# Hospital-based Medicine: Miscellaneous

**Thursday, August 13  4:30-6:00 pm EDT**

**Moderators**
Rebecca Rosenberg  
Alisa Khan

<table>
<thead>
<tr>
<th>EDT</th>
<th>Abstract</th>
<th>Title</th>
<th>Presenting Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:30 pm</td>
<td></td>
<td>Introduction &amp; General Information</td>
<td></td>
</tr>
<tr>
<td>4:35 pm</td>
<td>3376496</td>
<td>Challenges Faced by Caregivers During and Post Pediatric Hospitalizations</td>
<td>Judit Marquez</td>
</tr>
<tr>
<td>4:45 pm</td>
<td>3378302</td>
<td>The attitude-behavior gap among families, nurses, and physicians about family-centered rounding</td>
<td>Shilpa Patel</td>
</tr>
<tr>
<td>4:55 pm</td>
<td>3368533</td>
<td>High Flow Nasal Cannula for Pediatric Respiratory Illnesses at a Community Hospital: Is pCO2 a Valuable Screening Tool?</td>
<td>Jillian Cotter</td>
</tr>
<tr>
<td>5:05 pm</td>
<td>3380353</td>
<td>Early weight loss nomograms and feeding practices for neonatal abstinence syndrome (NAS) infants managed via the Eat, Sleep, Console (ESC) approach</td>
<td>Frances Cheng</td>
</tr>
<tr>
<td>5:15 pm</td>
<td>3381864</td>
<td>Patient Characteristics, Risk, and Outcomes for Brief Resolved Unexplained Events: A Multicenter Study</td>
<td>Joel Tieder</td>
</tr>
<tr>
<td>5:25 pm</td>
<td>3377098</td>
<td>Development of a collaborative care model for neonatal abstinence syndrome: a multi-site community hospital qualitative study</td>
<td>Corrie McDaniel</td>
</tr>
<tr>
<td>5:35 pm</td>
<td></td>
<td>Wrap Up</td>
<td></td>
</tr>
</tbody>
</table>

Note: Schedule subject to change based on presenter availability.
Challenges Faced by Caregivers During and Post Pediatric Hospitalizations

Judit Marquez

Vaz, Louise E.1; Jenisch, Celeste1; Jungbauer, Rebecca M.2; Everist, Steven J.1; Libak, Alyssa J.1; Marquez, Judit1; Wagner, David1; Vega, Raul3; Austin, Jared P.1; Harris, Michael A.1; Zuckerman, Katharine1

L.E. Vaz, C. Jenisch, S.J. Everist, A.J. Libak, J. Marquez, D. Wagner, J.P. Austin, M.A. Harris, K. Zuckerman, Pediatrics, Oregon Health & Science University, Portland, Oregon, UNITED STATES; R.M. Jungbauer, Pacific Northwest Evidence-based Practice Center, Oregon Health & Science University, Portland, Oregon, UNITED STATES; R. Vega, General Pediatrics, Oregon Health & Science University, Portland, Oregon, UNITED STATES;

Hospital-based Medicine

Hospital-based Medicine: Miscellaneous

Hospital-based Medicine: Miscellaneous

Webinar|Platform

Background: Caregivers of inpatient children likely experience challenges during admission that impact child health and child/caregiver quality of life post-discharge. Better understanding of these stressors and interventions to address these concerns have not been thoroughly explored.

Objective: To qualitatively assess challenges caregivers face in the context of a pediatric hospitalization and their perception of potential interventions to mitigate stress and improve the quality of care during and following hospitalization.

Design/Methods: Patient-caregiver dyads (n=24) were enrolled from a general pediatric hospitalist service at a Pacific Northwest children’s hospital from December 2018 – June 2019. Caregivers completed a pre-discharge survey and a semi-structured qualitative interview to capture their perception of challenges and potential solutions as part of a broader IRB-approved study on social risks. Interviews were audio recorded, transcribed, and coded for thematic content using Dedoose data analysis software and a framework analytic approach. A coding structure was created by the study team with at least two study team members independently coding each transcript. Coded data were analyzed and categorized thematically.

Results: 58% of enrolled caregivers completed the qualitative interview. Caregivers were predominantly female (100%), English-speaking (100%), White (71%), and publicly insured (83%). Half had a high school education or less (50%). Several recurrent themes related to challenges and stress during pediatric hospitalization arose: 1) Lack of basic caregiver physiologic needs (e.g. insufficient access to food, hygiene, and/or sleep); 2) psychological support from family or friends as a source of resiliency when available, or a challenge when not, particularly for one-third of caregivers who were single parents; 3) family-provider communication difficulties, specifically relating to rounding, the discharge process and primary care provider follow-up; and 4) financial stress as a result hospitalization costs. Caregivers were then asked to suggest and reflect on specific intervention ideas that might allow hospitals to address caregiver areas of high need (Table 1).

Conclusion(s): A caregivers’ ability to cope and focus on their child’s health may be affected due to the immediate and post-effects of a pediatric hospitalization. Caregiver-derived interventions included specific examples that could potentially modify caregivers’ perception of stress and influence the downstream events of the hospitalization and transition to home.
The attitude-behavior gap among families, nurses, and physicians about family-centered rounding

PRESENTER: Shilpa J Patel

AUTHORS (LAST NAME, FIRST NAME): Patel, Shilpa J.1; Khan, Alissa3; Baird, Jennifer D. 2; Markle, Peggy5; Cray, Sharon4; Liss, Isabella3; Graham, Dionne3; Bass, Ellen J.6; Knighton, Andrew J.7; Study Group, I-PASS SCORE3

AUTHORS/INSTITUTIONS: S.J. Patel, Pediatrics, Hawaii Pacific Health/Univ of Hawaii John A. Burns School of Medicine, Honolulu, Hawaii, UNITED STATES; J.D. Baird, Institute for Nursing and Interprofessional Research, Children's Hospital Los Angeles, Los Angeles, California, UNITED STATES; A. Khan, I. Liss, D. Graham, I. Study Group, Boston Children's Hospital, Boston, Massachusetts, UNITED STATES; S. Cray, St Christophers Hospital, Philadelphia, Pennsylvania, UNITED STATES; P. Markle, Children's National Medical Center, Washington, District of Columbia, UNITED STATES; E.J. Bass, Drexel University, Philadelphia, Pennsylvania, UNITED STATES; A.J. Knighton, Intermountain Healthcare Delivery Institute, Murray, Utah, UNITED STATES;

CURRENT CATEGORY: Hospital-based Medicine

CURRENT SUBCATEGORY: None

KEYWORDS: Family-centered rounding, Communication with families, Attitudes and behavior gap.

SESSION TITLE: Hospital-based Medicine: Miscellaneous |Hospital-based Medicine: Miscellaneous

SESSION TYPE: Webinar|Platform

ABSTRACT BODY:

Background: Family-centered rounding (FCR) is associated with improved safety outcomes, however variation in use persists nationally. Understanding variation in provider and family beliefs and attitudes regarding FCR may support implementation efforts.

Objective: To elucidate attitudes and behaviors regarding FCR among families, nurses, and physicians.
**Design/Methods:** The first step in our implementation project to improve communication between families, nurses, and physicians during FCR included a cross-sectional survey with a purposeful sample of stakeholders (hospitalized pediatric patients/families and providers (unit nurses and physicians)) at 19 geographically diverse US community and academic hospitals. The Theory of Planned Behavior (Image 1) and the Consolidated Framework for Implementation Research guided question development. Rates of support for (very or extremely important) and reported practice of (often or always occurs) FCR elements were estimated with mixed effects logistic regression to control for hospital clustering. Logistic regression was used to test for differences in survey responses between groups.

**Results:** Response rate=62%: 42% of 1,138 surveys were from families, 24% from nurses, 34% from physicians. Over 75% of providers stated the main purpose of rounds was to share information with families. Mixed effects logistic regression showed that beliefs and attitudes varied by role; physicians rated most key FCR elements lower than other roles (p<0.01) (Image 2). Support for use of key FCR elements ratings were higher than reported practice (p<0.01) where 88% of providers believed family participation was important but only 67% reported it often/always occurred. This gap persisted and varied in spread by FCR element (Image 3). Behaviors that stakeholders rated as important were more often performed; providers who rated family participation on rounds as very/extremely important were more likely to report that patients/families expressed concerns on rounds (70% vs. 43%) (p<0.01) (Image 4).

**Conclusion(s):** Support for family participation on FCR is high among providers. However, significant differences exist between what nurses and physicians endorse as important elements of FCR and what they report being practiced. Behaviors were reported to occur more frequently when endorsed as important. Understanding underlying attitudes and behaviors can help address barriers to effective implementation of FCR in order to improve communication among providers and families.

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**Image 1:** Theory of Planned Behavior framework

**Image 2:** The importance of various elements of FCR, as rated by stakeholder groups.

**Image 3:** The gap between provider beliefs and practice regarding FCR.
Image 4. Individual providers who rate a practice as very/extremely important are more likely to report that it often/always occurs.

IMAGE CAPTION:
Image 1: Theory of Planned Behavior framework
Image 2: The importance of various elements of FCR, as rated by stakeholder groups.
Image 3. The gap between provider beliefs and practice regarding FCR.
Image 4. Individual providers who rate a practice as very/extremely important are more likely to report that it often/always occurs.

CONTROL ID: 3368533
TITLE: High Flow Nasal Cannula for Pediatric Respiratory Illnesses at a Community Hospital: Is pCO2 a Valuable Screening Tool?
PRESENTER: Jillian Cotter
AUTHORS (LAST NAME, FIRST NAME): Cotter, Jillian1; Dempsey, Amanda F.1; Moultrie, Sarah1; Moss, Angela2; Nathaniel, Emma1; Nosek, Gayle S.1; Bakel, Leigh Anne1
AUTHORS/INSTITUTIONS: J. Cotter, A.F. Dempsey, S. Moultrie, E. Nathaniel, G.S. Nosek, L. Bakel, University of Colorado, Denver, Colorado, UNITED STATES; A. Moss, ACCORDS, University of Colorado, Aurora, Colorado, UNITED STATES;
CURRENT CATEGORY: Hospital-based Medicine
CURRENT SUBCATEGORY: None
KEYWORDS: high flow nasal canula, bronchiolitis, community hospital.
SESSION TITLE: Hospital-based Medicine: Miscellaneous | Hospital-based Medicine: Miscellaneous
SESSION TYPE: Webinar|Platform
ABSTRACT BODY:
Background: Heated high flow nasal cannula (HHFNC) is commonly used to deliver supplementary oxygen in acute respiratory illnesses. Patients who do not improve with HHFNC, also known as HHFNC failure, often require escalation of care to an intensive care unit (ICU). To safely implement HHFNC in community settings without an ICU, it is important to identify patients at risk for HHFNC failure, enabling early transfer prior to clinical deterioration. Studies suggest that partial pressure of carbon dioxide (pCO2) greater than 50mmHg can predict HHFNC failure, but there is limited literature on the impact of a pCO2-driven protocol in the community setting.

Objective: To determine the ability of pCO2 to predict HHFNC failure in pediatric patients at a community hospital.

Design/Methods: We performed a retrospective cohort study of patients <19 years of age who had a venous blood gas (VBG) obtained prior to HHFNC initiation at a community hospital over 2 years (7/2017-2019). Patients with complex
neuromuscular or respiratory comorbidities were excluded. Per protocol, VBG was obtained prior to HHFNC initiation, and patients were transferred to a quaternary-care hospital with an ICU if pCO2 was >50mmHg or based on the clinical discretion of treating providers. The primary outcome was HHFNC failure, defined as the need for non-invasive positive pressure ventilation (e.g. CPAP, continuous positive airway pressure) or intubation. Demographic and clinical characteristics were compared between those with pCO2 >50mmHg and ≤50. We calculated sensitivity and specificity of the pCO2 threshold of 50mmHg for predicting HHFNC failure and used receiver operating characteristic (ROC) analysis with Youden’s J statistic to determine a more optimal threshold.

**Results:** Of 257 patients requiring HHFNC, 187 (73%) had a pCO2 obtained, and 11% of these patients had a pCO2 >50. There were some demographic differences between the groups, and those with pCO2 >50 had a higher likelihood of HHFNC failure compared to those with pCO2 ≤50 (67% vs 40%, p=0.02, Table 1). A pCO2 >50 had a 93% specificity and 18% sensitivity for predicting HHFNC failure. Based on the ROC analysis, the optimal pCO2 threshold predictive of HHFNC failure was 44 with a sensitivity of 38% (Figure 1, Table 2).

**Conclusion(s):** pCO2 was rarely >50mmHg and no threshold was sensitive enough to be used as a screening tool to predict HHFNC failure. A pCO2-based screening protocol for implementing HHFNC in the community setting does not appear to be a high-value clinical practice.

<table>
<thead>
<tr>
<th>Table 1. Demographics and Clinical Characteristics of Patients who had a pCO2 Obtained Prior to Initiation of HHFNC in the Community Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (months)</strong> - median [IQR]</td>
</tr>
<tr>
<td><strong>Gestational age</strong></td>
</tr>
<tr>
<td>Premature (&lt;35 weeks)</td>
</tr>
<tr>
<td>Term or Post-term (37-42weeks)</td>
</tr>
<tr>
<td>Length of stay (days) - median [IQR]</td>
</tr>
<tr>
<td>Transfer rate</td>
</tr>
</tbody>
</table>

Table 2. Sensitivity and Specificity for Other PCO2 Thresholds Identified by Top 10 Youden Indexes

<table>
<thead>
<tr>
<th>PCO2 Threshold (mmHg)</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Youden’s J Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>38%</td>
<td>86%</td>
<td>0.62</td>
</tr>
<tr>
<td>45</td>
<td>31%</td>
<td>90%</td>
<td>0.59</td>
</tr>
<tr>
<td>47</td>
<td>26%</td>
<td>93%</td>
<td>0.59</td>
</tr>
<tr>
<td>49</td>
<td>21%</td>
<td>95%</td>
<td>0.57</td>
</tr>
<tr>
<td>50</td>
<td>22%</td>
<td>93%</td>
<td>0.55</td>
</tr>
<tr>
<td>55</td>
<td>39%</td>
<td>76%</td>
<td>0.50</td>
</tr>
<tr>
<td>57</td>
<td>44%</td>
<td>76%</td>
<td>0.50</td>
</tr>
<tr>
<td>59</td>
<td>42%</td>
<td>74%</td>
<td>0.49</td>
</tr>
</tbody>
</table>

**Figure 1. Receiver Operating Characteristic (ROC) Curve**

ROC curve labeled with PCO2 thresholds for predicting HHFNC failure. The optimal PCO2 threshold predictive of HHFNC failure was 44mmHg with a sensitivity of 38% and specificity of 86%.
Table 1. Demographics and Clinical Characteristics of Patients who had a pCO2 Obtained Prior to Initiation of HHFNC in the Community Setting

*Wilcoxon rank sum test or Chi-squared analysis as applicable

Table 2. Sensitivity and Specificity for Other PCO2 Thresholds Identified by Top 10 Youden Indexes

Figure 1. Receiver Operating Characteristic (ROC) Curve

ROC curve labeled with PCO2 thresholds for predicting HHFNC failure. The optimal pCO2 threshold predictive of HHFNC failure was 44mmHg with a sensitivity of 38% and specificity of 86%.
methods of weight loss prevention in these neonates can help guide management of feeding in this vulnerable population.

**Table 1. Patient Demographics and Clinical Characteristics.**

<table>
<thead>
<tr>
<th>Method of Delivery</th>
<th>Vaginal (N=263)</th>
<th>Cesarean (N=103)</th>
<th>Total (N=366)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (g)</td>
<td>3.30 (3.1-3.4)</td>
<td>3.30 (3.0-3.4)</td>
<td>3.30 (3.1-3.4)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male: 111 (47.2%)</td>
<td>55 (52.4%)</td>
<td>166 (52.4%)</td>
</tr>
<tr>
<td></td>
<td>Female: 152 (52.8%)</td>
<td>48 (47.6%)</td>
<td>200 (47.6%)</td>
</tr>
<tr>
<td>Gestational Age (w)</td>
<td>39.2 (1.5)</td>
<td>39.1 (1.3)</td>
<td>39.2 (1.5)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>6.3 (2.0-22.0)</td>
<td>6.3 (2.0-22.0)</td>
<td>6.3 (2.0-22.0)</td>
</tr>
<tr>
<td>Length (cm)</td>
<td>50.0 (20.0-50.0)</td>
<td>50.0 (20.0-50.0)</td>
<td>50.0 (20.0-50.0)</td>
</tr>
</tbody>
</table>

**Figure 1. Early weight loss nomogram for NAS infants delivered vaginally.**

**Figure 2. Early weight loss nomogram for NAS infants delivered via Cesarean section.**

**IMAGE CAPTION:**

Table 1. Patient Demographics and Clinical Characteristics.

Figure 1. Early weight loss nomogram for NAS infants delivered vaginally.

Figure 2. Early weight loss nomogram for NAS infants delivered via Cesarean section.

**CONTROL ID:** 3381864

**TITLE:** Patient Characteristics, Risk, and Outcomes for Brief Resolved Unexplained Events: A Multicenter Study

**PRESENTER:** Joel Tieder

**AUTHORS (LAST NAME, FIRST NAME):** Tieder, Joel; Stephans, Allayne; Sullivan, Erin; Hall, Matt; Quality Improvement Research Collaborative, BRUE

**AUTHORS/INSTITUTIONS:** J. Tieder, B. Quality Improvement Research Collaborative, Pediatrics, Seattle Children's Hospital, Seattle, Washington, UNITED STATES; E. Sullivan, Seattle Children's Hospital, Seattle, Washington, UNITED STATES;
Background: The American Academy of Pediatrics (AAP) established the definition, risk criteria, and management recommendations for Brief Resolved Unexplained Events (BRUEs) using the heterogeneous, less specific Apparent Life Threatening Event research populations. An understanding of risk factors and outcomes specific to the more precisely defined BRUE population can improve management decisions.

Objective: To describe patient characteristics, risk factors and outcomes after an initial emergency department (ED) evaluation for a BRUE.

Design/Methods: As part of a 14-hospital quality improvement and research collaborative, we reviewed the medical records of children < 1 year of age with an ED visit between 10/1/2015 and 9/30/2018. We identified potential patients using ICD-10 codes for BRUE, BRUE symptoms (e.g., apnea), associated diagnoses (e.g., seizure and gastroesophageal reflux), and excluded children with comorbidities. Using the AAP guideline, chart review determined BRUE qualification, risk criteria and stratification, discharge diagnoses, and outcomes. Outcomes included a 1) serious underlying explanatory diagnosis (i.e., prompt diagnosis or treatment prevents morbidity or mortality), 2) recurrent BRUE in the ED or hospital during the index visit or 3) hospital revisit before 1-year of age related to the index BRUE.

Results: A total of 4,446 records were reviewed across 14 academic and community hospitals; 2036 (45%) patients met inclusion criteria and 1286 (63%) of these were hospitalized. [Table 1] Patients meeting higher-risk AAP criteria accounted for 74% of ED discharges and 93% of inpatient admissions. Of patients discharged from the ED, 48% (360) had a probable or definite diagnosis compared to 24% (306) of hospitalized patients. The most common explanations for the BRUE episodes included gastroesophageal reflux, choking or gagging, and breath-holding spells. There were 43 patients (2%) with a serious explanatory diagnosis, the most common included airway abnormalities requiring surgery (21%), seizures requiring treatment (21%), and occult respiratory infections requiring treatment (21%). [Table 2] Risk of a recurrent BRUE in the ED or hospital was 21% and hospital revisit before 1-year of age was 9%.

Conclusion(s): Although BRUEs are often explained by normal infant immaturity and serious underlying diagnoses are rare, risk of recurrent events and readmission are relatively high. Further study of risk factors may identify patients most likely to benefit from diagnostic evaluation and hospitalization.

Table 1. Patient Characteristics, Risk Factors, and Outcomes by Setting

Table 2. Serious diagnoses for patients evaluated for a BRUE (i.e., an underlying condition that requires prompt diagnosis or treatment to prevent morbidity or mortality)
Background: Recent shifts to prioritize non-pharmacologic care of neonatal abstinence syndrome (NAS) are associated with reductions in length of stay, cost, and total post-natal opioid exposure. Non-pharmacologic care requires intensive caregiver presence and multidisciplinary team-based care, yet how to optimally deliver this type of care in community hospitals is not known.

Objective: To develop a conceptual model for family-provider collaborative care for infants hospitalized with NAS in community hospitals.

Design/Methods: Using a Donabedian framework, we conducted a multi-site qualitative study employing pragmatic inquiry to elicit the perspectives of diverse stakeholders. We conducted semi-structured interviews at 3 community hospitals with parents of infants hospitalized with NAS, nurses, social workers, physicians, lactation nurses, child protective service (CPS) providers, patient “cuddlers”, and hospital administrators. We used thematic analysis to identify structures, processes, and outcomes for optimal care of NAS, and applied axial coding to examine interrelationships between these domains. We established trustworthiness of the data through triangulation and member checking.

Results: We interviewed 45 interdisciplinary stakeholders, including 35 healthcare providers and 10 parents. Based on participant perspectives, we developed a conceptual model for optimal NAS care (Figure 1). Participants reported that integrating a family’s previous experiences with opioid addiction and withdrawal in order to create a customized care plan for NAS infants empowers families and mitigates parental experience of judgement and guilt. Transparent collaboration with external partners (e.g. CPS, methadone clinics, social support services) and establishing a flattened provider hierarchy improves the timely delivery of NAS-specific care and decreases barriers to parental involvement. Participants also identified best practice recommendations to optimize collaborative care for NAS (Figure 2).

Conclusion(s): We identified unique structural factors, care processes, and meaningful outcomes to optimize collaborative care for NAS, such as individualizing care plans, transparency in the CPS process, developing strong coordination with social services, and cultivating NAS-prioritized teams and facilities that support parental presence and engagement. This care model highlights recommendations from stakeholders to inform future quality improvement interventions to optimize NAS care.
Figure 2: Overview of the model for implementing care with national evidence guidelines (2023)

**Structure**
- Policy development
- Implementation of policies
- Training and education
- Evaluation

**Process**
- Identification of needs
- Development of strategies
- Implementation
- Monitoring and evaluation

**Outcome**
- Improved patient outcomes
- Increased efficiency
- Cost savings
- Improved staff satisfaction

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**Table: Suggested Changes for Optimal Care**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Suggested Changes</th>
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<tbody>
<tr>
<td>Decision-making</td>
<td>- Development of shared decision-making between providers, nurses, and families around treatment options and interventions.</td>
</tr>
<tr>
<td>Medication management</td>
<td>- Increased use of electronic prescribing systems.</td>
</tr>
<tr>
<td>Communication</td>
<td>- Enhanced communication between all members of the care team.</td>
</tr>
<tr>
<td>Interdisciplinary collaboration</td>
<td>- Increased coordination between medical, nursing, and social work teams.</td>
</tr>
<tr>
<td>Patient education</td>
<td>- Development of patient education materials.</td>
</tr>
<tr>
<td>Patient safety</td>
<td>- Enhanced use of evidence-based practices to reduce errors and improve safety.</td>
</tr>
<tr>
<td>Cost management</td>
<td>- Increased use of cost-effective interventions.</td>
</tr>
</tbody>
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**IMAGE CAPTION:**

[Diagram showing the structure, process, and outcome of implementing care with national evidence guidelines]