved. He was able to discharge home with a total of 10 days of clindamycin from the date of drain placement and close ID follow up.

Conclusions: CLOVES syndrome and other associated lymphatic overgrowth syndromes can have an array of complications throughout life, as lymphatic and vascular malformations pose various risks such as bleeding, infection, and mass effects. One such complication is overlying and indwelling infection requiring broad spectrum antibiotics and ultimately drainage from the mass to aid in antibiotic guidance and treatment of the infection, putting a twist on a classical general pediatrics diagnosis.

MRSA-ing the signs: A rare case of cellulitis in a lymphatic malformation syndrome

Emily Granger, MD; Laura Bishop, MD
Norton Children's and the University of Louisville School of Medicine
Louisville, Kentucky

BACKGROUND

- CLOVES syndrome (Congenital Lipomatous Overgrowth, Vascular malformations, Epidermal nevi, and Skeletal abnormalities)is a recently characterized PIK3CA-related overgrowth disorder It has been recently characterized as a new type of PIK3CA-related overgrowth syndrome

- Severe complications such as pulmonary embolism, paraspinal hemorrhage, intracranial malformations, seizures, and bilateral Wilms tumors have been reported.

CASE PRESENTATION

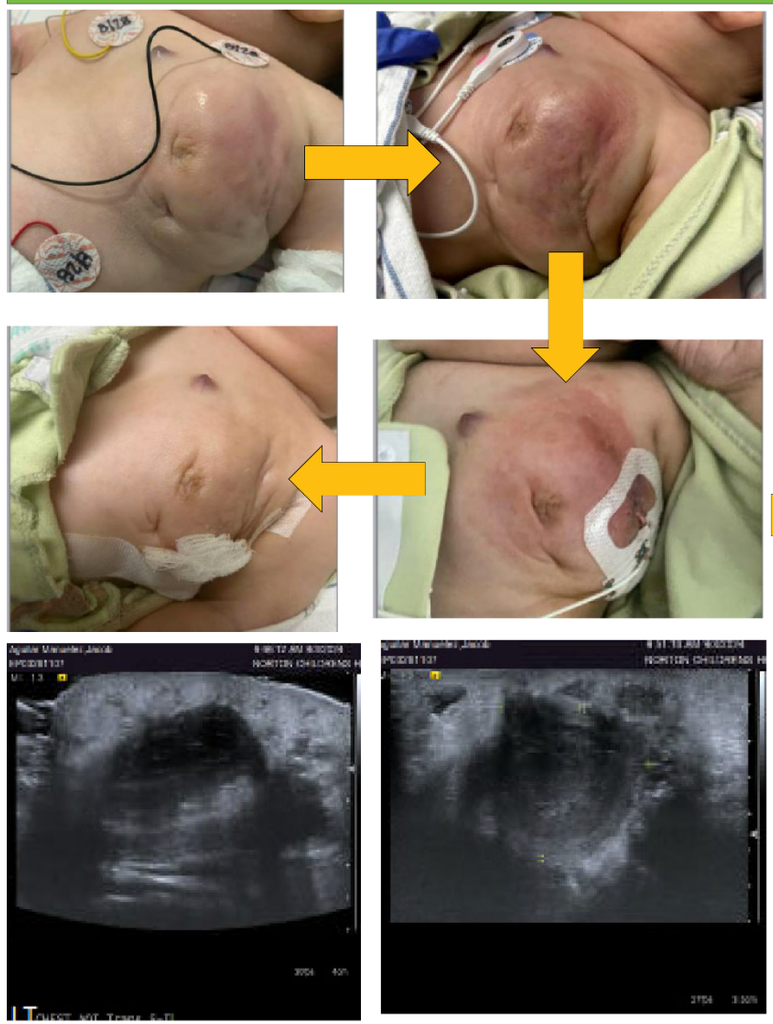
- 3-month-old male with presumed diagnosis of CLOVES syndrome presented with fevers, increased swelling/erythema of lymphatic overgrowth on left chest wall

Workup:

- WBC 25, CRP 19.2, Procalcitonin 2.34
- Respiratory Pathogen Panel (+) rhino/enterovirus
- Ultrasound of malformation → debris within cystic components of lymphatic malformation + overlying subcutaneous thickening/edema, consistent with cellulitis/abscess

- Admitted to PICU on broad-spectrum abx (CTX, Vancomycin)

HOSPITAL COURSE



- Ongoing fevers for 7 days despite abx regimen
- I&D performed, pigtail catheter placed
- Wound culture: MRSA, susceptible to clindamycin
- Symptoms improved after drain placement and drain was removed after 3 days
- Discharged home with 10 days clindamycin from day of drain placement

CONCLUSIONS

- CLOVES syndrome and other associated lymphatic overgrowth syndromes can have many complications, including bleeding, Infection, mass effect
- This patient had overlying and indwelling infection requiring broad spectrum antibiotics and drainage from the mass
- Few case reports have detailed the course of infection in CLOVES syndrome, but other complications have ultimately had poor outcomes

Congenital Complexities Times Two: A rare case of congenital heart disease and giant congenital melanocytic nevi

Hasna Khandekar, MD – Pediatrics Resident (PGY-3)
Co-Author(s): Caroline Jackson, MD; Amanda Farris, MD

Introduction: Despite advancements in medicine, anomalies often have unknown etiologies. A neonate was found to have complex congenital heart disease (CHD) in addition to giant congenital melanocytic nevi (GCMN) with neurocutaneous melanosis.

Case Description: Dichorionic-diamniotic male twins were delivered at 33 weeks due to preterm labor. Twin A was discharged within a month; Twin B's course was far more complex. Prenatal evaluations revealed CHD, confirmed on admission as dextrocardia, complete AV canal defect, double outlet right ventricle, malposed great arteries, pulmonary atresia, situs inversus, and tortuous reversed oriented patent ductus arteriosus. Prostaglandins were started while awaiting surgical intervention. He was unable to wean from mechanical ventilation support. Airway evaluation revealed severe tracheomalacia and bronchomalacia, but normal ciliary function. Physical exam showed a giant congenital melanocyte nevus measuring 12 cm in diameter along his back with multiple satellite nevi. Whole exome sequencing was unremarkable. Due to the extent of the nevi, neuroimaging was recommended. Brain MRI showed ventriculomegaly and multiple hyperintensities throughout the brain, consistent with neurocutaneous melanosis, a finding which carries a poor prognosis. A VP shunt was considered to mitigate obstruction, however, given the early extensive involvement, comorbidities, and lack of clear obstruction, this was not pursued. After interdisciplinary review, he was no longer considered a CV surgical candidate. Goals of care were redirected to comfort measures.

Discussion: Congenital anomalies are a leading cause of infant mortality, and genetic testing is often pursued with the goal to identify a possible cause. However, it should not serve as the primary diagnostic or prognostic modality. Although there are syndromes which present as CHD with cutaneous findings, no known genetic change was identified in our patient. In fact, there are no reported cases of CHD in the setting of GCMN or vice versa. Notably, there are only about 100 symptomatic cases of GCMN with neurocutaneous melanosis found in literature. It could be considered that Twin B's CHD and GCMN were due to a mutation in the signaling pathway of neural crest cells. These cells play a vital role in mapping the outflow tract of the heart. In addition, it is also noted that a mutation in the RAS-pathway involving these cells lead to the development of GCMN. However, there are gaps in knowledge surrounding the implications of these conditions occurring in tandem. Nonetheless, studies illustrate that both CHD and GCMN with neurocutaneous findings carry increased risk of morbidity and mortality in the neonatal period.

Conclusion: Despite advancements in genetic prognostication and detection of congenital anomalies, there remains much to be discovered. Our patient had two congenital abnormalities that were genetically unrelated but profoundly impacted his course.

Congenital Complexities Times Two: A rare case of congenital heart disease and giant congenital melanocytic nevi

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BACKGROUND

Congenital anomalies are a leading cause of infant mortality. Genetic testing can be supportive but not conclusive, and the presence of multiple congenital anomalies may create diagnostic challenges for providers.

CASE PRESENTATION

Dichorionic-diamniotic male twin with known prenatal diagnosis of CHD delivered at 33 weeks due to preterm labor.

Apgars at birth were 6, 6, and 1 and pt required intubation shortly after birth.

PHYSICAL EXAM

General: premature infant, mechanically ventilated

HEENT: Normocephalic with normal suture, soft and flat fontanel

Respiratory: Coarse breath sounds bilaterally

Cardiovascular: Regular rate and rhythm, continuous 3/6 murmur

Abdomen/Genitalia: Soft, nondistended without organomegaly normal male, both testes palpable

Skin: numerous melanocytic, largest ~12 cm in diameter extending over spine + multiple satellite nevi covering torso, extremities and face

HOSPITAL COURSE

Cardiac

- Prenatally was diagnosed with Dextrocardia, complete AV canal defect, double outlet right ventricle, malposed great arteries, pulmonary atresia, situs inversus, and tortuous reversed oriented patent ductus arteriosus

Respiratory

- Mechanically ventilated throughout hospital course. Diagnosed with severe tracheomalacia and bronchomalacia and determined to need surgical intervention for single ventricle palliation and trach

Dermatology

- Diagnosed with giant cell melanocytic nevi with multiple satellite lesion. Due to size 12cm on back and location of the nevi, recommended MRI brain/spin to rule out neurocutaneous process. Did not recommend biopsy or excision of nevi

Genetics

- Genetics consulted due to two confounding genetic anomalies. Thought genetic anomalies secondary to de novo mutation. Whole genome testing negative and newborn screen was normal

Neurology

- MRI obtained at two months notable for diffused ventriculomegaly that was markedly increased from prior head ultrasound, T1 shortening, and multiple hyperintensities in the various parts of the brain. Findings were in congruent with neurocutaneous melanosis and severe hydrocephalus. cEEG notable generalized cerebral dysfunction.

Figure 1: example of giant congenital melanocytic nevus

DISCUSSION

Giant congenital melanocytic nevus (GCMN) syndrome is a rare congenital disease, with only ~100 symptomatic cases with neurocutaneous melanosis reported.

Thought to be secondary to mutation in neural crest cells involving RAS signaling pathway.

In fact there are no previously reported cases of CHD in the setting of GCMN.

CONCLUSION

While congenital abnormalities may present with significant or obvious findings, presence of a single congenital disease may not rule out a second related or unrelated diagnosis.

This patient was ultimately diagnosed with both GCMN and CHD which were deemed to be likely unrelated, but both had profound impact on his course. Providers should note that though medicine has advanced, a lot has yet to be uncovered

The Perplexing Purple Phalanx

Marina Shenouda, DO – Pediatrics Resident (PGY-3)
Co-Author(s): Jessica Isibor, MS3; Francesca Kingery, MD

Initial History/Presentation: A 16-year-old female presents with new burning pain, numbness, and tingling in her distal fingertips for 4 days. It is worse at night and with cold or wind chills. Her thumbs also turned purple during the night and intermittently throughout the day without clear trigger. Her menses are monthly, and she changes pads 3-4 times a day. She has had no fevers or sick symptoms, dizziness, syncope, or bruising. There is no known family history of autoimmune or hematologic disorders.

Physical Exam: Vitals were normal for age. Physical exam revealed a tearful adolescent in distress. There was purple/blue discoloration to her bilateral thumbs past the distal interphalangeal joint. They were exquisitely tender to touch. There was no discoloration of her other fingers. She had a capillary refill of less than two seconds, and she had 2+ radial pulses bilaterally. Her mucosa was normal.

Diagnostic Evaluation: Hemoglobin and ferritin were low at 6.2 g/dL and 6.1 ng/mL. Iron was also low at 9 ug/dL. Platelets were elevated to 1,480 10*3/uL. Hemoglobin electrophoresis was normal. Protein electrophoresis revealed increased IgG and IgM, and the immunofixation assay showed mildly increased gamma globulins. Both findings were of polyclonal origin and therefore not concerning. Bilateral upper and lower extremity doppler venous ultrasounds were normal. Vitamin B-12, methylmalonic acid, lupus anticoagulant, vitamin C, protein S, and protein C levels were all within normal limits. A left thumb biopsy revealed small vessel microthrombi in the left thumb.

Diagnosis: The biopsy revealed an acral skin fragment with microthrombi, epidermal and eccrine gland necrosis, subepidermal vesiculation with features of re-epithelialization and focal fibrinoid alteration of dermal vessels. This patient had microthrombi due to thrombocytosis in the setting of severe iron deficiency anemia.

Discussion/Conclusion: Chronic iron deficiency anemia can result in detrimental side effects. Reactive thrombocytosis occurs due to the relationship between erythropoietic and thrombotic growth factors. There have been many case reports in which adult and pediatric patients suffered from thromboembolic events due to iron deficiency anemia. Early identification of iron deficiency anemia is critical in preventing thromboembolic events which occur because of reactive thrombocytosis. Treatment for this patient included blood transfusion, iron supplementation and aspirin for prophylaxis against further microthrombi.

The Perplexing Purple Phalanx

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CASE PRESENTATION

16-year-old female presents with new burning pain, numbness, and tingling in her distal fingertips for 4 days.

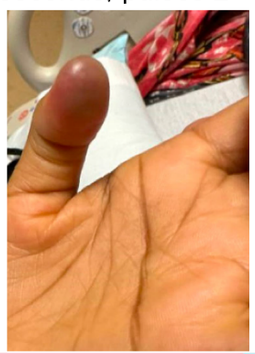
Worse at night or with cold: thumbs turn purple intermittently

No fevers or sick symptoms, dizziness, syncope, or bruising. Regular periods without menorrhagia.

No known family history of autoimmune or hematologic disorders.

PHYSICAL EXAM

General: tearful adolescent in distress
HEENT: Normal mucosa
Extremities: discoloration to b/l thumbs past the DIP. Exquisitely tender. Cap refill <2 seconds, pulses 2+



DIAGNOSTIC EVALUATION

Type of study	Study	Findings
Imaging	B/L upper and lower extremity doppler ultrasound	Normal
Serum studies	Hemoglobin	★ 6.2 g/dL
	Ferritin	★ 6.1 ng/mL
	Iron	★ 9 ug/dL
	Platelets	★ 1,480 10*3/uL
	Hemoglobin electrophoresis	Normal
	Protein electrophoresis	★ Elevated IgG and IgM
	Immunofixation assay	★ Increased gamma globulin, polyclonal origin
	Vitamin B12	Normal
	MMA	Normal
	Protein C	Normal
	Protein S	Normal
	Lupus anticoagulant	Normal
Pathology	Left thumb biopsy	★ Acral skin fragment with microthrombi, epidermal and eccrine gland necrosis, subepidermal vesiculation with features of re-epithelialization and focal fibrinoid alteration of dermal vessels

CASE CONTINUED

The patient's condition was a result of microthrombi due to thrombocytosis in the setting of severe iron deficiency anemia. She was treated with Aspirin 81 mg daily and discharged home on iron supplementation.

CONCLUSIONS

Distal finger pain and swelling differential includes hematologic, rheumatologic, infectious, and traumatic causes

Severe iron deficiency anemia can cause reactive thrombocytosis due to relationship between erythropoietic and thrombotic growth factors.

Early identification of iron deficiency anemia is critical in preventing thromboembolic events

Treatment includes iron supplementation and aspirin to prevent against further microthrombi

Hereditary Orotic Aciduria: an Uncommon Presentation in a Pediatric Patient

Kyle Welhouse, MD – Pediatrics Resident (PGY-3)
Co-Author(s): Mustafa Barbour, MD

Introduction: Hereditary orotic aciduria (HOA) is an inborn error in pyrimidine metabolism, a deficiency in the final two steps of de novo pyrimidine synthesis using the enzymes orotate phosphoribosyl transferase (OPRT), and orotidine 5'-monophoshate decarboxylase (ODC). Both steps are catalyzed by uridine monophosphate synthase (UMPS) (*Figure 1*) increasing the amount of orotate or orotic acid. HOA is exceedingly rare but currently has a successful treatment regimen. Typically, these children present as normal newborns. They will start to show signs of lethargy, poor weight gain, and failure to thrive resulting in developmental delay. Laboratory tests commonly show a megaloblastic anemia which is refractory to typical treatment with folate or vitamin B12. Bone marrow will show evidence of erythroid hyperplasia with megaloblastic erythroid precursors, respectively (1 – Rimon).

Case Presentation:
Patient presented with neutropenia and anemia at age 9 months. She had no improvement in anemia after a trial of oral iron which warranted further evaluation by pediatric hematology. At age 11 months, the blood count and blood smear showed a normocytic anemia (Hemoglobin 8.2, MCV 82) with anisopoikilocytosis and fragmentation with schistocytes. RBC morphology concerning for hemolysis, however, patient's reticulocytes, LDH, haptoglobin and bilirubin was appropriate. Coombs negative; B12 and folate normal. No evidence of iron deficiency with a normal iron panel. Prior to this incident the patient was otherwise healthy, meeting developmental milestones, and gaining weight and height appropriately. She was born term, no significant complications at time of delivery. Despite the lab findings she overall had no symptoms. Bone marrow aspiration and biopsy showed evidence of hypercellularity, significant erythroid dysplasia of, myeloid left shift with mild dysplastic changes, and increased blasts at 6% (see image 1-6). Initially concerned for a myelodysplastic syndrome (MDS) or an underlying congenital dyserythproietic anemia. A multitude of genetic studies were sent including: bone marrow chromosomal analysis and MDS FISH panel (Mayo Clinic), bone marrow failure NGS panel (PerkinElmer genomics, Pittsburgh PA) telomere Length (Johns Hopkins), and chromosomal instability. The patient was found to have a heterozygous mutation in SAMD9L; however, this was considered a variant of unknown significance. Bone marrow transplantation was considered at that time while awaiting further workup results because of steady worsening anemia and neutropenia. The patient underwent a second bone marrow biopsy 5 months after the initial evaluation showing 95% cellular marrow with trilinear hematopoiesis and myeloid maturation arrest and depression. S 38 table erythroid dysplasia with expansion. There was no significant increase in blasts. Whole exome sequencing (WES) was done. The patient's mother had UMPS c.857T>A (p.Ile286Asn); father UMPS c.937 C>T (p.Arg313Trp) on exon 3. The patient was found to have compound heterozygous mutations in the UMPS gene c.857T>A (p.Ile286Asn) and c.937 C>T (p.Arg313Trp). This increased concern for HOA. The patient's initial urine orotic acid initial level was 2986 mmol (normal limit is 0.7 – 5.1 mmol). The patient was referred to pediatric genetics and started on Xuriden. Subsequent orotic acid levels have declined to more appropriate levels. The patient is continuing to meet developmental milestones. Blood counts improved after starting medication. Roughly six to eight weeks after starting therapy the patient's hemoglobin was 10.5 and MCV 82.6 and normal neutrophil count with significant drop in orotic acid level.

Discussion: In this case we review a patient who initially presented with neutropenia and a normocytic anemia who ultimately was diagnosed with HOA. For approximately 9 months the patient underwent extensive testing until the diagnosis of HOA was made by WES. Urine orotic acid level is not a component of usual work up for megaloblastic anemia. Without WES findings, we would not have had urinary orotic acid levels taken as the presentation was significantly different than the norm for the illness. Prior to WES results, the patient's cytopenia steadily worsened and bone marrow transplant was considered with concern for MDS and other underlying bone marrow dysfunction illnesses. Currently, MDS does not have a specific

diagnostic indicator. Further, there are multiple iterations of the disease with different treatment plans (2 – Dotson, 3- Yoshia). Olcay describes a significant differential diagnosis when MDS is considered (4- Olcay). we believe this case is a good example for physicians to consider genetic conditions including HOA when considering MDS. Orotic acid is also a simple urine study which can be obtained with quick results. With this finding, it may have expedited the patient's care. Fortunately, there was no significant developmental regression in our patient. HOA is not currently on newborn screens in the United States (7). Likely because of how rare the illness is, and because it doesn't show extreme changes on development as other diseases on the screen do. Israel instituted studies to identify if orotic acid measurements were feasible. They have subsequently been able to integrate into their routine mass spectrometry panel and have subsequently identified multiple children with the UMPS gene variation (5,6). Thus, it may be able to integrate it into our routine screening given it's known therapy and possible developmental concerns later in childhood. Given this idea, it is quite unique that the patient's sister was born two weeks after her HOA diagnosis. Genetic testing obtained at birth using cord blood confirmed presence of heterozygous mutations in the UMPS gene c.857T>A (p.Ile286Asn) and c.937 C>T (p.Arg313Trp). At age 2 months, the sister was found to have a normocytic anemia (hgb 9.5, MCV 91.8) with mild neutropenia (ANC 920). Her orotic acid level was obtained and it was greater than 3000 mmol (normal limit is 0.7 – 5.1 mmol). Patient was started on Xuriden and her orotic acid level significantly decreased within 2 months and the abnormalities on her CBC normalized.

Conclusion: In conclusion, an 11-month-old child presented with neutropenia and normocytic anemia and was ultimately diagnosed with HOA. This presentation was quite unusual and required an extensive work up to achieve. We believe this case offers an example of alternatives to keep on the differential when MDS is considered, especially when BMT is being considered as a possible therapeutic intervention. Lastly, it appears orotic acid levels could be part of future newborn screens pending further analysis of beneficence to the larger population in this country.

Hereditary Orotic Aciduria: an Uncommon Presentation in a Pediatric Patient

Kyle Welhouse, MD; Mustafa Barbour, MD

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CASE PRESENTATION

Previously healthy 11-month-old female presented for 9-mo well check and found to have normocytic anemia, mild neutropenia

Started trial of oral iron supplements x2 months without improvement → referred to Pediatric Hematology. Patient otherwise healthy without systemic symptoms.

WORKUP/PROGRESSION

Exam: Appropriate development, heigh/weight for age.

Labs:

- CBC: Hb 9.3, ANC 1370, Plt 595
- Peripheral blood smear with moderate anisopoikilocytosis, including ovalocytes, elliptocytes, target cells and schistocytes suggestive of a hemolytic process, possibly hemoglobinopathy.
- Reticulocyte count, LDH, haptoglobin, and bilirubin normal
- Iron studies, folate, vitamin B12, and copper normal.
- Hb electrophoresis → increased Hgb A2 (5.8%). Alpha and beta globin locus analysis showed no mutations or copy number variations.

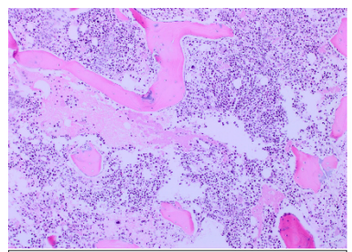
- Normocytic anemia and neutropenia worsened over the following 2 months to as low as 6.6 g/dL and 170, respectively.

BONE MARROW EVALUATION

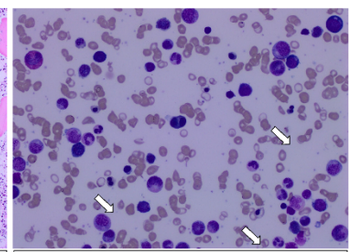
Bone marrow aspiration and biopsy:

- Cellular marrow with trilineage hematopoiesis
- Mild erythroid hyperplasia, dyserythropoiesis and left-shift myelopoiesis.
- Blasts (CD34-positive cells) increased to 6% by morphology and 3.6% by flow cytometry.
- Chromosomal analysis, myelodysplasia panel by FISH negative.

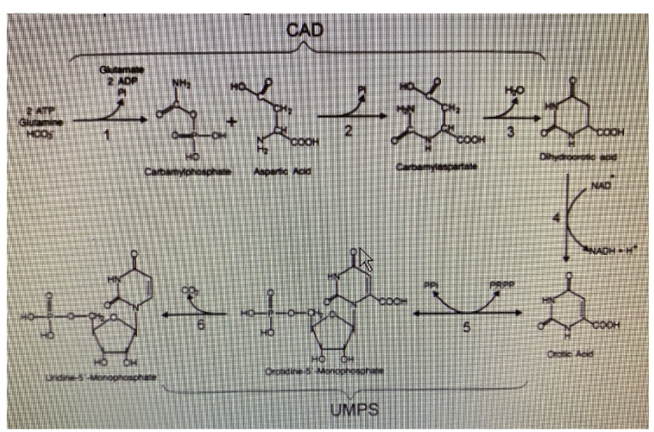
PATHOLOGIC FINDINGS



Bone marrow biopsy: Normal cellularity (95%) with erythroid hyperplasia (75% of cells CD71+, not shown).



Bone marrow aspiration: Erythroid megaloblastic changes; nuclear lobation, binucleation and nuclear contour irregularities (arrows).



GENETIC STUDIES

- Whole Exome Sequencing on the patient and her parents detected compound heterozygous mutations in the UMPS gene; c.857T>A (p.I286N) maternal, and c.937C>T (p.R313W) paternal.
- Urine orotic acid elevated to 2986 mmol (normal 0.7 – 5.1) confirming the diagnosis of hereditary orotic aciduria.

DISCUSSION

- Hereditary orotic aciduria (HOA) is a rare genetic disorder caused by variations in the Uridine monophosphate synthetase (UMPS), critical in the biosynthesis of pyrimidines

- Common sxs: Normal at birth. Later → lethargy, poor weight gain, and failure to thrive causing developmental delay.
- Labs:
  - CBC: Treatment-resistant megaloblastic anemia within a few months of life
  - Bone marrow: erythroid hyperplasia with megaloblastic erythroid precursors

- Diagnosis may be challenging as Initial direction of MDS does not have a specific diagnostic indicator. Not currently included on NBS

ONGOING CARE

- Bone marrow transplant was considered for the patient until diagnosis of HOA was made but not necessary for HOA

- Started on Xuriden with resolution of neutropenia and anemia in 3 weeks

A Case for Early Transesophageal Echocardiography in Native Mitral Valve Thrombus in a Pediatric Patient

Lucas Banter, MD – Internal Medicine/Pediatrics Resident (PGY-4)
Co-Author(s): Ryan Conard, MD; Laura Bishop, MD

Background: Embolic stroke represents a clinically significant proportion of cerebrovascular accidents. While recognized as a common source in adults, cardioembolic origin is far less often considered in the pediatric population. In this case report we evaluate the presentation and workup of native-valve thrombus in children and adolescents.

Case Description: A 16-year-old male, 6'3" and 110kg, with history of MIS-C and CKD secondary to left renal infarct presented with acute onset dysarthria and right-sided weakness. He had MIS-C the year prior, complicated by mitral valve (MV) thrombus and renal infarct. MV thrombus was treated with rivaroxaban and resolution was noted on transthoracic echocardiogram (TTE) 3 weeks into treatment. On presentation, neurologic symptoms had resolved but imaging demonstrated multiple scattered ischemic foci in the bilateral frontal, parietal and occipital lobes. He was admitted to the PICU where TTE was negative for intracardiac thrombus with sufficient windows. Anticoagulation was held in preparation for a lumbar puncture to rule out intracerebral vasculitis Unfortunately, he sustained acute onset right-sided paralysis with imaging demonstrating left MCA and ACA embolic occlusion requiring urgent thrombectomy. During recovery the patient sustained an acute left femoral artery thrombus, thus underwent a second thrombectomy. Transesophageal echocardiogram (TEE) at that time demonstrated a large, mobile pedunculated mass (23mm x 10mm) attached to the anterior mitral valve leaflet that was not evident on prior TTE. Rivaroxaban was discontinued and the patient was started on warfarin with plan for life-long anticoagulation.

Discussion: Little has been published previously comparing the inherent benefits and pitfalls of TTE versus TEE in the pediatric patient. Mitral valve thrombus, especially on a native, structurally normal heart valve, is an atypical finding in children and adolescents. Though atypical, the incidence of cardiac thrombus among children with ischemic stroke is 20%[4]. Similarly, 15% to 40% of all ischemic strokes in adults are of cardiac origin[1].

Echocardiography is performed as a standard workup for cardiac thrombus in both adult and pediatric patients. The American Society of Echocardiography (ASE) generally recommends TTE-first examination; however, suggests stratifying each patient for risk of intracardiac thrombus when considering initial choice of study. Per the ASE guidelines they recommend both TTE and TEE as initial or supplemental test for evaluation for cardiovascular source of embolus without identified non-cardiac sources elsewhere[1]. In adults, it has been well documented that TEE is superior to TTE in detecting intracardiac pathology such as vegetations The sensitivity of TTE for vegetations when compared to TEE was only 55% overall. There is still a paucity of data in the pediatric population for sensitivity and specificity of TTE versus TEE in identifying native mitral valve thrombus.

Conclusion: When evaluating a pediatric patient with poor windows for poor transthoracic echo study or with increased pretest probability for valvular thrombus, we argue for early TEE in an effort to expedite diagnosis. Earlier diagnosis in our patient may have prevented further organ damage. We acknowledge that TEE-first approach would not be appropriate in all patients but encourage pursuits of more clearcut guidelines for children and adolescents, especially ones considering patient age and size.

A Case for Early Transesophageal Echocardiography in Native Mitral Valve Thrombus in a Pediatric Patient

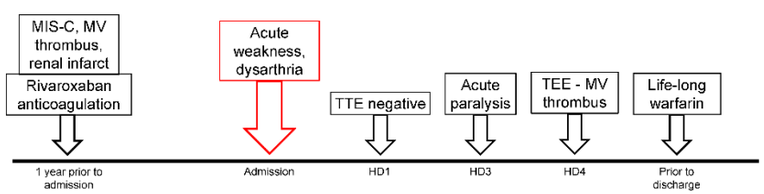
Lucas Banter, MD, Ryan Conard, MD, and Laura Bishop, MD

BACKGROUND

Embolic stroke represents a clinically significant proportion of cerebrovascular accidents. While recognized as a common source in adults, cardioembolic origin is far less often considered in the pediatric population.

CASE DESCRIPTION

- 16-year-old male, 6'3" and 110kg, presented with acute onset dysarthria and right-sided weakness
  - **PMH:** History of MIS-C the year prior complicated by mitral valve (MV) thrombus and renal infarct. Treated with rivaroxaban and resolution noted on transthoracic echocardiogram (TTE) 3 weeks into treatment.
- Initial inpatient imaging demonstrated multiple scattered intracranial ischemic foci
- TTE was negative for intracardiac thrombus (Figure C)
- Patient then developed acute right-sided paralysis
- Brain MRI showed left MCA and ACA embolic occlusion (Figure A and B) requiring urgent thrombectomy
- Transesophageal echocardiogram (TEE) at that time demonstrated a large thrombus attached to the anterior MV leaflet that was not evident on prior TTE (Figure D)
- Rivaroxaban was discontinued and the patient was started on warfarin with plan for life-long anticoagulation



DISCUSSION

Comparisons of TTE vs TEE in pediatric patients are limited.

While ischemic stroke is less common in children, ASE guidelines suggest both TTE and TEE as suitable initial evaluation of cardiovascular source of embolus.

TEE is superior to TTE in detecting intracardiac pathology such as vegetations in adults, but there remains a paucity of data in the pediatric population for sensitivity and specificity of TEE in identifying native mitral valve thrombus.

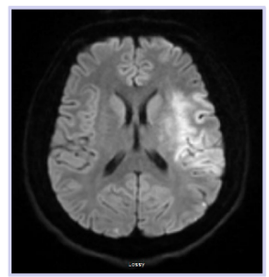


Figure A: DWI bMRI

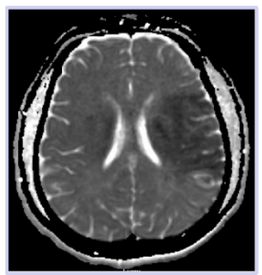


Figure B: ADC bMRI

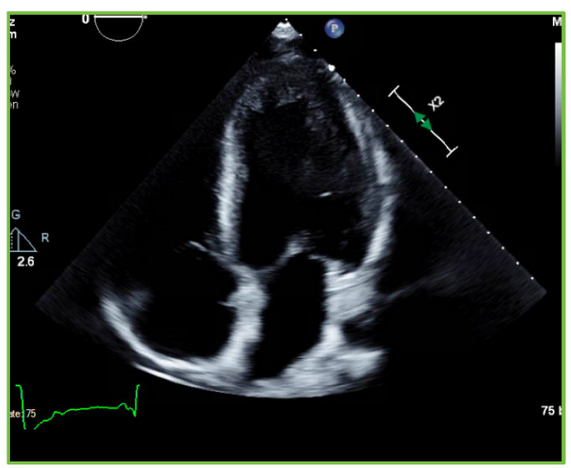


Figure C: TTE without evidence of intracardiac thrombus; apical 4-chamber view

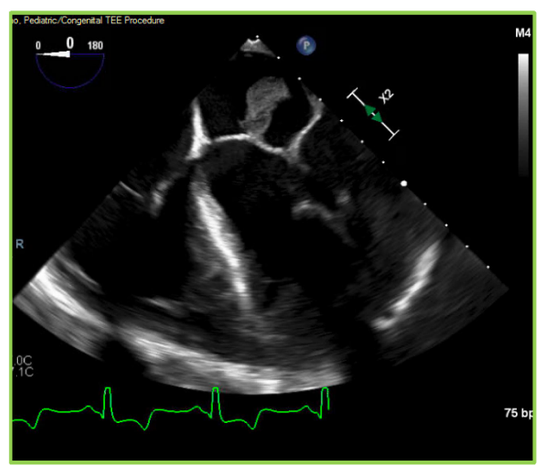


Figure D: TEE demonstrates a large, mobile pedunculated mass (~23mm x10mm) attached to anterior mitral valve leaflet; mid-esophagus four chamber view

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3. Ziesmann, Markus T et al. "Cardioembolic stroke in children: a clinical presentation and outcome study." *Pediatric neurology* vol. 51,4 (2014): 494-502. doi:10.1016/j.pediatrneurol.2014.06.013

CONCLUSIONS

When evaluating a pediatric patient with increased pretest probability for valvular thrombus or poor windows on TTE, we argue for early TEE in an effort to expedite diagnosis.

TEE-first approach may not be appropriate in all patients, but development of more clearcut guidelines for children and adolescents with significant risk factors may be helpful to guide clinicians in such cases.

Climate Change and Tick-Borne Diseases: Revisiting "Endemicity"

James E. Stanton, MD, SCM – Internal Medicine/Pediatrics Resident (PGY-4)
Co-Author(s): James LeMaster, BS; Michael Hogg, MD; Allison Etling, MD; Justin Kingery, MD, PhD

Background: Changes in climate are increasingly linked to alterations in human disease. Recent data suggests that more than 50% of infectious diseases have been worsened by environmental changes. One of these, tick borne diseases, has steadily increased over the past 20 years. Commonly attributed to Lyme, rarer causes including ehrlichiosis, anaplasmosis, and babesiosis may be overlooked, particularly in areas previously thought to be non-endemic for their vectors.

Case: A 23-year-old Amish male with past medical history of prolactinoma, adrenal insufficiency, and Moyamoya malformation presented with a three-day progressive rash followed by fever. Social history included childhood vaccinations until age 12, daily exposure to farm animals, recent initiation of chasteberry (*Vitex Agnus Castus*) supplement, and employment at a wood mill. He denied any sick contacts or recent insect bites. The patient noted pruritic forearm rash four days prior to admission, which then progressed to involve the face, trunk and legs and was associated with fevers to 102F. On presentation, temperature was 101.6, HR 107, RR 22, and BP 96/80. Laboratory analysis was significant for WBC 4.9, CRP 18, Na 129, ESR 36, and Plt 160. He was admitted for evaluation of possible sepsis. Dermatology was consulted and noted a widespread morbilliform eruption, however mucous membranes were clear, which was felt inconsistent with supplement-induced reaction. Given the social history, tick-borne and other infectious diseases (Coxiella, Brucella, etc) were considered. Empiric doxycycline and cefepime were started. Infectious workup including blood culture, respiratory viral panel, coxsackie virus PCR, CMV IgM, EBV IgM, RPR/HIV, ANA, and Coxiella/Parvovirus PCR were negative, and pt was Rubeola non-immune. Tick-borne workup including Ehrlichia IgM/IgG, Borrelia IgM/IgG, Rickettsia IgM/IgG, and Anaplasma/Ehrlichia/Babesia PCR were all negative, but Anaplasma IgM titers were <1:160. The patient was diagnosed with Human Granulocytic Anaplasmosis (HGA).

Discussion: Anaplasmosis is a lesser known, but equally important, cause of tick-borne disease as compared to Lyme; both are carried by the same vector, *Ixodes scapularis*. While Lyme disease and *Ixodes Scapularis* are traditionally considered endemic to the US Northeast, this paradigm is shifting with climate change and migration of vectors outside previous endemic environments. As such, Anaplasmosis, can easily be overlooked in the evaluation of possible Lyme disease, especially by medical staff trained and working in areas previously thought non-endemic. This is especially alarming given the debilitating nature of disease and mortality rate of 1%, even in young adults. Therefore, in a patient with diffuse rash, heavy animal and outdoor exposure, rarer tick etiologies should be considered regardless of geographic endemicity.

Climate Change and Tick-Borne Diseases: Revisiting "Endemicity"

James E. Stanton, MD, ScM [1]; James LeMaster, BS [1];Michael Hogg, MD [2]; Allison Etling, MD [1]; Justin Kingery MD, PhD [2]

[1] Department of Internal Medicine/Pediatrics, University of Louisville School of Medicine, Louisville, KY
[2] Department of Internal Medicine, University of Louisville School of Medicine, Louisville, KY

Introduction

Changes in climate are increasingly linked to alterations in human disease. Recent data suggests that more than 50% of infectious diseases have been worsened by environmental changes.

Tick-borne disease incidence has steadily increased over the past 20 years and currently account for 90% of all vector-borne disease--but may be overlooked, particularly in areas previously thought to be non-endemic for their vectors.

Case Description

HPI: 23 vear old Amish male with history of prolactinoma, adrenal insufficiency, and Moyamoya malformation presented with pruritic forearm rash x4 days → progressed to involve the face, trunk and legs with fevers to 102F.

Social hx: + childhood vaccinations until age 12, daily exposure to farm animals, recent initiation of chasteberry (Vitex Agnus Castus) supplement, and employment at a wood mill. No sick contacts or recent insect bites. Recent travel to Michigan.

Initial Evaluation: T 101.6, HR 107, RR 22, BP 96/80.
--Labs: WBC 4.9, CRP 18, Na 129, ESR 36, and Plt 160.

Hospital Course: Dermatology consulted and noted a widespread morbilliform eruption. Mucous membranes were clear, which was inconsistent with supplement-induced reaction. Given exposures noted in his social history, tick-borne and other infectious diseases (Coxiella, Brucella, etc) were considered and mpiric doxycycline and cefepime started.

Infectious workup: Blood cultures, respiratory viral panel, coxsackie virus PCR, CMV IgM, EBV IgM, RPR/HIV, ANA, Coxiella/Parvovirus PCR all NEG. Rubeola non-immune.

Tick-borne panel: Ehrlichia IgM/IgG, Borrelia IgM/IgG, Rickettsia IgM/IgG, Anaplasma/Ehrlichia/Babesia PCR all NEG. Anaplasma IgM titers <1:160. The patient was diagnosed with Human Granulocytic Anaplasmosis (HGA).

Background

Anaplasmosis: Symptoms, Prevalence, and Coinfection

Incubation Period	1-2 weeks
Symptoms	• Fever • Chills • Myalgias • Rash
Labs	• Anemia • Thrombocytopenia • Leukopenia • Elevated liver enzymes
Diagnosis	PCR and antibody titers in sera
Treatment	Doxycycline 1oomg BID x10 days

Table 1. Characteristics of Anaplasmosis Infection

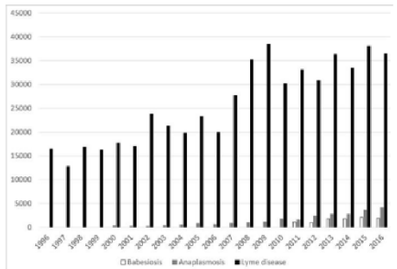

Figure 1. Reported Cases of Babesiosis, Anaplasmosis, and Lyme Disease in the US, 1996 - 2016 (adapted from CDC.gov)

Epidemiology

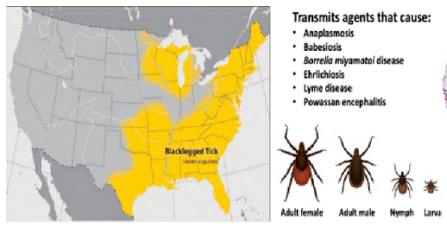

Figure 2. Endemic Range of *Ixodes scapularis* (adapted from CDC.gov)

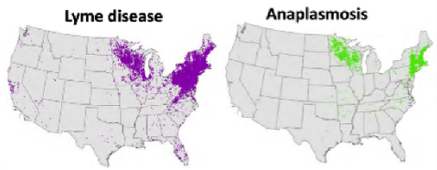

Figure 3. Geographic Distribution of Select Tick-borne Disease, 2015 (adapted from CDC.gov)

Fueling the Spread

- Ticks
- Host
- Habitat
- Humans
- Climate

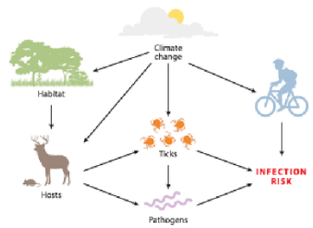

Figure 4. Inter-relation of Ticks, Hosts, and Climate (adapted from Gilbert (2021))

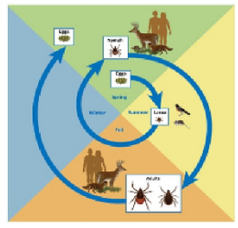

Figure 5. Tick Life Cycle (adapted from CDC.gov)

Discussion

Revisiting "Endemicity"

- Alterations to host behavior
- Alterations to habitat
- Rising temperatures
- Changes to feeding behavior
- Wetter and/or dryer conditions

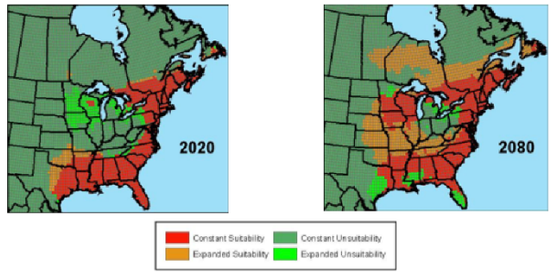

Figure 6. Predicted Expansion and Contraction of *I. scapularis* (adapted from Brownstein et al. (2005))

Conclusion

Vector range and disease may have increased in recent decades due to climate change and general warming trends, although increased testing/awareness may also contribute, along with recolonization of regions as humans alter environments to make them more suitable for ticks.

Health-care providers in previously non-endemic areas may begin to see anaplasmosis cases due to migration of tick vectors secondary to climate change. Therefore, in a patient with diffuse rash, heavy animal and outdoor exposure, rarer tick etiologies should be considered regardless of geographic endemicity.

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