Department of Pediatrics
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Pediatrics Research Week

Resident Program Guide

Resident Presentations

Promoting Family Voices: A QI Initiative to Increase In-Person Interpreter Use on Pediatric Hospitalist Rounds

Shen M, Christensen E, Shadman K, Allen A, Bidar-Sielaff S, Anillo Manotas D, Wilhelm M, Chen L

Background: Patients that speak a language other than English (LOE) have worse health care quality and outcomes. In-person interpreters provide the most effective communication. Our specific aim was to increase use of in-person interpreters on pediatric hospitalist round from 39% to 75% over 6 months.

Methods: Using the model for improvement, a multidisciplinary stakeholder team conducted this quality improvement study. LOE families on the pediatric hospitalist service were identified via chart review and demographic information obtained. Attendings and fellows completed daily surveys regarding interpreter use. Encounters were excluded if person needing an interpreter was not present at rounds. Baseline data was collected September to November 2024; implementation data from November 2024 to March 2025. Primary outcome measures were percent of in-person interpreter use and interpreter use documentation, tracked over time using run charts. Process measure was presence of consult interpreter services order. Balancing measure was time waiting for in-person interpreter. Interventions included secure chat workflow to schedule in-person interpreter and Epic smartphrase to improve documentation.

Results: Survey response rate was 94.2%. There were 187 rounding encounters and 62 unique patients (4 readmitted during the study period). Language spoken was 59% Spanish, 14% Swahili, 7% American Sign Language; average length of stay was 91 hours. An in-person interpreter was used in 29% of rounding encounters, video interpreter in 60%, and 11% family declined an interpreter. For Spanish-speaking patients, an in-person interpreter was used in 42% of rounding encounters. No sustained improvement was seen after interventions. Interpreter use was documented in 36% of notes. Consult interpreter services order was present in 98% of patient admissions. In-person interpreter was waiting for the team 63% of the time, while 21% of the time team waited more than 10 minutes.

Conclusions: There was no sustained change in in-person interpreter use, and use was higher for Spanish-speaking families. Changing the culture of in-person interpreter use is challenging. Future interventions include resident education and improving coordination between interpreters and hospitalist team

Outcomes following Non-invasive Respiratory Support Failure in Moderate Preterm Infants

Elliott J, Brady J, Christensen M, Wentela K, Eickoff J, Peebles P, Kaluarachchi D

Background: Noninvasive respiratory support (NRS) is critical in initial management of preterm neonates with respiratory distress syndrome (RDS). Many neonates fail NRS and require advanced support within the first days of life. Data on outcomes following NRS failure in moderate preterm neonates is limited, particularly its impact on length of NICU stay.

Objective: To evaluate the association between NRS failure and short term NICU outcomes. We hypothesized that neonates who develop NRS failure have a longer NICU stay.

Study Design: A retrospective cohort study of infants born between 290/7 and 336/7weeks with RDS admitted to UnityPoint Health Meriter NICU between 1/1/2017- 12/31/2020. Neonates intubated in the first 2 hours of life or those who didn't require respiratory support were excluded. The cohort was divided into two groups; NRS failure and NRS success. NRS failure was defined as administration of surfactant and/or need for mechanical ventilation in the first 72 hours of life. Surfactant typically administered when FiO2 reached 30-40% on CPAP of 6-7 cm H20. Univariate analysis was performed to compare characteristics and outcomes between the two groups and a multivariable logistic regression analysis was performed to evaluate the primary outcome of length of stay controlling for relevant variables.

Results: 267 neonates were included. 21% developed NRS failure. Neonates who failed NRS were less likely to receive antenatal steroids, and more likely to be born to mothers with chorioamnionitis (Table 1). NRS failure was associated with higher rates of pneumothorax, bronchopulmonary dysplasia, duration of total respiratory support (Table 2). Neonates who failed NRS had a longer length of stay, but this was not statistically significant (p=0.05). After adjusting for gestational age, gender, birthweight percentile, and antenatal steroid exposure, a generalized estimating equation analysis was used to account for twins/triplet births. There was no significant difference in length of stay between the two groups (OR 1.01, CI 0.99-1.04, P=0.33).

Conclusions: NRS failure was associated with multiple adverse short term NICU outcomes. However, NRS failure in moderate preterm neonates was not associated with increased length of stay. These findings should be replicated in large multi-center studies. We also propose that future studies should evaluate the effects of NRS failure on late preterm infants born at gestational ages of 34-36 weeks.

Doctors Against Bullying (DAB): Pediatrician Identification and Guidance for Bullying

Zarbock S

Background: Bullying is unfortunately a common occurrence in the United States. In the US, 1 out of every 5 children reports being bullied. In Wisconsin, 18% of high schoolers report being bullied in the last 12 months. Bullying is shown to be associated with depression, anxiety, changes in sleep patterns, changes in eating patterns, increased health complaints, decreased academic achievement, disruption of school attendance, increased suicidal ideation, and increased suicide attempts. These problems can persist into adulthood. Bright Futures recommends screening for bullying in appropriate age well child visits, however pediatricians are not routinely educated on how to identify and provide guidance for patients who experience bullying. Consequently, it was suspected that confidence in doing either of these things was low and could benefit from focused education.

Design and Methods: This project initially assessed the confidence of pediatric residents in identifying bullying in pediatric patients and their confidence in providing appropriate guidance for patients in whom bullying is identified. Participants ranked their level of confidence using a Likert 5-point scale. A 45-minute training session was then provided to those assessed. The training included how to properly identify bullying and how to adequately provide guidance for patients in whom bullying is identified. After training, assessment was done again asking the same questions.

Results: Surveys were done by 16 pediatric residents. Questions assessed confidence in identifying bullying and confidence in providing guidance to patients in whom bullying is identified. Upon initial assessment, the most common answer to these questions was “somewhat unconfident”. Upon reassessment following training, the most common answer to both questions was “somewhat confident”, with “very confident” being the second most common answer. Somewhat confidence or greater increased from 35% to 94% for confidence in identifying bullying and from 15% to 100% for confidence in providing bullying guidance.

Conclusions: The 45 minutes training session was effective in increasing pediatrician’s confidence in identifying bullying in pediatric patients and increasing confidence in appropriate guidance for patients in whom bullying is identified. Given the incidence of bullying, the potential negative effects, and the results of the initial assessment, this training would be beneficial to provide to more pediatricians.

Parental Preferences for Summarized Inpatient Notes: A Qualitative Study m

Bethel J, Kelly M, Tse G, Kieren M, O'Hara C, Ebby C

Background: Current federal mandates aim to improve healthcare transparency by giving patients and their caregivers easy access to their health information including provider notes. Facilitating access to provider notes has improved patient autonomy, patient understanding of their health, and adherence to provider recommendations. However, provider notes are typically written in complex language with medical jargon, not easily understandable for patients and caregivers. Plain language summaries of provider notes could address this need but is time-consuming to produce. Artificial intelligence (AI), with its ability to summarize complex texts, may help bridge this gap. This study aims to establish best practice guidelines for inpatient note summaries from a caregiver perspective and caregiver attitudes towards AI producing such a summary.

Methods: For this qualitative study, we aim to recruit caregivers of pediatric patients admitted at American Family Children's Hospital. Caregivers of pediatric patients were eligible for recruitment if the child was 12 years old or younger, admitted to the pediatric hospital medicine service, caregiver was proficient in both written and spoken English, the patient not being admitted for concerns of neglect or abuse, and, once approached, the caregiver consented to participate in the study. A demographics survey collected information to gauge socioeconomonic status and medical complexity of child. The caregiver participates in a 30- to 60-minute semi-structured interview conducted by author CE exploring their preferences on how information from inpatient notes is presented and their thoughts regarding AI generating a summary of an inpatient note. The interviews were audio-recorded, transcribed, and deidentified transcripts will be uploaded into Dedoose. Qualitative data will be analyzed using an inductive thematic approach with the study team conducting open coding to develop codebooks. Parents will be given a $30 gift card for participation. IRB approval was obtained.

Results: The team will have a preliminary qualitative analysis at the end of April 2025.

Conclusions: Will be based on qualitative analysis results.

Parenting Newborns: Building Bonds, Breaking Stigma

Clemens J, Caniza R, Ellenbecker C, Mathur M

Background: Parental incarceration affects 7% of American children, and 16% of Americans have a substance use disorder (SUD), which are both adverse childhood events. Children of these parents can experience negative mental and physical health outcomes including heart disease, depression, and SUD. These parents can experience stigma in healthcare, which may lead to avoidance of medical systems and further poor health outcomes for parents and children. Comfort level of pediatric residents in caring for these children is unknown. This study's purpose is to understand the interest and comfort level of pediatric residents in caring for children of parents with SUD or Department of Corrections (DOC) involvement, and to evaluate if more exposure changes comfort.

Methods: First year pediatric residents on an advocacy rotation completed readings about caring for children with parental DOC involvement or SUD. Residents led a discussion session on a newborn care topic at a residential program for women with SUD and DOC involvement and their infants. Residents completed pre- and post-visit surveys to assess comfort level in caring for children with parental DOC involvement or SUD, with answer choices on a scale of agree, neutral, or disagree. McNemar test was used to assess significance in each response category and in overall comfort.

Results: Ten participants completed the pre- and post-visit surveys. Residents reported higher comfort levels (60% comfortable, 40% neutral) in caring for children with parents with SUD or DOC involvement post-visit, compared to uncomfortable (20% DOC, 30% SUD) and neutral (70% DOC, 50% SUD) prior. Changes were not significant. Post-visit, all residents indicated increased interest in working with community partners and most reflected positively on the experience.

Conclusions: Leading education sessions with parents with SUD or DOC involvement may have been effective in increasing residents' comfort in taking care of these children, given increase in agreement and decrease in disagreement of comfort. Lack of significance was likely due to small sample size. Working with community partners can broaden resident education via exposure to specific patient populations. Similar experiences may work to decrease physician bias when caring for patients from these populations. Ongoing work includes assessing if the sessions improve the women's confidence in newborn care and comfort in discussing these topics with healthcare providers.

Retroperitoneal Teratoma with Dilated Cardiomyopathy

Skelton P, Montes Ramirez D, Gulliver J

Background: Abdominal mass is a common presentation for solid tumors in infants and young children. The most common causes of abdominal mass in this age group include neuroblastoma, nephroblastoma (Wilms tumor), and teratoma. While rare, there are many reports of dilated cardiomyopathy (DCM) in cases of neuroblastoma and nephroblastoma. We present here the second reported case of DCM complicating an abdominal teratoma.

Case: A 3 month old previously healthy female presented to the emergency department for right sided abdominal mass. Her abdominal CT demonstrated a heterogenous mass in her right retroperitoneal space abutting her right kidney. She was hypertensive on her admission to the hospital and had an enlarged left ventricle noted on her chest CT during her staging workup. Echocardiogram demonstrated DCM with ejection fraction of 19%, which required treatment with antihypertensives and inotropes in the PICU. Her mass was biopsied and determined to be an immature extragonadal teratoma. It was then surgically removed and the patient had complete resolution of her hypertension and DCM after ~2 months.

Discussion: The mechanism by which abdominal tumors cause DCM is currently unknown. The most likely cause is some combination of cardiotoxic factors, such as high levels of catecholamines or RAAS system hormones, and hypertension. Resection and/or treatment of the tumor with chemotherapy/radiation leads to complete resolution of the cardiomyopathy in nearly every case. In many cases of DCM complicating retroperitoneal abdominal tumors, the patient is minimally symptomatic for their degree of heart failure. While DCM is a rare complication of retroperitoneal abdominal tumors, the authors feel it would be reasonable to screen all infants and young children presenting with abdominal mass and hypertension for this complication.

Efficacy of a Pilot Workshop Intervention to Affect Pediatric Resident Conceptualization of Mentorship

Bade R, Sklansky D, Moreno M, Boyett Anderson J

Background: Mentoring involves a multidimensional relationship between junior and senior professionals that is integral to the development of the junior professional. Mentors impact career choices, clinical practice, research productivity, and professional identity throughout clinicians' careers. Pediatric residents are required to identify a mentor, but it is unclear how pediatric residents conceptualize and use them. The aim of this pilot study was to understand how residents view mentoring and assess a workshop designed to empower residents in mentoring relationships.

Methods: A one-hour interactive workshop with lecture and small-group activities was delivered to all pediatric residents at a mid-sized residency program. The workshop goals were to facilitate the identification and utilization of mentors in medical professional development. The workshop employed a constructivist framework with a focus on social and experiential learning centered around the community of practice. A survey was administered before and eight months after the workshop. The survey assessed residents' growth priorities, sources of mentorship, people from whom they sought advice, satisfaction with previous mentorship, and training in cultivating mentoring relationships.

Results: Twenty-nine residents completed the pre-course survey and nine residents completed the post-course survey. Residents conceptualized clinical skills, career development, work/life balance, leadership, and research as their top priorities for growth, with no significant differences among resident-year. 97% of residents identified individuals from whom they sought advice, though only 65% conceptualized these individuals as mentors. The number of residents who identified having a mentor as well as whom they sought advice from did not change after the workshop. Residents reported increased confidence in initiating mentoring relationships and mentoring other trainees ($p=0.048$).

Conclusions: Residents reported a durable increased confidence in their ability to initiate a mentoring relationship as well as their ability to be a mentor. This workshop may serve residents by preparing them to build and use their mentoring network. While many residents were unable to identify a mentor, nearly all identified advisors, suggesting discordance between resident conceptualization and actualization of mentoring.

Case Study

Bellary A

Introduction: Salmonella meningitis is a rare manifestation of Salmonella infection that primarily affects infants. We present a 23-day-old infant with Salmonella meningitis due to a lizard exposure that was complicated by leptomeningitis and empyema.

Case Description: A 23-day-old female born at 36 weeks and 4 days presented to the pediatric emergency department with one day of lethargy and poor feeding. Parents reported one episode of leg stiffening. They denied fevers, rashes, vomiting, or diarrhea.

On exam, she was hypothermic, pale, lethargic, and hypotonic with a dysconjugate gaze. Laboratory evaluation revealed sodium of 127 mmol/L, glucose of 69 mg/dL, and white blood cell count of 3,680 per microliter. Lumbar puncture demonstrated cerebrospinal fluid (CSF) with 1,310 WBC/mm3, 165 RBC/mm3, glucose <20 mg/mL, and protein >600 mg/dL. Gram stain of the CSF showed gram negative rods.

CSF and blood cultures grew Salmonella enterica. She was initially on ampicillin, cefepime and vancomycin, then transitioned to ceftriaxone. Serial lumbar punctures demonstrated continued Salmonella growth; ciprofloxacin was added with eventual clearance of CSF. She completed four weeks intravenous antibiotics, starting from her first negative CSF culture.
Repeated episodes of eye-rolling and extremity jerks were diagnosed as seizures on electroencephalogram, and she was started on levetiracetam and lacosamide. Brain MRI showed subdural empyema and leptomeningitis, which required bilateral burr hole decompression and washout by Neurosurgery. Six weeks after discharge, she developed worsening postinfectious hydrocephalus and underwent ventriculoperitoneal shunt placement by Neurosurgery.

Discussion: Salmonella meningitis is rare in high-resource countries and no consensus treatment exists due to frequent treatment failure and recurrence. Third-generation cephalosporins with or without a fluoroquinolone are commonly used. Long-term complications include epilepsy, developmental delays, visual deficits, and hearing loss.

In this case, further social history revealed that the family had a pet lizard at home, which was thought to be the source of infection. Reptile-associated salmonellosis (RAS) in children is primarily due to direct contact with turtles and indirect contact with more exotic reptiles. RAS primarily presents as gastrointestinal disease, but some can present with invasive disease, including septicemia, meningitis, and bone and joint infection.

Conclusions: Salmonella meningitis is a devastating manifestation of severe Salmonella infection, and treatment can be challenging due to high rates of failure and relapse. Although rare in the US, clinicians should be aware of its presentation and possible neurologic sequelae.

When Your Treatment Seems To Be Working, Don't Be Too Sure

Kelleher E, Sklansky D

Presentation: A previously healthy 4-year-old female presented with cervical lymphadenopathy, fevers, night coughs and recurrent respiratory symptoms. She had been treated with multiple courses of antibiotics over the past 4 months with waxing and waning symptoms. She has no night sweats or weight loss. She lives in a wooded area and had known exposure to ticks, cats, dogs, chickens, goat and pigs.

Physical Exam: Vital signs normal except with mild tachycardia (heart rate 132). She was irritable, ill, but non-toxic appearing. Visible neck swelling with 1-1.5 cm tender, non-fluctuant, freely mobile lymph nodes in left anterior cervical, right supraclavicular and right cervical areas.

Diagnostic Evaluation: CT neck revealed bilateral cervical and mediastinal lymphadenopathy with some necrotic nodes. Labs showed WBC 11.4 K/uL, Hb 10.2 g/dL, Plt 579 K/uL, ANC 8390, CRP 13.7 mg/dl. She was treated with IV daptomycin and analgesics. Antigen, PCR and antibody tests as available were obtained for Histoplasma, Blastomyces, Bartonella Henselae, Lyme disease, CMV and EBV were all negative, as was a Tuberculin skin test. Lymph node aspirate had negative staining and culture for bacterial, acid-fast bacteria, and fungi, 16s bacterial identification, and bartonella PCR. She remained afebrile with decreasing lymphadenopathy, pain, and CRP. She was discharged on a 2-week course of linezolid. She remained afebrile with ongoing, but reduced lymphadenopathy until discontinuing linezolid, presenting 4 days later with worsening cough, pain, and neck swelling. Repeat CT imaging showed greater bulk and enhancement of lymph nodes. Antibiotics were not restarted without a clear source of infection. She underwent excisional lymph node biopsy with pathology and subsequent imaging consistent with Stage III peripheral T-Cell lymphoma (PTCL).

Diagnosis: PTCL is rare in the pediatric population, with no standard of care and little is known about prognosis. She was started on cyclophosphamide, doxorubicin, vincristine, etoposide and prednisone chemotherapy.

Conclusion: With clinical improvement on daptomycin and linezolid, it was thought that she had a gram-positive infection or resolving Kikuchi-Fujimoto disease. Necrotic lymph nodes on the initial CT were smaller than expected for lymphoma. Consideration of a broad differential diagnosis and close follow-up is important for patients with large multifocal lymphadenopathy. Some literature supports linezolid toxicity to T-cells, which may have been a confounder in this case.

Differences in Breast Milk Composition Based on Farming Exposures and Associations with Allergic Disease

Behmer R, Tackett A, Lee K, Kalan L, Seroogy C, Lucey J, Singh A

Rationale: Human milk (HM) is influenced by maternal exposures and may impact the development of allergic diseases. Early life farming exposure is associated with lower risk for allergic disease in children. We compared HM biochemical composition with varying levels of farm exposure and allergic disease in infants.

Design/Methods: Maternal HM samples (N=88) were collected from the Wisconsin Infant Study Cohort at 2 months of life. Traditional Agrarian participants (TA n=30) are self-declared Amish community members. Non-traditional agrarian (NTA) participants (n=23) were defined as residence on a farm or mother working full-time on a dairy or cattle farm at the time of pregnant mother enrollment. Non-farm (NF) participants (n=35) do not reside or work on a farm, or reside within 1/8 of mile for a farm. Fatty acids, human milk oligosaccharides (HMOs), and proteins were compared. HM samples were analyzed using gas chromatography-mass spectrometry (fatty acids), capillary electrophoresis (individual proteins), high performance anion-exchange chromatography (HMOs), and Miris human milk analyzer (general composition). Atopic dermatitis (AD) and food allergy (FA) were parent-reported via questionnaire. Principal component analysis was used to identify HMO and fatty acid groupings defined as clusters. Cluster analysis was performed to define HMO and fatty acid groupings and to characterize HM compositional relationships with farm exposure and allergic disease.

Results: TA HM contained less C18:2, C18:1cis, Cluster 5, polyunsaturated, omega-6, and long-chain fatty acids, and more C16:1t, C8, C13, and Cluster 1 fatty acids ($p<0.05$ for all comparisons). Infants with any allergic disease had lower C18:1cis, Protein Cluster 1, alpha-s1-casein, and kappa-casein than non-allergic infants ($p<0.05$ for all comparisons). Infants who had both AD and FA had higher C20:3, C22:6, C20:4, Fatty Acid Cluster 2, and long-chain polyunsaturated fatty acids compared to nonatopic infants ($p<0.05$ for all comparisons). Regarding cluster analysis, fatty acids generally did not correlate based on chain length or saturation status, whereas human milk oligosaccharides did cluster based on fucosylation or sialylation status.

Conclusions: Farm exposure is associated with differences in HM composition. Several biochemical components of HM are associated with early life allergic disease expression or health. HM compositional differences may contribute to the early life farm exposure protective effects from allergic disease.

Inv(3) Acute Myeloid Leukemia in a Young Adult and Review of the Literature

Blakemore C, Damodharan S, Puccetti D

Survival rates for pediatric acute myeloid leukemia (AML) have drastically increased over the past few decades with improved supportive care along with more precise risk stratification and associated treatments. However, this is not true for all as certain cytogenetic findings are considered high-risk given their inferior outcomes and resistance to conventional treatment. AML with the high-risk variant inv(3)/t(3;3) is rarely seen in the pediatric population. It is associated with poor outcomes due to ineffective therapeutic options and early relapse in those who do achieve a complete remission. The median overall survival for patients with inv(3)/t(3;3) AML is dismal with median overall survival of 10 months from diagnosis. Here, we present a case of an 18-year-old female with treatment refractory inv(3) AML in whom remission was unable to be obtained with multiple cycles of therapy. Additionally, we review the literature on pediatric inv(3) AML along with newer therapeutic options. Better treatment options are needed given the increased resistance to traditional therapy this subtype portrays.

What's In a Name? Increasing Use of Caregiver Names during Hospitalist Rounds

Schmit M

Background: Hospital teams at American Family Children's hospital consistently use the term "mom and dad" to refer to caregivers in patients' rooms despite evidence that some parents prefer to be called by their first name. Additional feedback gathered by patient representatives supported that caregivers would feel more included in rounds if the team knew their names. The overall aim of this project was to increase the use of caregiver names by members of the hospitalist team during daily rounding.

Design/Method: Data collected in a large academic care center with two separate teams rounding on general care patients comprised of an attending, senior resident, interns and medical students. Intervention was to add caregiver names to the medical hand-off that most team members refer to during rounds. During rounds, medical students tasked with recording the number of patients rounded on in total, and how many patient's had caregivers referred to by name before and after the intervention.

Results: Both groups with similar use of caregiver names prior to intervention (12% and 18%) with increased use of caregiver names after intervention in group that had caregiver names added to handoff (100%) and no change in group without an intervention (11%).

Conclusion: Improved awareness of the importance of using caregiver names in room, in conjunction with adding caregiver names to a frequently referenced information sheet caused an increase in the percentage of instances caregiver names were used during rounds. Limitations include different members of the team with different patients each day of data collection. Further studies would be needed to determine if this increased use of caregiver names translated into improved patient outcomes and increased perception of caregiver involvement in medical decisions.

Pediatric Resident Participation in Trauma Evaluation at a Tertiary Care Center

Sternhagen T, Joshi D, **Brock J,** Sklansky D, Fabian K

Pediatric Resident Participation in Trauma Evaluation at a Tertiary Care Center

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Introduction

- Traumatic injury evaluations are a subset of patient encounters requiring basic and advanced life support skills
  - Anecdotally, there is limited pediatric trainee participation across training institutions
  - Trauma evaluations could be fertile ground for increased cardiopulmonary assessment skills and procedural exposure[1]
- Simulation-based medical education has been shown to increase self-reported confidence with trauma evaluation and resuscitation skills but did not improve pediatric resident attendance at evaluations[2]
  - Limited data exists that identify barriers for pediatric resident attendance at trauma evaluations

Methods

Chart Review

- Pediatric resident trauma attendance (Level 1 & 2) obtained from Jan 2023–Nov 2023 via EMR documentation review

Resident & PEM Faculty Questionnaires

- Developed with assistance of University of Wisconsin Survey Center
- Assessed comfort with, knowledge about, and perceived barriers to participating in trauma evaluation
- Likert-scale and free response questions
- Anonymized with a $40 completion incentive for resident respondents

Low pediatric resident attendance of trauma evaluations may be driven by a **perception of insufficient training and educational barriers** as *opposed to disinterest.*

Results

Pediatric residents attended **only 17%** of pediatric trauma evaluations

28/38 eligible residents completed questionnaire (74% completion rate)
PL1: 5 PL2: 13 PL3: 10

82% indicated *interest* in trauma participation

57% believe concepts and skills of trauma evaluation are valuable

86% report not feeling *comfortable* with necessary skills

71% report being not at all or only slightly *familiar* with ATLS

What's one word that describes how you feel when a leveled trauma is announced?

Barriers to Participation

Residents	Faculty
• Role uncertainty	• Faculty communication
• Prior passive involvement	• EM trainees have unspoken understanding of roles
• Confidence to "take charge"	• Trainees interest or comfort with possible procedures
• Performance "in a full room"	• Trainees don't know the "script"
• Fear of adversely impacting care	• Just-in time teaching limitations given acuity/immediacy of evaluation
• Perceived faculty discouragement	
• EM trainees eager to help	
• No formal education	
• Busy department/time consuming medical patients	
• Limited just-in time teaching	

Conclusions

- Pediatric residents have interest in participating in trauma evaluations and recognize the importance of the associated skills
- Many educational, environmental, and psycho-social barriers exist which are limiting resident education

Next Steps

- Knowledge
  - Structured orientation to ED
  - Institution-specific video demonstration of skills and roles
  - Lecture-based didactics
- Skills (simulation-based)
  - Primary and secondary trauma survey
  - Institution specific "head of bed" expectations including airway and c-spine management
- Environment
  - Direct messaging to faculty and staff in Peds ED to prioritize pediatric learns in trauma evaluations
  - Structured orientation to ED for pediatric residents

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An Adaptive Framework for Machine Learning Assisted Brain Tissue Segmentation

Casey C, Grimaldo A, De Abreau E, Gouvea A, Sutter E, Dean III D, McAdams R, Gillick B

Background: Perinatal brain injury, including brain bleed or stroke, is a major cause of cerebral palsy (CP). Magnetic Resonance Imaging (MRI) has become an essential tool for studying neurodevelopment in both neurotypical individuals and individuals with CP. Many methods of measuring neurodevelopment depend on accurate tissue segmentation, i.e. labeling each section of the image based on tissue type. However, in the presence of pathology, segmentation methods often fail to produce accurate tissue labels. Poor segmentation accuracy is also a common challenge for analyzing infant MRI data, where grey and white matter tissue contrasts are reduced or inverted compared to what is observed in older children and adults. Improved segmentation tools that are well suited to this population are indicated.

Methods: We present an algorithm for MRI-based tissue segmentation tailored to input scan(s), making it highly flexible and robust to atypical image properties such as those seen in pediatric imaging and CP. The algorithm begins with minimal manual segmentation, then generalizes the manual labels to the whole image using machine learning.

Results: The algorithm is as follows: 1) Partial tissue segmentation is performed manually of the structural scans using ITK-SNAP software to generate training data. 2) A random forest classifier model is trained using the structural scans as training features from (1). 3) The random forest classifier is applied to the structural scans to generate probability maps of each tissue class. 4) Low probability voxels are filtered out from the probability maps. 5) Voxel class assignment is performed by voting across probability maps. 6) Optionally, post-processing may be applied to refine the resulting tissue masks. If the results of (6) remain unsatisfactory, steps 2-6 are repeated using the original output of (6) to retraining the random forest classifier with additional data. The final output is a label image specifying tissue class of all image voxels.

Conclusion: The presented methodology allows improved rapidity and accuracy of MRI-based tissue segmentation for infants who have experienced perinatal brain injuries and are at high risk for developing CP. With this methodology, we can build individualized tissue models to investigate developmental trajectories. Importantly, the method is highly adaptable to other diagnoses as well, potentially expediting tissue segmentation efforts in many domains related to rehabilitation medicine.

Poster Presentations

Thursday, May 15 | 2:30 – 4:30 p.m. | HSLC Atrium

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