H2020 Sunday, October 21, 2012
8:00 am until 3:00 pm

8:00 AM  Scientific Abstract Session and Award Presentation  
Daniel Rauch, MD, Moderator

10:00 AM  Accountable Care Organizations and the Pediatric Hospitalist  
Patrick Conway, MD

11:00 AM  The Quiet Malpractice of Poor Communication: Transition of Care and the Pediatric Hospitalist  
Todd Washko, MD

12:00 PM  Business Lunch for Members  
Ricardo A. Quiñonez, MD, Chair

1:00 PM  The Value in Inpatient Pediatrics: The AAP's Quality Improvement Network for Pediatric Hospitalists  
Mark Shen, MD

2:00 PM  Controversies in the Management of Pediatric Urinary Tract Infections  
Michelle Arandes, MD

3:00 PM  Adjourn

Abstract Presentations following on page 2
Abstract Presentations

1) Pediatric Hospital Medicine Abstract Research Award Winner: The SOHM annual abstract award recognizes outstanding research presented during the SOHM academic and scientific program at the Academy’s National Conference & Exhibition (NCE).

Perceptions of Timeliness and Content of Discharge Communication Differ Between Hospitalists and Primary Care Providers: Results from the Value in Inpatient Pediatrics Transitions of Care Collaborative
JoAnna K. Leyenaar, MD, MPH, Department of Pediatrics, The Floating Hospital for Children at Tufts Medical Center, Boston, MA, David Cooperberg, MD, Pediatrics, Drexel University College of Medicine/ St. Christopher's Hospital for Children, Philadelphia, PA, Caroline E. Rassbach, MD, Pediatrics, Stanford University, Palo Alto, CA, Leah A. Mallory, MD, Pediatrics, Tufts University School of Medicine/ Maine Medical Center, Portland, ME and Daniel T. Coghlin, MD, FAAP, Pediatrics, The Warren Alpert Medical School of Brown University/ Hasbro Children's Hospital, Providence, RI

Purpose: Effective communication between hospitalists and primary care providers (PCPs) at the time of discharge is essential in the transition of patients from the inpatient to outpatient setting. Our objective was to assess the content and timeliness of discharge communication from a national sample of pediatric hospital medicine programs.

Methods: A survey querying current and desired discharge communication was sent to 320 PCPs who refer patients to 16 hospitals participating in the Value in Inpatient Pediatrics Transitions of Care Collaborative. An analogous survey was sent to 147 hospital medicine program directors (PDs) listed in the AAP SOHM database. Descriptive statistics were calculated and chi-square tests performed to identify differences between physician groups. Subgroup analysis was conducted to assess for differences in discharge communication patterns between freestanding children's hospitals, community hospitals and children's hospitals within adult centers.

Results: Responses were received from 201 PCPs and 71 PDs, representing response rates of 62% and 48% respectively. Among PDs, 85% reported reliably sending discharge communication within two days of discharge, with 79% reporting that all necessary details were consistently transmitted. Among PCPs, 72% reported reliably receiving discharge communication within two days of discharge, with 65% reporting that the communication contained all necessary details. These between-group differences are statistically significant (p < 0.01). In comparing the content PCPs consider essential with that reported as consistently received within two days of discharge, significant gaps were found. The largest gaps included: immunizations given during inpatient stay (reported as essential by 83% and consistently received by 36% of PCPs); pending investigations (essential to 78% and received by 45% of PCPs) and discharge medications (essential to 97% and received by 72% of PCPs).

Conclusion: The results of this multi-center study suggest that perceptions of PCPs and PDs regarding the timeliness and content of discharge communication differ significantly. Although the majority of PCPs report receiving communication within two days of discharge, the content may be sub-optimal. It will be important to assess for perceived improvements in discharge communication following implementation of the next phase of this quality improvement initiative.

2) Bedside Moderate Sedation by Non-Anesthesiologist Dramatically Improves the Success Rate of Peripherally-Inserted Central Catheter (PICC) Lines in Pediatric Patients
Diana Bottari, DO, Kim Wittmayer, APN and Kent T. Nelson, MD, Pediatrics, Advocate Hope Children’s Hospital, Oak Lawn, IL

Purpose: The ability to obtain and maintain reliable intravenous access is an essential but sometimes elusive goal in pediatric in-patient medicine. Peripheral inserted catheters (PICC) have long been established as reliable and safe for pediatric patients and are ideal for children requiring several days or weeks of IV infusion therapy. Bedside PICC placement has had less than ideal success in the pediatric world as compared to adults who have had documented success in the high 90%. Barriers encountered during PICC line insertion include vessel caliber, age of the patient, and the inability for patients to cooperate and remain still for the procedure.

Methods: At a large Midwestern Children’s Hospital, bedside PICC insertion traditionally occurred without sedation under ultrasound guidance by specially trained vascular assist device (VAD) nurses with annual success rate of 77% (2008), 75% (2009), and 77% (2010). In May 2010, a dedicated Pediatric Sedation Service was established with the goal to reduce pain and anxiety as much as possible during a wide range of procedures including PICC line insertion. Each candidate for sedation had a full history and physical performed by the board-certified pediatrician on the Sedation Service documenting not only the suitability of the patient for sedation but also American Society of Anesthesiology status (ASA), airway documentation, and NPO status.

Results: Between January 1, 2011 and December 31, 2011, 189 bedside PICC lines were attempted. Of these, 79 were attempted with sedation provided by the Sedation Service and 110 were attempted without sedation. The success rate was 94% with sedation versus 75% without. One episode of laryngospasm occurred without adverse outcome; no other adverse events reported.

Conclusion: Our outcomes demonstrate that sedation can be delivered safely and positively impact the pediatric PICC insertion success rate. The average cost of each bedside PICC insertion is $1,300 while the average cost of a PICC insertion by interventional radiology (IR) is $2,600. Neither of these prices includes the cost of the interventionist, anesthesiologist, or the sedationist. Not only is there an immediate cost savings, but also a savings in avoidable days. If bedside failure occurs, the patient has to wait one to several
days to have the PICC attempted by IR, increasing the burden on the patient, family, and hospital. It is clear that with the addition of a board-certified and experienced pediatrician providing sedation for bedside PICC placement success is overwhelmingly increased and costs decreased.

3) Use of a Standardized Respiratory Scoring System and a Threshold Score Prior to Intervention Decreases Unnecessary Bronchodilator Usage in Bronchiolitis

Michelle Marks, DO1, Rita Pappas1, Matthew Garber, MD2, Michele Lossius, MD, FAAP3, Shawn Ralston, MD, FAAP4 and A. Steve Narang, MD, FAAP5; (1) Pediatric Hospital Medicine, Cleveland Clinic Children’s Hospital, Cleveland, OH; (2) Palmetto Health - University of South Carolina, (3) Pediatrics, University of Florida, Gainesville, FL, (4) University of Texas Health Science Center San Antonio, San Antonio, TX, (5) Cardon Children’s Medical Center

Purpose: Use of a standardized respiratory scoring system and a threshold score prior to intervention will decrease unnecessary bronchodilator usage in bronchiolitis across diverse clinical settings.

Methods: Five hospitalist groups incorporated the WARM (wheeze, air exchange, respiratory rate, muscle use) respiratory score into their bronchiolitis protocols, but the individual protocols varied. Data were retrospectively collected on all children less than 24 months of age with a primary diagnosis of acute viral bronchiolitis admitted to observation or inpatient status from 2007 to 2010. Patients admitted to intensive care or who had chronic lung diseases, asthma, chromosomal abnormalities, congenital heart disease or neurological diseases were excluded. Bronchodilator utilization was measured by the overall percentage of patients who received any dose of bronchodilator and the total number of bronchodilator doses used during the year. Data were analyzed on the hospital level using repeated measures mixed models with year treated as a continuous variable from 1 to 4; correlation within hospital over time was modeled with an autoregressive correlation structure. All tests were two-tailed and performed at a significance level of 0.05 using SAS 9.2 software (SAS Institute, Cary, NC).

Results: Over the intervention period from 2007-2010, there was a significant decrease in the percentage of patients who received bronchodilators over all 5 institutions, an average of 8% per year (P=0.004). There was a significant decrease in the number of bronchodilator doses given during the intervention period, reported as the mean number of bronchodilator doses per patient, which decreased by an average of 1 per year (P=0.036). The average length of stay and readmission rate did not change significantly at any of the 5 institutions over the intervention period.

Conclusion: Use of a standardized respiratory scoring system and a threshold score prior to intervention decreases unnecessary bronchodilator usage in bronchiolitis across diverse clinical settings without increasing length of stay or readmission rate.

4) Maintaining Sedation Proficiency and Quality Improvement of Pediatric Hospitalist Sedation Providers

Mythili Srinivasan, MD, PhD, Pediatrics, Washington University School of Medicine, St. Louis, MO and Douglas Carlson, MD, Pediatrics, Washington University/St. Louis Children's Hospital, St. Louis, MO

Purpose: Procedural sedation (PS) is a core competency for pediatric hospitalists (PH), but there is little sedation training during pediatric residency. Our goal was to develop strategies to maintain competency by identifying knowledge gaps and developing measures to improve proficiency and quality within our sedation program.

Methods: A web-based anonymous survey was developed consisting of multiple choice questions and case-based scenarios to query the knowledge base of PH regarding two commonly used PS agents, ketamine and nitrous oxide (N2O).

Results: The survey was sent to 49 PH at St. Louis Children’s Hospital. All responded, 86% completed the survey. 85% of PH had performed >20 ketamine sedations; 48% >20 N2O sedations. 100% and 88% of PH correctly identified the sedative properties of ketamine and N2O, respectively. 88% and 55% identified their analgesic properties, respectively. We queried PH on contraindications for ketamine and N2O (Tables 1 & 2). We categorized PH as experienced (>50 ketamine/N2O sedations) or less experienced (<50 ketamine/N2O sedations).

Table 1: Identification of ketamine contraindications

<table>
<thead>
<tr>
<th>Contraindication</th>
<th>Less experienced PH (n=20) %</th>
<th>Experienced PH (n=20) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased intracranial pressure</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>40</td>
<td>65</td>
</tr>
<tr>
<td>Increased intraocular pressure</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>Age &lt; 3 months</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>All 4 contraindications</td>
<td>5</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 2: Identification of N2O contraindications

<table>
<thead>
<tr>
<th>Contraindication</th>
<th>Less experienced PH (n=26) %</th>
<th>Experienced PH (n=14) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumothorax</td>
<td>85</td>
<td>86</td>
</tr>
<tr>
<td>Bleomycin sulfate treatment</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>Recent intraocular surgery</td>
<td>65</td>
<td>100</td>
</tr>
<tr>
<td>Vitamin B12 deficiency</td>
<td>19</td>
<td>50</td>
</tr>
<tr>
<td>Methylene tetrahydrofolate reductase deficiency</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>Recent tympanoplasty</td>
<td>58</td>
<td>100</td>
</tr>
<tr>
<td>All 6 contraindications</td>
<td>4</td>
<td>21</td>
</tr>
</tbody>
</table>
We presented a case scenario of a sedated child who develops stridor due to partial laryngospasm. 95% of PH recognized laryngospasm in the patient; 60-65% provided CPAP, the preferred initial management strategy. Next, the patient progresses into complete laryngospasm, which can often be resolved by firm pressure over the laryngospasm notch. 15% of experienced and 5% of less experienced PH chose this maneuver as the first management step. 70% of experienced and 90% of less experienced PH chose instead to administer succinylcholine and bag-mask-ventilate or intubate the patient, which although effective, can be deferred until the more benign airway maneuver is attempted. 65% of experienced and 35% of less experienced PH identified the location of the laryngospasm notch. Over 90% of PH found the survey to be a useful self-assessment tool of sedation knowledge and practices.

**Conclusion:** There are specific knowledge gaps regarding sedation medications, especially contraindications not often encountered, and in management of laryngospasm among our PH sedation providers. We will use this survey tool as well as didactic lectures, small group sessions and simulation training to improve and maintain the proficiency of our PH sedation providers and improve the quality of our sedation program.

5) Using Technology to Study the Art of Medicine

Heather M. French, MD1, Katherine Durrwachter-Erno, MD2, Leonard J. Levine, MD3, Edward J. Gracely, PhD4 and Keri N. Fugarolas, MD2. (1)Dept of Pediatrics, University of Pennsylvania School of Medicine, Philadelphia, PA, (2)Dept of Pediatrics, St. Christopher’s Hospital for Children, Philadelphia, PA, (3)Dept of Pediatrics, St. Christopher's Hospital for Children, Drexel University College of Medicine, Philadelphia, PA, (4)Family, Community and Preventative Medicine, Drexel University College of Medicine, Philadelphia, PA

**Purpose:** Medical educators assume clinical observation skills improve as practitioner level of experience increases, but no studies to date assess whether such improvements occur. This study compares observational skills of medical students, residents, fellows, and attending physicians in a simulated inpatient environment.

**Methods:** Approval from the Institutional Review Board was obtained. From October to December 2011, 59 participants, ranging from medical students through attendings, completed a seven minute session in the simulation laboratory at a pediatric hospital. A simulated inpatient room included a high fidelity mannequin, a real-time cardiac monitor, a documented history and physical, and vitals flow sheet. Actors role-played the bedside nurse and infant's parent. After reading a brief HPI (a four month old infant with Hirschsprung's disease presenting with diarrhea), participants were instructed to write down their visual observations only. They were not expected to communicate with the actors, intervene, or assess the patient. Participants listed any observations they deemed important to the clinical scenario by free text during the allotted time period. Each participant sheet was scored by three raters according to a predetermined scoring sheet. One point was given for each observation that matched these data points up to a maximum score of twenty. Participants were grouped by their level of training: third year medical students, third year pediatric residents, pediatric subspecialty fellows, and pediatric attendings. A tukey post hoc test with ANOVA was used to determine which group means were significantly different from one another. Inter-rater reliability was assessed with intraclass correlation coefficients, calculated using mixed and random-effects models.

**Results:** Residents scored significantly higher than medical students on their matched observations (p<0.05) (Figure 1). The other comparisons between individual groups were not statistically significant. The raters were assessed using intraclass correlation coefficients. A two-way random effects model was used to allow for different raters in each subject, taking mean differences into account. The three raters were quite reliable with the lowest intraclass correlation of 0.851 for the attending physicians.

**Conclusion:** There was a significant difference in the clinical observational skills between the medical student and the resident levels. However, an increase in observed data did not continue beyond the resident level of training. We speculate this lack of progression is multifactorial. The absence of formalized training in teaching the art of medicine may be one reason. Another explanation may be the integration of electronic health records and advancing medical technology which allow for the assimilation of patient data without the need to be at the bedside. The simulated environment is a novel and useful tool to evaluate clinical observational skills. Future research directions may include an intervention to teach observational skills in a training program or continuing medical education curriculum.

**Figure 1.**
6) Breathe Easy: The Impact of an Asthma Pathway across the Care Continuum on Clinical Outcomes and Cost Containment

Lindsay K. Kahlenberg, DO¹, Michael L. Forbes, MD, FAAP², Kimberly Spoonhower, MD³, Maria A. Enrione, MD⁴, Joann Bedore, RN⁵, Jeffrey Hale, MBA⁶ and Sadie E. Roth, BISE, MS⁷, (1)Graduate Medical Education, Akron Children's Hospital, Akron, OH, (2)Pediatrics, Akron Children's Hospital, Akron, OH, (3)Department of Pediatrics, Division of Pulmonary Medicine, Akron Children's Hospital, Akron, OH, (4)Department of Pediatrics, Division of Critical Care Medicine, Akron Children's Hospital, Akron, OH, (5)Financial Performance Improvement, Akron Children's Hospital, Akron, OH

Purpose: To analyze the effect of a pediatric asthma pathway (AP) on hospital and intensive care unit (PICU) length of stay (HLOS, PLOS), cost of hospitalization ($HOS), rates of asthma education (AEd), home management plan at discharge (HMP) and readmission rates.

Methods: This is a retrospective before-and-after study using the discharge diagnosis status asthmaticus (SA) including 282 PICU admissions (251 patients) from 2008-2011. Admissions were divided into 2 eras, "preAP" (6/2008-8/2009, N=96) and "postAP" (1/2010-6/2011, N= 186). Patients were risk stratified by Pediatric Index of Mortality (PIM2) scores. Comparison of outcomes included PLOS, HLOS, ($HOS), AEd attendance, and discharge with HMP. Categorical data are presented using descriptive statistics. Numerical data are presented as median (range) formatted as preAP vs. postAP. PLOS and HLOS are represented in days. Statistical significance was defined as p<0.05.

Results: There was no difference in PIM2, or rates of invasive/noninvasive ventilation between the 2 eras. Overall lengths of stay were reduced by 24.8% and 33.3%, respectively, PLOS 1.09(0.11-8.41) vs. 0.82(0.10-10.40), p=0.0225 and HLOS 3(1-13) vs. 2(0-15), p=0.0101. Specifically, PLOS was reduced in the 2nd and 3rd PIM2 severity of illness quartiles. Additionally, the number of total charged items/patient was reduced 98.5(15-386) vs. 73(1-525), p<0.0001 and was associated with an 11% reduction in $HOS, p<0.0001. Discharge with an HMP increased (80.2% vs. 94.1%, p=0.0010). There was no difference in AEd attendance or PICU readmissions. There was also no difference in hospital readmissions at any time interval. AEd did not impact readmission rate overall in patients with SA.

Conclusion: This is the first report of an AP impacting care in the PICU. Implementing an AP led to a significant decrease in PLOS and HLOS. The differential impact of the pathway in the middle quartiles suggests patients with the lowest (1st) and highest (4th) initial severity of illness may benefit from additional pathway branch points. The 25% reduction in charged items/patient coupled with the 11% cost reduction suggests the value of the pathway may be in minimizing practice variability. Readmission rates appear refractory to this pathway. AEd did not increase postAP and did not protect against readmissions to the hospital overall. However, more patients on the AP were discharged with an HMP. This study supports the value of a pediatric AP across the inpatient care continuum. Further investigation is warranted to optimally match patients and appropriate treatment strategies when hospitalized due to status asthmaticus.
Purpose: A verbal handoff from one pediatric hospitalist to another is common practice between shifts. At a community hospital, with nine pediatric hospitalists conducting their own style of handoffs each morning, inconsistency is inherent; leading to a lack of a minimum standard for newborn sign-out. Over the course of 6 months, a quality improvement process was explored by which hospitalists were surveyed; observed via voice recordings; and evaluated on their transference of Key Elements during the handoff of each newborn on the service.

Methods: Members of the team answered a 22 element questionnaire asking "What independent key elements about a newborn's birth history and hospital course would you like to specifically know for a safe transfer of care? Prior to sharing the pooled survey data, voice recordings of morning handoffs were analyzed and evaluated for which of the 22 elements were conveyed. From the questionnaire, elements requested by more than half the group were compiled into a handoff template and characterized as the "Key Elements. Additionally, feedback was given to stress the Key Elements that should be discussed with each newborn for a safe handoff. Voice recording were repeated and statistical analysis was done on the pre and post intervention recordings regarding the Key Elements.

Results: The Key Elements were: 1. Last name of infant, 2. Gender, 3. Gestational age category, 4. Weight compared to gestational age, 5. Method of delivery, 6. Maternal GBS status, 7. Maternal blood type, and 8. Expected day for discharge. Prior to querying the hospitalist, Key Elements were discussed 40% (Range of 0-74%) per handoff, and after feedback and creation of the newborn handoff template the average was 84% (Range of 23-99%, P=0.006.) Seven of the eight Key Elements demonstrated statistically significant improvement. Method of delivery (P=0.07) demonstrated improvement but it was not statistically significant. A decrease in time per handoff per newborn from 57 seconds to 51 seconds (P=0.6) was seen.

Discussion: This process of surveying members of a team, compiling their preferences, and using a reminder template allowed the nine hospitalists to focus their handoff to critical elements that were expected and regarded as important. As two examples of the improved handoff technique: knowledge of maternal GBS status increased from 42% to 93% (P=< 0.05). It is anticipated this this will lead to improved decision making on length of stay, laboratory screening, and treatment options that are consistent with CDC guidelines. Improvement in communication of the Maternal blood type (2% to 81%, P=< 0.05) may lead to increased surveillance of ABO incompatibility for jaundice.

Conclusion: By identifying shared priorities and directing a focused poll towards members of a community hospitalist team, it is possible to improve the quality and decrease the length of time for a newborn handoff.

8) Nasal Decongestants and Its Use In Hospitalized Infants with Bronchiolitis: Variation in Practice and Association with Outcomes

Vivian Lee, MD, Pediatrics; Division of Hospital Medicine, Children's Hospital Los Angeles, Los Angeles, CA, Sheree M. Schrager, MS, PhD, Community, Health Outcomes, and Intervention Research, Saban Research Institute, Children's Hospital Los Angeles, Los Angeles and Susan Wu, MD, Division of Hospital Medicine, Dept of Pediatrics, Children's Hospital Los Angeles, Los Angeles, CA

Purpose: Bronchiolitis is the most common cause for hospitalization in infants in the US. There is no clear therapeutic advantage to any particular medical management, and practice varies across centers. Nasal decongestants have been proposed to decrease nasal airway obstruction and resistance, thereby alleviating respiratory distress. There is limited data on its use in bronchiolitis, consisting of two small randomized controlled trials demonstrating no change in their measured outcomes. Among patients hospitalized at those nine hospitals, there were 13,982 admissions for bronchiolitis, of which 2,788 (19.9%) included nasal decongestant upon admission for each hospital ranged from zero to 35.1%, with nine hospitals using it in more than 10%. Among patients hospitalized at those nine hospitals, there were 13,982 admissions for bronchiolitis, of which 2,788 (19.9%) included pharmacy charges for nasal decongestants. In comparing those who received decongestants to the control group, there were slightly less cases of bronchiolitis whose severity was categorized as extreme (1.3% vs. 3.2%) or major (7.4% vs. 9.5%), and less white patients (54.2% vs 64.2%), but otherwise baseline demographic factors were similar in the two groups. Median age at admission was 2 months in the exposure group and 3 months in the control. Unadjusted analysis of LOS, excluding outliers of greater than 14 days, suggests no difference in LOS between those who received decongestants and those who did not (mean 3.66 days +/- 3.28 days vs. 4.28 days +/- 7.49 days, p=0.901), but a significant difference in adjusted cost (mean $7,458.50 +/- $9,858.91 vs. $9,543.38 +/- $23,247.76, p=0.002).
Conclusion: The use of nasal decongestants in infants hospitalized with bronchiolitis varies greatly across the nation. Unadjusted analysis suggests its use is not associated with improved LOS, though may be associated with decrease in total adjusted costs. Further analysis with multivariable regression is being conducted to investigate whether severity or other demographic factors can account for these differences.

9) Family Centered Rounds: Pediatric Residents' Perspective

Dorothy Chu, MD, Anna Petrova, MD, PhD, MPH and Jamie Pinto, MD, FAAP, (1)Pediatrics, Jersey Shore University Medical Center, Neptune, NJ, (2)Pediatrics, UMDNJ-Robert Wood Johnson Medical School, New Brunswick, NJ

Purpose: Family centered rounds (FCR) have been shown to improve parental satisfaction and outcomes for hospitalized children. The American Academy of Pediatrics published a policy statement in 2003 endorsing this rounding method. A recent survey of U.S. and Canadian pediatric hospitalists shows that FCR are the most common rounding style in academic hospitals. Hospital-based rounds are an essential part of resident education. As more pediatric residents are exposed to FCR, it is important to evaluate their opinions on this practice. The purpose of the present report is to evaluate pediatric residents' perceptions of FCR in the inpatient setting.

Methods: Residents from accredited pediatric residency programs in New Jersey (n=9) were asked to anonymously respond to a web-based, survey questionnaire. A letter was sent to program directors, alerting them to the survey. The survey consisted of 37 close-ended or likert scale questions that assessed year of training, rounding practices in the trainees' hospital and their perceptions of the impact of FCR on communication, quality of care, resident teaching, efficiency and resident comfort. A descriptive analysis was performed. Regression models were used to see if year of training or rounding type experienced had an effect on resident responses.

Results: Among 102 respondents (38% response rate), 20% practice FCR, 11% traditionalconference room rounds (TR) and 69% a combination of FCR and TR. There was no significant difference in distribution of trainees in respect to year of training between rounding categories. The majority of respondents believe FCR improves communication between the medical team and families (87%) and feel it creates stronger alliances with families (72%). Respondents report FCR benefits their pediatrics training (63.4%) and that it improves non-didactic teaching, didactic teaching and clinical decision making (68%, 46% and 41.1%, respectively). Longer rounding times in association with FCR are reported by 70.5% of respondents; while 63.3% agree that FCR decreases the amount of times they get called back into a room to clarify the plan. Residents agree that attending physicians' styles greatly impact their experience on FCR (90%) and answering questions wrong affects rapport with families (73%). Moreover, respondents report they are more likely to omit sensitive information during FCR (75%) and are less likely to ask an attending a question on management when a family is present (67%). Regression models show that participant responses are not impacted by year in training or type of rounding practice experienced.

Conclusion: Although pediatric residents agree that FCR are beneficial to families, factors including attending physician style, resident discomfort and efficiency of rounding may prevent full resident acceptance of FCR as a teaching strategy. Overcoming the barriers identified by the present study may benefit faculty development and residency educational programs for successful implementation of FCR at pediatric teaching hospitals.

10) Length of Hospital Stay and Costs in Obese Pediatric Patients

Kara Wong Ramsey, MD, Pediatrics, University of Hawaii John A. Burns School of Medicine, Honolulu, HI, James Davis, Biostatistics, University of Hawaii John A. Burns School of Medicine, Honolulu, HI and May M. Okihiro, Pediatrics, University of Hawaii John A Burns School of Medicine, Honolulu, HI

Purpose: Obesity is a growing problem, with 17% of US children considered obese in 2010. Obesity is associated with increased hospital complications, length of stay and cost among adults. Similar trends are found among hospitalized pediatric patients as identified by ICD-9 coding, but ICD-9 coding underestimates true prevalence of obesity as opposed to using calculated BMI to identify obese patients. The objective of this study was to compare the length of stay and cost for normal weight, overweight, and obese pediatric patients based on body mass index (BMI) on hospital admission.

Methods: Our study was a retrospective chart review of patients aged 2 through 18 years admitted between May 2009 and January 2012 at a children's hospital. Analysis was limited to the top 20 most common primary diagnostic codes. Medically complex children were excluded. Length of hospital stay and hospital costs were compared for obese, overweight and normal weight patients while controlling for age, gender, insurance type, and diagnosis using logistic regression analysis.

Results: 730 patients were included for analysis. Obesity rate was 18%, comparable to national trends. When controlled for age, gender, insurance type, and primary diagnosis, obese patients were significantly more likely to have a hospital length of stay longer than the median (odds ratio 1.72, confidence interval 1.07-2.77, p=0.025) and had significantly higher median hospital costs ($1,014 higher, confidence interval $144-$1,895, p=0.024) compared to normal weight patients. No significant differences in length of stay or hospital costs were found when comparing obese patients by different diagnoses.

Conclusion: Hospitalized pediatric obese patients, as identified by measured BMI upon admission, are significantly more likely to have a longer length of hospital stay and have significantly greater median hospital costs compared to normal weight patients. The growing epidemic of childhood obesity must be addressed to prevent increased burdens on our healthcare system. Further research is needed to see if this is a nationwide trend and to study the factors associated with the increased length of stay and hospital costs in obese patients.
Pediatric Discharge Communication: What Is Essential to Include? Results from the Value in Inpatient Pediatrics Transitions of Care Collaborative

Daniel T. Coghlin, MD, FAAP, Pediatrics, The Warren Alpert Medical School of Brown University/ Hasbro Children’s Hospital, Providence, RI, David B. Cooperberg, MD, Pediatrics, Drexel University College of Medicine/ St. Christopher’s Hospital for Children, Philadelphia, PA, Leah A. Mallory, MD, Pediatrics, Tufts University School of Medicine/ Maine Medical Center, Portland, ME, Caroline E. Rassbach, MD, Pediatrics, Stanford University, Palo Alto, CA and JoAnna K. Leyenaar, MD, MPH, Department of Pediatrics, The Floating Hospital for Children at Tufts Medical Center, Boston, MA

Purpose: The Value in Inpatient Pediatrics Transitions of Care Collaborative is a consortium of sixteen pediatric hospital medicine programs working to assess and improve the quality of discharge communication. Previously, the multi-site collaborative demonstrated improved timeliness of discharge communication. The aim of the current phase of this project is to define essential components of discharge communication sent to primary care practitioners (PCPs) within two days of discharge from an inpatient stay.

Methods: A survey of physician preferences and experiences regarding discharge communication from pediatric hospital medicine services was sent by email or fax to twenty PCPs who refer patients to each of sixteen pediatric hospital medicine programs participating in the Collaborative. An analogous survey was sent to 147 hospital medicine program directors (PDs) listed in the AAP SOHM database. Descriptive statistics were calculated. Chi-square analyses were performed to compare the proportion of PCPs and PDs reporting discharge components to be essential for receipt within two days of discharge.

Results: A total of 201 out of 320 (62.8%) PCPs responded, and 71 out of 147 (48.3%) PDs responded. The percentages of PCPs and PDs reporting discharge components as essential are illustrated in the Figure. Although there were significant differences between PCPs and PDs regarding which discharge elements were essential, seven elements were reported as essential by > 75% of PCPs and PDs. These include: (i) dates of admission and discharge, (ii) discharge diagnoses, (iii) brief hospital course, (iv) discharge medications, (v) immunizations given, (vi) pending test results, and (vii) follow-up appointments. PCPs considered the chief complaint, admission diagnosis, consultants, and lab tests to be essential significantly more often than PDs did. PCPs considered the discharge destination, pending labs, and attending MD’s name and number to be essential significantly less often than PDs did.

Conclusion: The results of this multi-center study suggest that, although there are significant differences between PDs and PCPs regarding discharge communication priorities, several elements are perceived as essential by both physician groups. These elements may be used as indicators to track the quality of discharge communication in subsequent phases of this collaborative.

Figure: Percentages of PMDs and PDs Who Considered Items Essential to Communicate
12) Moderate to Deep Procedural Sedation with Inhaled Nitrous Oxide and Oral Opioids for Painful Procedures

*Kim Hamlin,* Mythili Srinivasan, Yasmeen Daud, Colleen Wallace and Doug Carlson, Pediatrics, Washington University/St. Louis Children's Hospital, St. Louis, MO

**Purpose:** Pediatric hospitalists are frequently asked to provide sedation for painful procedures in children. Sedation frequently requires painful and sometimes difficult placement of an intravenous catheter for sedation medications and prolonged recovery. Inhaled nitrous oxide is an attractive agent because of its rapid onset, lack of need for an intravenous catheter, and short recovery time. The use of 50% nitrous oxide to provide minimal sedation has been previously described. However, there is little data on the use of nitrous oxide coupled with other agents to achieve deeper levels of sedation adequate for the completion of painful procedures outside of the operating room. The purpose of this study was to describe the use of 70% inhaled nitrous oxide with orally administered opioids to achieve moderate to deep sedation sufficient to complete painful procedures such as abscess incision and drainage and burn debridement.

**Methods:** A retrospective chart review of all outpatient pediatric patients seen in a pediatric acute wound clinic from July 1 2009 to Jun 30 2010 was performed. Patients were premedicated with oral oxycodone approximately 1 hour prior to sedation with 70% inhaled nitrous oxide. Data was collected on patient demographics, wound type, procedure, sedation length, maximal depth of sedation, and complications.

**Results:** During the study period, 1157 outpatients were seen for 2154 visits in the PAWS unit. To date, we have analyzed 103 patient charts for 173 nitrous sedations during this period. The average age of the patients was 14 years; there were 43 males and 60 females. There were 81 sedations for abscess wound care (including incision and drainage and dressing change), 29 sedations for burn debridement and dressing change, and 30 sedations for care of pilonidal abscess/cyst. Of the 154 patients for which sedation depth was documented, moderate and deep sedation was achieved in 60% and 39%, respectively. Complications were seen in 16% of patients. Nausea/vomiting occurred in 10% of patients and crying/agitation in 4%. In only one patient was the procedure not completed due to inadequate depth of sedation. Average duration of nitrous oxide delivery was 8 minutes; average procedure duration was 9.4 minutes.

**Conclusion:** Inhaled 70% nitrous oxide, delivered after premedication with oral opioids, is a safe and effective modality for short painful procedures, including incision and drainage of abscesses and burn debridement. Using this combination of medications, moderate to deep levels of sedation can be consistently achieved. Nitrous oxide can be delivered without placement of an IV and has a rapid onset and recovery, making it an attractive option for short, moderately painful procedures. Complications appear to be mild and self-limited.

13) Off-Label Drug Use in the Pediatric Intensive Care Unit

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**Purpose:** To determine the frequency of off-label medication prescribing in the Pediatric Intensive Care Unit (PICU) at Primary Children's Medical Center (PCMC) in Salt Lake City, Utah

**Methods:** We conducted a prospective, observational study of all patients admitted to the 32 bed PICU at PCMC from October 2002 to February 2003. Data collected included patient age, diagnosis, medications ordered and indication for each medication order. As patients were discussed on daily bedside medical rounds, pharmacists recorded on the patient specific Medication Administration Record the indication for the medications. Each drug order was assessed for whether it was used in an on-label or off-label manner. Off-label use was declared when a drug was prescribed for a patient whose age was not listed in the package labeling and no pharmacokinetic (PK) data was listed in the package insert, or if the drug was used for an indication that was not FDA approved. The primary reference sources for determining labeling status were the PDR® Electronic Library, Release 2002.3A, the package insert, and Micromedex® Healthcare Series. Medication orders for parenteral nutrition, saline and heparin flushes, crystalloid intravenous fluids, herbal products, and vitamin and nutritional supplements were excluded from evaluation. This study received local IRB approval.

**Results:** The 490 patients ages, 4 days to 17 years were treated with 335 different drugs. Patients were treated with an average of 14±10 drugs (range 1-63). 74 medications were used off-label 10 or more times. Off-label treatment was ordered for 96% of patients and 100% of 13-17 year-old patients.
### Medications Ordered (20 Most Frequent)

<table>
<thead>
<tr>
<th>Medication</th>
<th>No. of Orders</th>
<th>No. of Off-label Medication Orders</th>
<th>% of Orders That Were Off-Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>268</td>
<td>268</td>
<td>100%</td>
</tr>
<tr>
<td>Potassium chloride</td>
<td>163</td>
<td>163</td>
<td>100%</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>144</td>
<td>144</td>
<td>100%</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>167</td>
<td>141</td>
<td>84%</td>
</tr>
<tr>
<td>Dopamine</td>
<td>130</td>
<td>130</td>
<td>100%</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>191</td>
<td>127</td>
<td>66%</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>108</td>
<td>108</td>
<td>100%</td>
</tr>
<tr>
<td>Spironolactone</td>
<td>106</td>
<td>106</td>
<td>100%</td>
</tr>
<tr>
<td>Nitroprusside</td>
<td>108</td>
<td>103</td>
<td>95%</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>153</td>
<td>102</td>
<td>67%</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>90</td>
<td>90</td>
<td>100%</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>100</td>
<td>86</td>
<td>86%</td>
</tr>
<tr>
<td>Milrinone</td>
<td>86</td>
<td>86</td>
<td>100%</td>
</tr>
<tr>
<td>Papaverine</td>
<td>84</td>
<td>84</td>
<td>100%</td>
</tr>
<tr>
<td>Hydrocodone/acetaminophen</td>
<td>77</td>
<td>77</td>
<td>100%</td>
</tr>
<tr>
<td>Lansoprazole</td>
<td>60</td>
<td>60</td>
<td>100%</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>92</td>
<td>56</td>
<td>61%</td>
</tr>
<tr>
<td>Piperacillin/tazobactam</td>
<td>56</td>
<td>56</td>
<td>100%</td>
</tr>
<tr>
<td>Nalbuphine</td>
<td>54</td>
<td>54</td>
<td>100%</td>
</tr>
<tr>
<td>Albuterol</td>
<td>55</td>
<td>52</td>
<td>95%</td>
</tr>
</tbody>
</table>

**Conclusion:** Treatment with medications off-label is the rule rather than the exception in the PICU. This exposes the patient to medications that may not have been adequately studied in that age range, in the ordered dose, or for the specific indication.

14) **Transitional Hospitalists: Where Do They Go?**

*Christopher J. Pingel, MD, Jonathan Chiles, MD, Shobha Bhaskar, MD, Theresa Frey, MD, G. Rosy Herath, MD, Ruth Hwu, MD, Abby Kushnir, MD, Sarah Majcina, MD, Monalisa Mullick, MD, Purvi P. Shah, MD and Michael Turmelle, MD, Pediatrics, Washington University School of Medicine, St. Louis, MO*

**Purpose:** Pediatric Hospital Medicine has seen tremendous growth in the last ten years. The Washington University program has been representative of that growth. Many of our former hospitalists chose our program as a transition to other careers. We suspect this is not unique to our group. Upon review of the literature, there is no description of how pediatricians perceive their time as a hospitalist, why they move on to new positions, or the types of positions they choose. Our purpose is to determine which roles former hospitalists transition to after leaving the Division of Pediatric Hospital Medicine, and to evaluate their perception of their time spent as a hospitalist.

**Methods:** We contacted former hospitalists employed at Washington University since 2000 via email. The email provided a link to an anonymous survey. Former hospitalists were asked about career satisfaction while at Washington University. Data was collected regarding their subsequent positions.

**Results:** 70% (31/44) of former Washington University pediatric hospitalists completed the survey. 29% (9/31) stayed in hospitalist medicine (89% academic, 11% community). 35% (11/31) chose subspecialty care (36% emergency medicine, 18% neonatology, 18%, cardiology, 9% gastroenterology, 9% allergy/immunology, 9% infectious disease). 19% (6/31) transitioned to outpatient primary care. 97% (30/31) responded that their time as a hospitalist was helpful in reaching their career goals, while 3% (1/31) felt that it hindered their career. 32% (10/31) entered the position at our program with the intention of remaining in hospital medicine for the duration of their career. An additional 6% (2/31) later decided upon hospital medicine as a career. The most common reasons for leaving the program were relocation (35%, 11/31) and fellowship training (29%, 9/31).

**Conclusion:** Pediatricians who have worked as hospitalists at Washington University go on to pursue a variety of different careers. The vast majority found this experience to be helpful in reaching their individual career goals. While not all individuals who work as a pediatric hospitalist at our institution entered with the intention of remaining hospitalists, this role is a useful bridge to many different career opportunities. Further studies are needed to elucidate the factors that contribute to career satisfaction as it relates to varying career paths.

15) **Pediatric Hospitalist Satisfaction and the Influencing Factors: The Washington University Experience**

*Jonathan Chiles, Christopher Pingel, Shobha Bhaskar, Abby Kushnir, Ruth S. Hwu, Sarah Graham Majcina, Theresa Frey, G. Rosy Herath, Monalisa Mullick, Michael Turmelle and Purvi P. Shah, Pediatrics, Washington University School of Medicine, St. Louis, MO*

**Purpose:** Pediatric Hospital Medicine has seen tremendous growth in the last ten years, with diverse staffing models at individual programs. The program at Washington University provides a broad range of clinical services. In 2000, we had five pediatric hospitalists covering four services in two hospitals. By 2010, we had 48 hospitalists covering 18 services at four hospitals. Given the
diversity of clinical services in both academic and community settings, satisfaction measures may be applicable to the field as a whole. Our objective is to determine the factors which influence career satisfaction in pediatric hospital medicine and to identify the features of an ideal hospitalist position.

Methods: We contacted current and former Washington University pediatric hospitalists since 2000 via email, which provided a link to an anonymous survey. Respondents were asked to rate their overall satisfaction with services they covered on a five-point Likert scale. Participants were also asked which services they would most enjoy in an ideal program. Satisfaction was further analyzed in relation to individual services regarding: clinical content, commute, timing of shifts, and interaction with physicians, nurses, medical students/residents, and patients/families. Pearson correlation coefficients (Pcc) between influencing factors and area satisfaction were calculated and compared in relation to mean ratings.

Results: 77% (68/88) completed the survey. Overall satisfaction ratings were high for all services (3.44-4.91). Highest rated services included circumcision service (4.91), academic ward attending (4.78), and academic nursery attending (4.73). Lowest rated were co-coverage of medically complex orthopedic patients (3.44), PICU (3.80), and academic EU (3.84). By service area, clinical content had the highest Pcc (0.61, p <0.0001) with a positive influence (mean rating of 4.26) on satisfaction. Interaction with physicians had the highest Pcc (0.63, p<0.001) with a negative influence (mean rating 4.10). The factor with the lowest Pcc (0.44, p<0.0001) was commute. When asked which services were most desirable, the most common responses were inpatient care (76%), sedation services (65%), and delivery attendance (59%).

Conclusions: Career satisfaction for pediatric hospitalists is high overall. Clinical content has the strongest correlation to higher ratings, while interaction with other physicians has the strongest correlation to lower ratings. An ideal hospitalist program likely would include inpatient care, sedation services and delivery attendance; however, academic nursery and circumcision services are highly satisfying despite less interest. This study may assist program directors when designing or expanding hospitalist services.

16) Blood Culture Utilization and Results for Common Inpatient Pediatric Diagnoses
Kavita Parikh, MD, Aisha Davis, Deena Zeltser and Padma Pavuluri, Hospitalist Division, Children's National Medical Center, Washington DC, DC

Purpose: Blood culture over-utilization is a widespread problem and leads to high rates of negative and contaminant results. Both types of results are associated with increased resource utilization and costs. The purpose of this study is to describe the rate of blood culture negativity and contamination for three common inpatient pediatric diagnoses: skin and soft tissue infection (SSTI), pneumonia (PNA), and bronchiolitis.

Methods: This was a retrospective, cohort study of patients greater than 6 months of age. Hospital administrative data were used to identify patients with a primary discharge diagnosis of SSTI, PNA, or bronchiolitis over the one year study period (January –
Results: Thirteen hundred patients age greater than 6 months were identified with one of the three primary diagnoses 504 (38%) had at least one blood culture drawn during the admission. Blood cultures were drawn in 48% of patients with SSTI, 45% of patients with PNA, and 18% of patients with bronchiolitis. A random 20% chart sampling revealed 76 of 98 (78%) patients met inclusion criteria. Negative blood culture results were common among patients with any diagnosis: SSTI (97%), PNA (93%), and bronchiolitis (100%). There were 2 (2.5%) contaminant cultures, and only two (2.5%) cultures were pathogenic (one each for SSTI and PNA).

Conclusions: The high total percentage of negative and contaminant blood cultures, but low percentage of pathogenic blood cultures, suggests blood culture over-utilization in these three common pediatric inpatient diagnoses. Quality improvement efforts to reduce resource utilization should target clinical decision support to limit blood cultures utilization for when there is a high index of suspicion for bacteremia.

17) Text Messaging As a Means of Communication among Pediatric Hospitalists
Stephanie Kuhlmann, DO1, Carolyn R. Ahlers-Schmidt, PhD2 and Erik Steinberger2, (1)Pediatrics, The University of Kansas School of Medicine - Wichita, Wichita, KS, (2)Pediatrics, University of Kansas School of Medicine - Wichita, Wichita, KS

Purpose: With the surge of cellular phone use, it is no surprise that the use of text messaging is being researched in health care. Many studies assess provider-patient communication, however minimal research has been done studying communication among physicians. Since the early 1980's, physicians have relied on pagers to contact other physicians, residents, nurses, and hospital staff. Thirty years later the use of these devices seems to be diminishing. Nurses and other hospital staff members are able to reach physicians with questions concerning patients through simple text messages; cell phones now have the capability to receive pages. The purpose of this study was to evaluate the use of text messaging and cellular phones by pediatric healthcare workers in a hospital setting.

Methods: An electronic, Survey Monkey-administered survey was distributed via the Pediatric Hospitalist listserve. Institutional Review Board (IRB) approval was obtained.

Results: The survey was completed by 106 pediatric hospitalists. The majority were female (68%) and had been in practice less than 10 years (62%). Ninety-percent of responders used a smartphone and 96% used text messaging. More than half (57%) reported they either send or receive work related text messages; some (12%) more than 10 times per shift. Nearly half (49%) also report receiving work-related text messages when not scheduled to be on call. Most often these text messages are to/from other pediatric hospitalists (59%), fellows or resident physicians (34%), or subspecialists and consulting physicians (25%). Many (41%) respondents worried that HIPAA rules can be violated by sending/receiving text messages concerning patient information, and 27% reported having received protected health information through text messages. However, only 10% reported their institution offered encryption software for text messaging. The most frequent methods of communication used in the hospital setting remained verbal face to face communication (92%) and verbal telephone conversation (92%). However, 41% reported receiving text messages to a personal phone and 18% to a hospital assigned phone as means of communication. When asked their preferred mode for brief communication, respondents varied between text to mobile phone (27%), hospital assigned pager (23%), or verbal face to face (21%).

Conclusion: With the advancement of technology and the high rate of cellular phone and texting use, the way physicians are communicating seems to be changing from the traditional pager method. Physicians are using text messaging as a means to communicate among themselves and with their staff. Although verbal communication is still the most frequent, pediatric hospitalists appear open to using text messaging for brief communication, and some even prefer it. However, concerns arise regarding transfer of protected health information using unsecured systems. Future research should examine the accuracy and effectiveness of text message communication in the hospital, as well as patient privacy issues.

18) Defining the Role of Pediatric Hospitalists in the PICU - A Survey of Pediatric Hospitalists, Hospitalist Directors and PICU Directors
Ryan S. Bode, MD, Dustin Rayhorn, Heidi Dalton and Murray Pollack, Department of Hospital Medicine, Phoenix Children's Hospital, Phoenix, AZ

Purpose: The expansion of pediatric Hospitalists' clinical roles has included the care of critically ill children, including patients within the pediatric intensive care unit (PICU) and code and rapid response teams (RRTs). Driving forces include: Hospitalist skill set development, anticipated shortfalls in the availability of Intensivists, further restrictions in resident work hours, potential cost advantages, and quality of Hospitalist versus resident coverage. It is not known how many Hospitalists practice in the PICU, training guidelines/requirements, or scope of practice. The aim of this study is to outline and define the current roles of pediatric Hospitalists in the PICU.

Methods: The American Academy of Pediatrics Section on Hospital Medicine maintains an active list serve with an estimated 2000 pediatric Hospitalists. A cross sectional on-line survey was sent to the listserve with separate links to "Hospitalists" and "Hospitalist Directors." In addition, a database was purchased thru the American Hospital Association. Hospitals with PICUs and PICU Directors were identified, an email database created, and an on-line survey was sent.
Results: 150 Hospitalists, 65 Hospitalist Directors and 42 PICU Directors completed the survey. 20% of Hospitalists, 21% of Hospitalist Directors, and 29% of PICU Directors indicated Hospitalists functioned within the PICU. Hospitalists' clinical roles identified included: "actively admit and manage patients under supervision of intensivist" (68%) and "admit and manage patients independently of intensivist" (20%). Patients cared for included: 68% "all patients regardless of severity" with 23% indicating only "intermediate or step-down patients". Hospitalists perform the following procedures/management on a regular basis: 63% intubation, 25% central line placement, 38% arterial line placement, 25% chest tube placement, 75% conventional ventilation, 31% advanced ventilation, 56% moderate-deep sedation and 69% vasoactive medications. 90% of Hospitalists with a clinical role in the PICU indicated no additional preparatory training or credentialing. PICU Directors using Hospitalists answered: 56% no additional training, 22% Pediatric Fundamentals of Critical Care Medicine, and 11% other formal training. 13% of PICU Directors not using Hospitalists indicated they planned to use Hospitalists in the future. Those not planning on using Hospitalists site the reasons: 33% insufficient training, 29% credentialing/medical staff issues, 19% no precedent or model. 37% of Hospitalists are on their code team and 41% are on their RRT with 25% serving as the physician lead.

Conclusion: Pediatric Hospitalists have an evolving role in the care of critically ill children in the PICU. This includes the active management of ventilated patients, patients on vasoactive medications and procedures such as intubation, line placement and sedation. There is a lack of additional or formal training, credentialing and shared precedent. Successful practice models need to be explored and shared as well as recommendations regarding additional and ongoing training, and scope of practice as the trend of Hospitalists' in the PICU is anticipated to continue and expand.

19) A Prospective Randomized Trial of the Effectiveness of Lumbar Puncture Simulation Training in Pediatric Residents

Ryan S. Bode, MD1, Kelly Kelleher1, Dominic Moore1, Clarke Daxa1, Jeffrey Foti, MD2 and Caputo Grace1, (1)Department of Hospital Medicine, Phoenix Children's Hospital, Phoenix, AZ, (2)Department of Hospital Medicine, Seattle Children's Hospital, Seattle, WA

Purpose: There is a clear emphasis on "real and/or simulated training" of procedures in the proposed ACGME program requirements for pediatrics. Recent evidence has shown a formal curriculum of patient simulation training could improve resident competency in core procedural skills. However, studies are needed to determine if pediatric procedural simulation training results in improved real patient performance. Objectives: The objectives of our study are to measure: 1. The difference in success rates, defined as successfully obtaining cerebral spinal fluid (CSF) in performing lumbar punctures (LP) between the control and study group 2. The difference in number of LP attempts prior to obtaining CSF between the control and study group 3. The proportion of patients with traumatic LPs, defined as CSF red blood cells (RBC) >400, between the control and study group 4. The perceptions of the study group on LP simulation education.

Methods: PL-1 residents were prospectively randomized. The control group received the historical gold standard of LP procedural education, which is the "see one, do one, teach one" model. The study group received a LP tutorial and patient simulation in addition to standard training. The study group completed a survey before and after simulation education. Residents' procedure logs and patient charts were reviewed to obtain patient age, successful completion of LP, number of attempts, and number of CSF RBC.

Results:

<table>
<thead>
<tr>
<th>Participants with ≥ 1 LP attempt recorded</th>
<th>Control Group</th>
<th>Study Group</th>
<th>Fisher exact test 2 tailed p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP's attempted (individual patient encounters)</td>
<td>12</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Total number of LP attempts</td>
<td>45</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>CSF successfully obtained</td>
<td>16 (53.3%)</td>
<td>23 (59.0%)</td>
<td>.8068 = NS</td>
</tr>
<tr>
<td>CSF obtained on 1st attempt</td>
<td>10 (33.3%)</td>
<td>10 (25.6%)</td>
<td>.3332 = NS</td>
</tr>
<tr>
<td>Number of traumatic LP's (rbc &gt;400)</td>
<td>5 (31.3%)</td>
<td>5 (21.7%)</td>
<td>.7110 = NS</td>
</tr>
</tbody>
</table>

Conclusion: Although data trended towards better success rates and decreased traumatic taps with the simulation exposed study group, none of the data showed statistical significance. The study will continue with tracking of the first 5 LPs of intern year for both groups and will continue with an additional recruitment of 31 new interns this summer. Survey data of the study group did reveal significant improvement in confidence level following simulation. Further subject recruitment and data collection will help determine if pediatric LP procedural simulation training results in improved real patient performance and outcomes.

20) The Burden of Recidivist Diabetic Ketoacidosis: Defining Incidence and Identifying Risk Factors

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Purpose: A significant proportion of admissions due to diabetic ketoacidosis (DKA) occur in a subset of individuals who present with recurrent episodes resulting in increased morbidity and costs. Our children's hospital, in NE Ohio, USA serves approximately 1,000 patients with Type I DM. Our local DKA incidence is estimated to be 9.9 episodes per 100 patient years. Our review of the literature failed to produce sufficient data that would facilitate benchmarking admissions, readmission and recidivist rates for DKA. We sought to determine the incidence of admissions, readmissions and recidivist (r-DKA) DKA in our large, urban children's hospital. Additionally, we sought to identify risk factors for r-DKA.
Methods: All patients with DKA are initially admitted to the pediatric intensive care unit (PICU). Using the VPS PICU database (https://portal.myvps.org), we identified and reviewed all DKA admissions from Jul2003-Dec2011. VPS data, paper charts and electronic medical records were reviewed to compile physiologic, demographic, and psychosocial information. Data are presented as median (range) and odds ratio (95% CI).

Results: There were 524 patients who had 834 DKA admissions. The incidence of single DKA admissions was 19 episodes per 100 patient years. There were 310 readmissions by 100 patients. Patients with r-DKA (> 4 DKA admissions) constituted 7.1% of patients, 24.7% of admissions, and 66.4% of readmissions. The DKA incidence in the r-DKA group was 66 episodes per 100 patient years. r-DKA cases were more likely to be female, OR 2.65 95%CI (1.987-3.705), and older 14.8(1.4-22.3) vs. 11.6(0.3-22.2) years, p<0.0001 than single admissions. The Medicaid/managed care insurance group had an increased risk of readmission, OR 1.251(1.028-1.511), p=0.021 compared to all other insurance. Of the 37 r-DKA cases, 33 (89%) had data available for risk factor analysis. Of these, 25.8% (8/31) presented with non-diabetic chief complaints but were diagnosed with DKA. Additionally, 90% (27/30) did not live with both biological parents, 27.6% (8/29) did not attend public school, and 10% (3/30) were involved in the juvenile court system. Finally, 58.1% (18/31) had a documented psychiatric diagnosis and 30.1% (9/30) had a psychiatric diagnosis documented in at least one first degree relative.

Conclusion: The incidence of DKA was nearly twice as high as expected. The majority of cases are single admissions, suggesting readmissions represent a unique subpopulation. Females, older patients and those with Medicaid/managed care insurance were more likely to be readmitted. We have identified a series of risk factors that may aid in the early identification and management of this subpopulation. Those with r-DKA pose a formidable public health and personal risk that require further analysis in order to optimize their care and eliminate the recidivist pattern. Prospective, multicenter analyses similar to this are needed to clarify risk factors for recidivism and identify best practices to eliminate all readmissions.

21) Comparative Analysis of Vital Sign Ranges in the Pediatric Early Warning System
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Purpose: The Pediatric Early Warning System (PEWS) is an established tool that aids in the identification of hospitalized patients at risk for clinical deterioration. Many pediatric institutions have adopted the PEWS as a patient safety initiative. At St. Louis Children’s Hospital, it was initially deployed on the oncology unit in June 2011 and then subsequently expanded to a general medical unit in December 2011. It was well received, but it led to numerous Rapid Response Team (RRT) activations triggered by PEWS scores that were only abnormal because of isolated tachycardia and/or tachypnea. These RRT activations often taxed the resources of the Pediatric Intensive Care Unit (PICU). An analysis demonstrated that the normal ranges for heart rate and respiratory rate, which were obtained from Wong’s Essentials of Pediatric Nursing, were overly restrictive. A substitution of the normal ranges with those from American Heart Association Pediatric Emergency Assessment, Recognition and Stabilization Provider Manual was proposed, but it was recognized that testing of this change before its implementation would be critical.

Methods: To ensure that the change would appropriately balance the desire to decrease the number of RRT activations and the requirement to maintain the efficacy of PEWS, a retrospective chart review of 24 affected patients was performed. They were randomly selected from age groups that matched those of the normal ranges from Wong’s: newborn (0 to 1 month), infant (1 month to 12 months), toddler (13 months to 3 years), preschool (4 to 6 years), school age (7 to 12 years), and adolescent (13 to 19 years). New PEWS scores were recalculated using the normal ranges from American Heart Association and then compared to the original PEWS scores that were generated using the normal ranges from Wong’s.

Results: A recalculation of the PEWS scores with normal ranges from American Heart Association decreased the number of RRT activations by 50% and did not miss any patients who genuinely needed a RRT evaluation. As a result, this change was approved and made with confidence and without complications.

Conclusion: Modifications of the PEWS must achieve desired outcomes but not compromise patient safety. In this case, a successful change in the normal ranges for heart rate and respiratory rate was accomplished through a systematic review of available clinical data. A prospective analysis of all unplanned transfers to the PICU is currently under way.

22) Resident Assessment of Overnight Education in Pediatrics
Amy Liu, MD/MPH, Sherita Holmes, MD and H. Barrett Fromme, MD/MHPE, Pediatrics, University of Chicago, Chicago, IL

Purpose: With the newest ACGME duty hour regulations, residency programs have expanded their use of Night Float rotations. Residents and faculty have indicated that they perceive a negative effect on training quality, educational encounters and overall learning compared to day rotations. However, most of these studies were either anticipatory or retrospective. Few studies have analyzed exactly what residents perceive immediately following an evening of night work to obtain a real-time view of night education. The objective was to determine pediatric resident perceptions of their educational experience while a part of a night team, with focus on preferences for teaching modalities, educator level, and comparison to daytime learning.

Methods: Pediatric residents on night rotations in a midsize academic pediatric residency training program were surveyed. A 15 question electronic survey was administered the morning to residents after residents completed a night shift. Data was collected three times a week for approximately for six months. The survey evaluated what type of teaching occurred overnight (e.g. self-directed, didactic, patient care centered), the residents’ rating of the teaching encounter that they experienced, and residents’ comparison to daytime teaching.
Results: 175 responses were collected; 48% from PL1s, 26% for PL2s, and 26% PL3/4s. Though no significant differences were found between the effectiveness of teaching modalities when stratified by learner level, for all residents independent patient care experiences and night rounds were significantly rated the most effective modalities of learning. The least effective methods for all learner levels were supervised patient care and didactics. Not surprisingly, the preferred learning methods for night shifts were independent patient care and self-directed learning. Didactic experiences, no matter the educator, was the least preferred method. These results were also statistically significant for all residents, but not when stratified by learner level. Though overall the residents showed a slight preference for daytime education compared to night education (mean 2.42 on a 1-5 likert scale where "1" strong preference for daytime learning) the results were not statistically significant (p = 0.12).

Conclusion: Despite published concerns that night rotations would have a negative impact on residents' education, we found that learners do not have significant preference for daytime learning. Night residents traditionally miss didactic conferences (e.g. morning reports and noon conferences) and rounds, but our respondents indicated that didactics and night rounds were the least preferred methods of learning at night. Though our study is limited by one site, it suggests further research into what is effective and preferred for learning at night. We should consider what the unique aspects of learning are on night rotations and maximize the use of those modalities rather than assuming a one-size fits all for day and night teaching.

23) Pediatric Pancreatitis in the Era of Obesity

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Purpose: Recent reports, primarily on the basis of adult data, have suggested an increasing incidence of pancreatitis and an association between obesity and severity of pancreatitis. In the pediatric literature however, studies of obesity associated pancreatitis are limited. Therefore, we sought to examine demographics and economic burden of pediatric pancreatitis in obese children.

Methods: The Kids’ Inpatient Database was used to select hospitalizations for pediatric pancreatitis from 2000 to 2009. Pancreatitis with and without obesity were compared for demographics, procedures, mean length of stay (LOS), and mean total hospital charges (THC).

Results: A total of 4,162 obesity associated pancreatitis cases were identified, with a significant increase from 409 in 1997 to 1,790 in 2009, P<0.001. Compared to pancreatitis without obesity, pancreatitis with obesity was more likely to be female (OR 1.615, P<0.001), Hispanic (OR 1.881, P<0.001), insured by Medicaid (OR 1.411, P<0.001), and from the poorest median income quartile (OR 1.597, P<0.001). Pancreatitis with obesity was more likely to undergo ERCP (OR 1.686, P<0.001) and cholecystectomy (OR 2.785, P<0.001). During the study period, median LOS remained stable at 4 days but with increasing mean THC ($21,403 in 1997 to $44,348 in 2009, P<0.001).

Conclusion: Pediatric obesity complicated with pancreatitis is increasing in the United States, especially in female, Hispanic, and children from the poorest socioeconomic demographics. Increasing utilizations of ERCP and cholecystectomy may contribute to the rising economic burden of obesity related pancreatitis.

24) Management of Bronchiolitis In the Emergency Department (ED): Impact of Evidence-Based Guidelines?

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Purpose: Recent practice guidelines from the American Academy of Pediatrics (AAP) recommend limiting use of bronchodilators, corticosteroids, antibiotics, and diagnostic testing for patients with bronchiolitis. We sought to determine the association of the evidence-based guidelines with bronchiolitis care in the emergency department (ED).
Methods: We analyzed data from the National Hospital Ambulatory Medical Care Survey (NHAMCS), a nationally-representative four-stage probability sample of ED visits. We compared utilization for patient visits before and after the publication of the guidelines. We used logistic regression to determine the association of the availability of the guidelines with resource utilization after adjustment for patient and hospital characteristics.

Results: Bronchodilators were used in 53.8% of patient visits with no differences noted after the introduction of the guidelines (53.6% vs 54.2%, p=0.91). Systemic steroids were used in 20.4% of patient visits and antibiotics were given in 33.2% of visits. There were no changes in the frequency of corticosteroid (21.9% vs 17.8%, p=0.31) or antibiotic (33.6% vs 29.7%, p=0.51) use. There was an associated decrease in use of chest X-rays (65.3% vs 48.6%, p=0.005). This association remained significant after adjusting for patient and hospital characteristics with an adjusted odds ratio of 0.41 (95% CI 0.26-0.67).

Conclusion: For patients seen in the ED with bronchiolitis, utilization of diagnostic imaging has decreased with the availability of the AAP practice guidelines. However, there has not been an associated decrease in use of non-recommended therapies. Targeted efforts will likely be required to change practice significantly.