VIRGINIA • PEDIATRICS

American Academy of Pediatrics • Virginia Chapter

IN THIS Issue

FALL 2018

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• Next Issue: Winter 2019 •

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Legislative Update

Pediatrics Issues are the Focus at MSV Conference!

Drs. Sandy Chung and Cara Tillotson represented the Virginia AAP at the annual Medical Society of Virginia meeting in Roanoke this past October. Physicians from all specialties met to discuss important topics in healthcare for our state and to vote on resolutions. Some Pediatric specific resolutions included discussion on gun safety, taxing sodas/sugary drinks in an effort to decrease obesity, work eligibility requirements for Virginia Medicaid, concussion education for young athletes, and prohibiting conversion therapy for patients under 18 years of age. Many other resolutions, several of which addressed the opioid crisis, were discussed, which will have impact on families throughout Virginia. Not surprisingly, the MSV held similar stances on most issues as we do as Pediatricians; the passed resolutions aligned with our beliefs and concerns as a chapter of AAP. Notably, there were many medical students present from all of our Virginia schools. We were encouraged to see what the future of medicine will hold given these strong, young leaders that are already so involved!

The meeting also included the Health Care Provider Opioid Summit, where our Governor Ralph Northam gave opening remarks. A full day of Opioid related CME was presented to address the serious issue of the Opioid crisis in our state. As Pediatricians who often treats neonatal abstinence syndrome, we were encouraged at the work being done in our state to provide care to those with addiction such as helping to expand treatment options and drug take back programs.

The annual Physicians Gala had a very Pediatric friendly theme: Magic in the House of Medicine! At the Gala, the Salute to Service awards were presented. I am proud to say that two of the awards were given to Pediatricians; Dr. Sergey Liauchonak, Pediatric Resident at INOVA, was given the award for Service by a Medical Student or Resident and Dr. Ann Kellams, General Pediatrician at UVA, was given the award for Advancing Patient Safety and Quality Improvement.

Although we are a small percentage of total physicians, Pediatricians were well represented in the MSV meeting. We look forward to continuing to advocate for children with our colleagues from all specialties.

Drs. Sandy Chung, President, Virginia Chapter, AAP and Cara Tillotson, VA-AAP SW Delegate and MSV Representative representing the Virginia Chapter, AAP at the MSV Annual Meeting in Roanoke, VA.

Dr. Ann Kellams received the award for Advancing Patient Safety and Quality Improvement.

Governor of Virginia, Ralph Northam, MD takes the stage at the Health Care Provider Opioid Summit portion of MSV's event.

President's • MESSAGE

Sandy L. Chung, MD, FAAP, FACHE
President Virginia Chapter, American Academy of Pediatrics

Children cannot vote. It is then our responsibility as the adults who care for children to advocate for them. You can do your part by making sure that you get out to vote this year, and every year. Important issues such as no smoking in restaurants, no smoking in cars, safety caps on liquid nicotine containers, protected recess time, and many others are the result of the advocacy of pediatricians. In January 2019, we tackle important issues such as protecting preventative services such as developmental screenings, increasing Medicaid payment rates, and improving mental health care access for children. The Virginia Chapter of the AAP is going to need your help! Please keep your eye out for Member Alerts with more information on our Advocacy Day in Richmond on January 17, 2019, where pediatricians go to Richmond and meet with legislators to advocate for pediatric issues. We, the Chapter, want to be your voice and represent you. There are several opportunities to participate and to tell us what would help you and your patients. Contact our Executive Director Jane Chappell by email at jchappell@ramdocs.org, or by phone at 804-622-8135 Contact me by email at schung@fairfaxpeds.com. As your President, I'm here to help you. We have helped pediatricians solve payment issues with insurance companies, including Medicaid. We have helped pediatricians speak on talking to patients about gun safety, on helping parents and children understand the effects of too much screen time, and on advocating in our state on the dangers of environmental changes on children's health. If you have a passion that is important for children and would like to teach others, please let us know!

As pediatricians, we are all experts in child health and organizations frequently want our opinions on how to appropriately address children's health in their work. If you are interested in advising others as a pediatrician, please let us know. We have helped schools, state government, county governments, advocacy groups, nonprofits, health systems, and community coalitions, just to name a few.

Nearly 50% of physicians report symptoms of burnout.

If you have ideas that would help bring back the joy of practicing medicine, we would love to hear from you! In pediatrics, we can take joy from knowing that our patients are adorable, our work is meaningful, and our impact on others lifelong. I find the joy of pediatrics in the drooling smiles of our infants, the giggles from the preschoolers, the awesome never-ending conversations from our preteens, the amazing fleeting eye contact from a sullen teenager, and the companionable talks from the now young adults. Our role in healthcare is so unique from others and we should all be proud of the work that we do.

Please contact us and help to make the Commonwealth of Virginia a fantastic place to be a pediatrician! I look forward to hearing from you,

Sandy Chung, VA-AAP President | schung@fairfaxpeds.com

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This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of Eastern Virginia Medical School and the American Academy of Pediatrics-Virginia Chapter. Eastern Virginia Medical School is accredited by the ACCME to provide continuing medical education for physicians.

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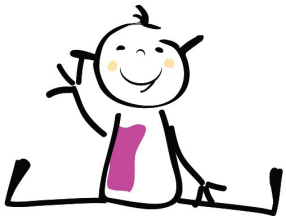

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Review the articles on pages 4-23. Complete the attached VA-AAP Newsletter Registration and Evaluation Form and return to the EVMS-CME, 358 Mowbray Arch, Suite 207, Norfolk, VA 23507 or scan/email to cme@evms.edu.

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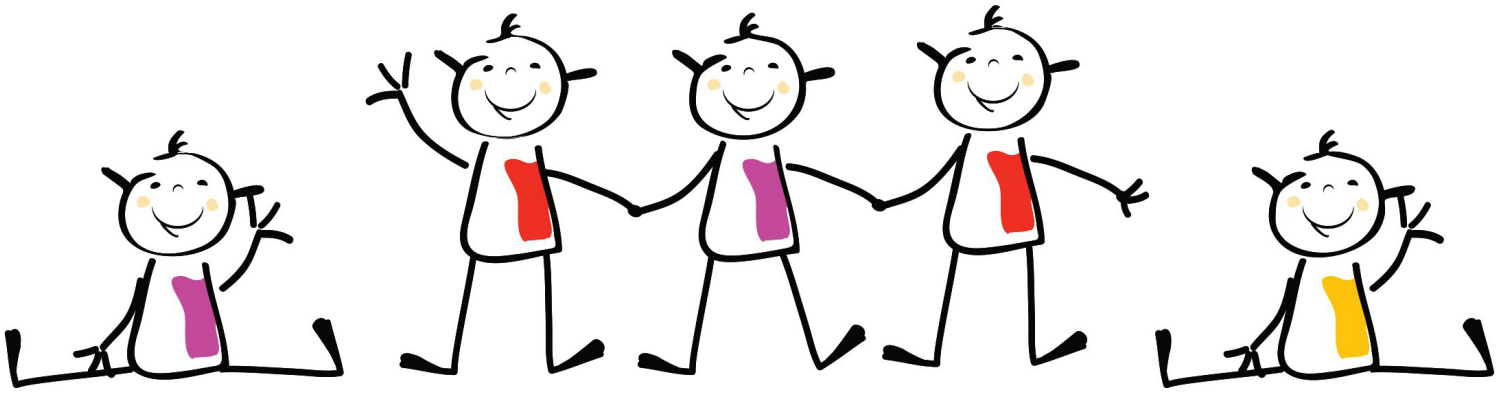

Posttraumatic Stress in Neonatal Intensive Care Unit (NICU) Mothers

Allison Baylor Williams, MS | Clinical Psychology PhD Student | Virginia Commonwealth University

***Objective**: (1) Gain understanding of the posttraumatic stress in intensive care settings, including: its prevalence, presentation, and consequences of untreated posttraumatic stress on infants/children, parents and medical providers; (2) Provide an example of how posttraumatic stress can be treated within intensive care settings.*

***ACGME Competencies**: Practice-based Learning and Improvement; Medical Knowledge; Interpersonal Communication Skills; Professionalism.*

When a mother first sees that little positive sign on her pregnancy test, she might picture a range of things—a soft baby snuggled against her chest, tiny baby shoes and big daycare bills, and tummy-time filled days followed by sleepless nights. She might adjust to the idea of motherhood with relative ease, or it may take some time. While the range of feelings in discovering a pregnancy are wide and changing from day to day, one thing is consistent: mothers picture a healthy baby.

Not included in mothers' visions of their newborn are the bright lights of the NICU, the slow hiss of the ventilators that allow their babies to breathe, or the fetal heart rate alarms that can cause their own heart rates to plummet. Expectant mothers don't picture pacing their babies' rooms while their infants undergo intensive procedures or anticipate how fragile holding a baby under two pounds will feel. Nowhere in envisioning a newborn do most expectant mothers imagine a birth where they suddenly have to be cut open—sometimes months before their due date—and that, as they lay shivering from medication and fatigue, they don't hear a cry.

And yet, this is what the NICU does every day: cares for and saves the lives of babies whose families' worlds are turned upside down. For the one in eight newborns who are admitted to the NICU each year, these scary sights and sounds are the new reality for their parents.[1] Decades of research have shown us that the NICU experience is stressful for families.[2] Unsurprisingly, substantial research has also demonstrated that postpartum depression and anxiety rates are significantly higher in NICU mothers than well-baby mothers, both in the short and long term.[3,4] Moreover, maternal mental health matters for mother, baby, and the medical team. Poor maternal mental health is associated with deleterious effects on the infant, including insecure attachment, less frequent NICU visitation, dysregulated infant sleep patterns, impaired infant cognitive development, and slower physical development.[5] Maternal postpartum mental health has been shown to increase the likelihood of maternal substance use and influence physical health outcomes, including chronic pain, insomnia, and cardiovascular disease.[6] Finally, the mother's mental health concerns could affect the medical team, contributing to competing demands on provider time and provider burnout. While research has established that the NICU can be stressful, with considerable mental health consequences, studies have only recently begun to document that a NICU hospitalization can be a potentially traumatic event for NICU mothers, resulting in the subsequent development of posttraumatic stress.

Mothers of NICU infants are often recovering from a traumatic birth while fearing for the well-being of their infants, both of which can contribute to posttraumatic stress symptoms, such as Acute Stress Disorder (ASD; diagnosed in the first month) or Posttraumatic Stress Disorder (PTSD; diagnosed after the first month) (ASD).[2] Posttraumatic stress in medical settings is a newer field of research, but a broader body of literature from the Pediatric Intensive Care, Burn, and Oncology units shows that parents can experience posttraumatic stress related to their children's hospitalizations.[7,8] Some of the symptoms of posttraumatic stress in NICU mothers look like textbook PTSD: flashbacks related to the birth or a procedure, nightmares, and intrusive thoughts.[9] Other symptoms are harder to identify, such as avoidance (e.g., infrequent visitation of the NICU), hypervigilance (e.g., looking at the monitors excessively) or hyperarousal (e.g., anger at medical team).[9] Many parents with posttraumatic stress might appear to be coping well by compartmentalizing the experience, but upon formal evaluation, are actually in need of support. For NICU mothers, posttraumatic stress rates are comparable—or higher--than other postpartum mental health concerns, as 18% to 54% of mothers meet criteria for ASD in the first month.[10,11] Moreover, posttraumatic stress remittance rates are low, as an estimated 13% to 62% of mothers have PTSD symptoms between one month and one year after delivery.[12,13]

Given the high prevalence and significant consequences of posttraumatic stress for both mothers and their babies, Virginia Commonwealth University's NICU has implemented trauma-informed mental health screening practices as well as a doctoral dissertation study on posttraumatic stress. These new services have a strong foundation, given the existing strengths and practices of our NICU. VCU's NICU has existing policies that promote bonding and stress reduction, such as breast-feeding, skin-to skin contact and involving family with care whenever possible. Our NICU medical team members are kind and capable. They work compassionately with our families, providing daily updates and addressing questions, teaching parents to care for their babies' often complex needs, assessing any barriers to care, and providing families with support. The new mental health services aim to build on this existing foundation of family-centered care.

At VCU, we are now providing formal assessments of maternal mental health during the first 30 days of infant hospitalization. These 45-90 minute assessments are conducted by masters-level, clinical psychology PhD students, supervised by a licensed clinical psychologist, Dr. Alyssa Ward. In these assessments, we formally evaluate presenting mental health concerns (e.g., posttraumatic stress, depression, anxiety), reproductive history (e.g., prior fetal loss, infertility issues), NICU-related stressors, birth experiences, and coping with hospitalization. The assessment responses are used to guide clinical interventions, as well as used as data for a dissertation study on posttraumatic stress in NICU mothers. The dissertation study is one of the first to examine risk factors for posttraumatic stress during early NICU hospitalization. It focuses specifically on pre-existing risk factors for posttraumatic stress, such adverse childhood experiences or history of fetal loss. Additionally, the study models how mothers' perceptions of their infants' health or birth experiences map onto objective markers of infant health to predict posttraumatic stress responses.

Following this assessment, NICU mothers are provided with follow-up mental health support and strengths-based interventions. First, mothers are given feedback and education about any areas of mental health concern, such as posttraumatic stress or postpartum depression. Coping strategies for specific stressors are directly addressed. We reinforce bonding and caregiving, providing both education and practical strategies. Additionally, given that avoidance is a primary mechanism through which posttraumatic stress is maintained, we introduce non-avoidant coping strategies, distress tolerance, process aspects of their traumatic experiences, and facilitate social support. We also offer other evidence-based treatments, including behavioral activation for depression, grounding or relaxation exercises, self-care, sleep hygiene, cognitive restructuring, and structured problem-solving. We hope that the new trauma-informed research and clinical interventions in the NICU will ultimately promote the health and well-being of our NICU families. ##

Neonatal Medicine: Three Quality Care Improvement Strategies to Influence Health Outcome of Virginia's most vulnerable infants

Quality Improvement One: Decreasing pharmacotherapy need and length of hospitalization for Neonatal Opioid Withdrawal Syndrome (NOWS) Care at CHOR

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***Objective**: To Describe quality initiatives to improve neonatal health.*
***ACGME Competencies**: Patient Care; Medical Knowledge; Practice-based Learning and Improvement; Systems-based practice.*

Rising opioid abuse in the U.S. has resulted in an increased incidence of neonatal opioid withdrawal syndrome (NOWS) as a consequence of fetal exposure. Accordingly, newborn services at CHOR at VCU have identified a steady increase in the incidence of NOWS from <10 in 2013 to 118 in 2017. NOWS, also called neonatal abstinence syndrome (NAS), is characterized by hyperactivity of the central nervous system, gastrointestinal system, respiratory system, and autonomic nervous system. The incidence and treatment of NOWS has high levels of variability (depending on multiple factors), with up to 80% of opioid-exposed neonates requiring pharmacological intervention. Infants born to mothers with opioid affected disorder remain in the hospital for a 5-7 day observation for risk of NOWS. Assessment of neonatal abstinence symptomatology and treatment need is performed using diagnostic score tools, with the Finnegan scoring system most widely used across U.S., including our institution. A more recently designed tool, the Eat, Sleep, Console scoring system (ESC) based on neonatal physiologic functions has been associated with reductions in both lengths of stay, and use of pharmacological intervention with integration of rooming in, use of non-pharmacologic therapy and integration of mother/parents in the decisions for care of the infant.
At CHOR, we evaluated the opportunities for quality care improvement, for NOWS infants, with a focus on strategies to decrease need for pharmacotherapy and length of hospitalization. To do so, we determined provider adherence to current NOWS guidelines for care in the neonatal intensive care unit (NICU) and Newborn Nursery (NBN), examined the use and the impact of non-pharmacological interventions on pharmacotherapy need and determined infant drug exposure, medical outcomes and length of hospitalization. We hypothesized that infants with greater non-pharmacologic intervention and visitation by parents would have improved outcomes as measured by decreased pharmacotherapy use and length of hospitalization.

Using a retrospective chart review we identified infants >34 weeks gestation in the NICU or the NBN at CHOR, who received NOWS scoring for maternal antenatal opioid exposure in 2017. Two thirds of these infants were selected for review. For each infant we collected Finnegan scores over the length of hospitalization, determined any opioid treatment or changes in treatment, identified the use of non-pharmacological interventions, and detailed maternal history including drug use, prenatal care, incarceration, existing medical concerns and maternal and family visitation.

Seventy-six infants were included in the evaluation with 51% White, 34% Black and 15% Other racial background. Fifty infants (76%) were cared for in the NBN while 26 infants (34%) required care in the NICU. Twenty infants (26.3%) received pharmacotherapy with methadone due to NOWS symptomatology. The average length of stay (LOS) for infants that receiving methadone treatment was 24±9 days compared with 7±5 days for those infants who did not require therapy. Maternal history was evaluated from 71 mothers, of which 67 mothers (94%) received some amount of prenatal care. Thirty-five mothers (49%) were enrolled in abuse recovery programs at the time of delivery and 42 mothers (55%) were identified as having a history of polysubstance use during the pregnancy. Polysubstance use included heroin, cocaine, alcohol and marijuana use.

In the evaluation of provider adherence to the CHOR NOWS guidelines, we identified an 85-90% provider adherence concerning treatment initiation and therapy weaning as well as patient discharge. Altered adherence were due to valid clinical judgement concerns in individual care management. Non-pharmacologic care, important to decrease pharmacologic treatment, included swaddling, holding, environmental control and non-nutritive sucking was documented in 100% of NICU infants. These non-pharmacologic interventions were employed both before and during treatment. Family visitation ≥ 50% of the length of hospitalization was independently associated with decreasing pharmacotherapy duration and LOS 5±2 days, $p<0.005$.

The outcomes of our investigations has provided us with additional information to improve the care provided to the infant with NOWS. We learned that the majority of our mothers received prenatal care for their infants during their pregnancies and documented comprehensive and excellent levels of staff adherence to NOWS treatment guidelines in infant initiation and discharge in the NICU and NBN. We identified that greater family presence and visitation with use of non-pharmacologic interventions including skin-to-skin was associated with a significantly reduced need for pharmacotherapy days and length of hospitalization. We are using this data to continue to augment maternal infant guidelines in the management of NOWS at CHOR.
Acknowledgements: Karen and Andrew Eichenbaum, JACK's Summer Scholar Program at VCU and JACK's Summer Scholars: Corene Cantwell, VCU School of Nursing and Serena Fang, University of Utah School of Medicine

References:
Tyler N.A. Winkelman, Nicole Villapiano, Katy B. Kozhimannil, Matthew M. Davis, Stephen W. Patrick; Incidence and Costs of Neonatal Abstinence Syndrome Among Infants With Medicaid: 2004–2014; Pediatrics Mar 2018, e20173520; DOI: 10.1542/peds.2017-3520
http://www.vhha.com/research/2018/03/30/rate-of-nas-babies-rose-11-percent-in-2017/ - Virginia Hospital and Healthcare Association.
Grossman MR, Berkwitt AK, Osborn RR, Xu Y, Esserman DA, Shapiro ED, Bizzarro MJ. An Initiative to Improve the Quality of Care of Infants With Neonatal Abstinence Syndrome. Pediatrics. 2017 Jun;139(6). pii: e20163360. doi: 10.1542/peds.2016-3360. Epub 2017 May 18.

Quality Improvement Two: Increasing human milk consumption for the high risk very low birthweight infant in the Neonatal Intensive Care Unit at CHoR

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Human milk (HM) is essential for all infants but is an especially valuable therapy for the Very Low Birth Weight (VLBW) at risk for morbidity and mortality in the neonatal intensive care unit (NICU). In cases where mothers cannot provide their own breast milk, pasteurized donor human milk (PDHM) can serve as an alternative and/or bridge for successful human feeding in these infants. As a baby-friendly hospital, the CHOR NICU aims at providing human milk to all VLBW infants. In this project, we aimed to identify factors contributing to barriers to human milk and mother's own milk consumption in the VLBW. The goal was to increase maternal milk consumption to greater than or equal to 80% use at discharge. In addition, we aimed to have 100% human milk provision for the VLBW infant during their hospitalization especially targeting the most vulnerable early weeks of life. Thus, the goals of this quality improvement project were to identify possible barriers to maternal and human milk use in the NICU. We further hypothesized that VLBW Infants, who received HM or PDHM during their stay at CHoR, would be more likely to continue to receive maternal milk upon discharge.

To understand barriers to human milk use we sought to evaluate provider and mothers perceptions of human milk use. We developed and distributed an anonymous survey to nurses and mothers at CHoR's NICU and NBN to seek their views on human milk including use of PDHM and formula. Additionally, to determine actual utilization of human milk in the VLBW infant, we performed a retrospective chart review of all VLBW infants admitted to the CHoR NICU between 1/1/2017-12/31/2017. We measured variables that included infant and maternal demographics, birth weight, corrected age (CGA), length of stay (LOS), type of feeding during stay and at discharge, maternal antenatal illness and drug use, as well as maternal human milk support including human milk feeding education, availability and use of breast pumps and lactation consultant utilization.

There were 73/172 (42%) nurses who participated in the nursing staff perception survey. The overwhelming majority of nurses >90% believed that maternal milk was best for the infant and that PDHM was safe and can serve as a bridge to successful maternal milk use at discharge. All fifteen mothers approached in this pilot convenience survey agreed to participate and responded to the survey. All mothers identified that they wanted to breastfeed and believed mother's milk was best for their infant. When asked about safety of PDHM, 50% of mothers expressed concerns related to donor milk safety. Additionally 50% of mothers aimed to use formula as a bridge to human milk and supplementation after discharge.

Sixty-four VLBW infants were included in the analysis. The mean gestational age of the group was 28.7 ± 2.9 weeks with a mean birth weight of 1090 ± 321 gms. Infant's racial/ethnic background included 22% Caucasian, 53% African American and 25% Hispanic or Other. Maternal illness and/or maternal drug use that prevented discharge on mother's milk was present in 11% (7/64) of cases. Sixty-one infants (95%) received HM feeding during their hospitalization with 30% of infants (19/64) having received DM during their stay at CHOR. Forty-nine percent of mothers (28/57) received lactation support through lactation specialists with the average time to lactation consultation of 14 days. By the time of discharge, the average corrected gestational age of the infants was 39.5+/-7 SD weeks with an infant average length of hospitalization of 79+/- 56 SD days. At discharge, 42% (24/57) of infants who were eligible to receive mother's milk were discharged receiving mother's milk.

These results provided detailed opportunities to improve our goal to increase mother's milk at discharge for the VLBW infant at CHOR. Our assessments identified that 65% of the VLBW infant received their mother's own milk during their stay with an additional 30% who received pasteurized donor human milk. The use of PDHM in our NICU allowed us to provide safe human milk nutritional support to 95% of VLBW infants. Through the survey we identified that NICU nurses regard mothers own milk as the best source of nutrition for all VLBW infants and regard pasteurized donor human milk as a bridge to provide safe nutrition for the at risk infant as well as a successful bridge to breastfeeding at discharge. Although 42% of VLBW infants whose mothers were eligible to continue breastfeeding were discharged on mother's milk, the majority of all VLBW infants were exposed to HM for at least 2 months during their hospitalization in the NICU.

This information will assist us to evaluate opportunities to improve lactation support services and accessibility for mothers in the NICU as well as continue to advance maternal education regarding the importance of human milk in the VLBW infant for improvement of breastfeeding at discharge.

Acknowledgements: Karen and Andrew Eichenbaum & JACK's Summer Scholars Program at VCU and JACK's Summer Scholars: Sathya Areti, VCU School of Medicine, Megan Foret VCU School of Nursing and Kaitlin Hiciano, Fordham University

Quality Improvement Three: Decreasing Neonatal Necrotizing Enterocolitis Through Academic Neonatology and Community Neonatology Clinical Care Integration

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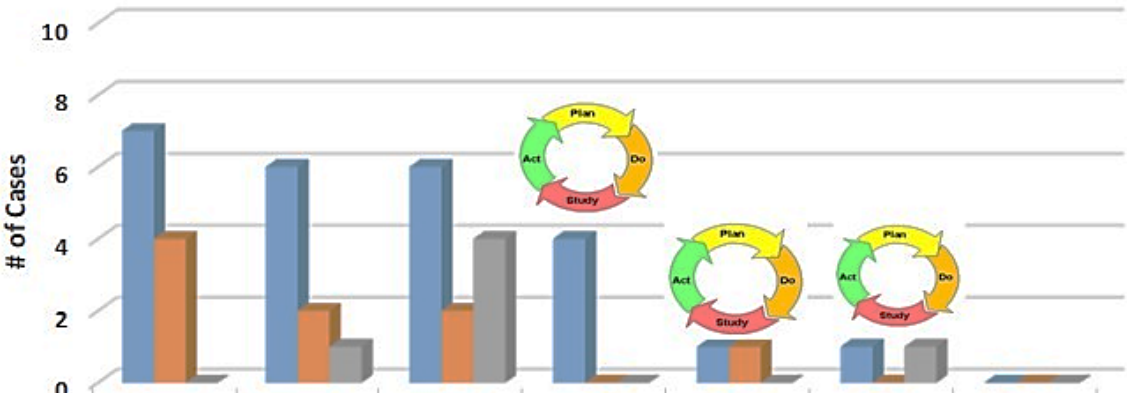
Necrotizing Enterocolitis (NEC) is a leading cause of morbidity and mortality affecting 1-5% of Neonatal Intensive Care Unit (NICU) admissions. Decreasing the devastating consequences of NEC is a global priority in neonatology. In 2014, the Children's Hospital of Richmond at Virginia Commonwealth University (CHOR at VCU) academic center neonatal division partnered with two community hospitals with level 3 NICUs to advance overall NICU and neonatal health. Decreasing NEC incidence, severity and mortality was a priority at these centers. CHOR academic medical leadership focused on a clinical care integration approach to decrease NEC severity and morbidity.

The approach we used included application of an early diagnosis tool developed at CHOR to identify early intestinal dysfunction, the Neonatal Necrotizing Enterocolitis Early Detection System (NeoNEEDS©). NeoNEEDS© a practical, easy to use clinical bedside assessment aims to identify infants with early signs of intestinal dysfunction. The tool implemented by the bedside nurse utilizes clinical changes in five domains (behavior, cardiac, respiratory, gastrointestinal and feeding tolerance) as well as specific risk factors for early NEC diagnosis. NeoNEEDS© was implemented in 2014 with further bundled care practices including donor milk program and feeding guidelines over the years as well as instituting a reporting NICU QI team. Integration focused on training academic and community NICU providers and nursing clinical care with accountable reporting to the QI Team. We hypothesized that this clinical care network integration approach of quality and safety that aligned diagnosis and management would lead to decreased NEC severity and mortality. We aimed that the integration of academic medical center NICU tools within the community NICU oversight would enhance local care at the community site decreasing NEC morbidity and need for transfer to the academic center.

We identified that implementation of an academic-community QI team focused on a clinical care network integration model improved nursing and provider communication and diagnostic skills in detection of early signs and symptoms of intestinal dysfunction. Implementation of this QI focused project was associated with decreasing NEC incidence and severity overall in both NICUs, Figure 1.

Figure 1

PDSA Cycles with Number of NEC Cases Annually and Subsequent Surgery or Mortality



	2011	2012	2013	2014	2015	2016	2017
NEC	7	6	6	4	1	1	0
NEC Surgery	4	2	2	0	1	0	0
NEC Death	0	1	4	0	0	1	0

The QI project led to systematic accountability, quality and safety leadership reporting with further cultivation and dissemination of other quality and process improvements in the community NICU including chronic lung disease and mortality.

The results of advancing academic-community QI team clinical care partnerships extends and leverages collaborative health improvements among community networks providing high level of neonatal care. These partnerships can support specific improvements in the NICU such as NEC severity and lead to further improvements in quality initiatives at the local level. These partnerships can expand broader community institutional leadership engagement and accountability as well as enhance NICU care value not only in the community but also at the academic health care level improving community perception of academic center value and alignment with the mission for community health improvement for the academic center.

References:
Fox JR, Thacker LR, Hendricks-Muñoz KD. Early Detection Tool of Intestinal Dysfunction: Impact on Necrotizing Enterocolitis Severity Am J Perinatol. 2015 Aug;32(10):927-32. doi: 10.1055/s-0034-1543984. Epub 2015 Mar 23.

Essentials of Pediatric Burn Injury

Megan Coe, MD, Kara Greenfield, DO, Deanna Willis, MD, Michael Feldman, MD,
Aline Baghdassarian, MD MPH, Oliver Karam, MD PhD, and David Marcello III, MD

***Objective**: Accurately assess the type, severity and percentage of body surface involvement of pediatric burn patients. Identify those patients who need fluid resuscitation and calculate the appropriate initial resuscitation fluid rate. Provide initial wound management and identify those patients at need for transfer of care to a burn center. Monitor for signs of systemic complications of burn injuries, including aberrant vital signs and risk factors that place patients at higher risk for serious bacterial infection.*
***ACGME Competencies**: Patient Care; Practice-based Learning and Improvement; Medical Knowledge; Systems-based Practice.*

BACKGROUND

Burns and fire are the third leading cause of unintentional death in children ages 1-15(CDC). Children with burn injuries present not only to emergency departments, but also to pediatrician offices and urgent care centers. As long term outcomes are related to the initial assessment and timely management, it is important for pediatricians to have an understanding of burns and their treatment as well as what needs to be managed in a specialty burn center.

INITIAL ASSESSMENT

The first step in pediatric burn evaluation and management is assessing the burn itself. Important aspects of the history that aid in determining the severity of the burn include time since burn occurred, whether the burn was due to flame or scald, whether it was a flash burn or required extinguishing, type of substance involved for scald burn, and duration of contact. The mechanism of injury is important when determining risk for issues such as abuse or potential for airway instability. For example, one would have a higher index of suspicion for abuse in a child under three with a flame burn, since the majority of burns in this age group are scald burns. Also, a practitioner would worry about inhalation injury if the patient was in an enclosed space with smoke exposure, as opposed to a scald burn.

Burn depth assessment can difficult to determine initially but is essential for determining the need for resuscitation and need for specialty burn care. It is important to note that first degree (superficial) burn injuries, red skin without blistering, should not be included in calculation of total body surface area (TBSA) of the burn.

Superficial Burns (NOT included in TBSA calculation)
- Red skin without blister formation
- Painful to the touch
- Blanches
- Brisk capillary refill

Partial Thickness Burns
- Blisters, intact or broken
- Pale and dry or cherry red
- Sensation to light touch and pressure generally intact
- Blanches. Deeper partial thickness may have delayed blanching.
- Delayed capillary refill

Full Thickness Burns
- White, leathery, and dry
- Does not blanch
- Sensation to light touch is diminished but they may still feel pain.
  They may have a feeling of numbness.
- No capillary refill

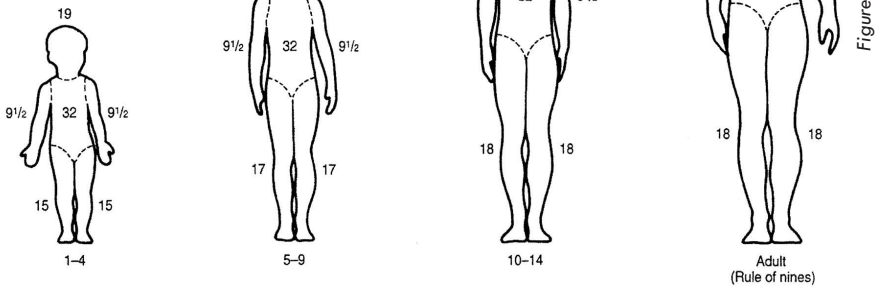


Figure One (Hettiaratchy, 2004)

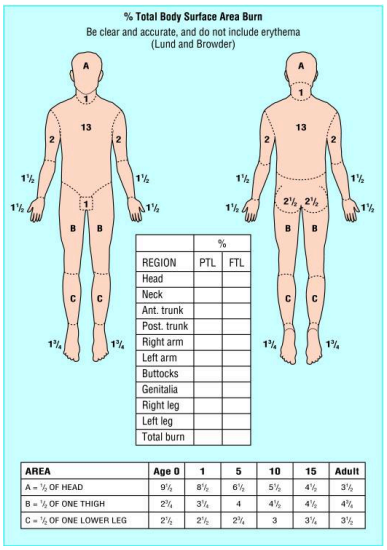


Figure Two (Hettiaratchy, 2004)

The next step in burn assessment is the calculation of total body surface area. TBSA is the percentage of a person's body surface area that has either partial thickness or full thickness burns. One of the more common methods of determining TBSA is using the Wallace Rule of 9's (Figure One - Hettiartchy, 2004). Originally used in adults, adaptations have been made for use in children to accommodate developmental differences in body proportions, mainly addressing the increased size of the head in younger children. However, this method still has been found to overestimate TBSA, especially in children and obese patients (Goverman, 2014). An alternative method frequently used is the Palmar Method. For this, the size of *patient's* palm including their fingers and thumb (with the fingers held together), is equal to approximately 1% of their own BSA. The provider compares the palm to the size of the burn to estimate TBSA. Another method of determining TBSA is to use a Lund and Browder diagram. This method takes into account the patient's age, proportion of body surface area, extent of extremity involvement, and when used correctly has been shown to be the most accurate method in children (Figure Two - Hettiartchy, 2004)

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FLUID RESUSCITATION

Optimal fluid management is essential to the survival of a severely burned patient, as the injured skin is no longer able to prevent water loss. In addition, there is an increase in capillary permeability that leads to loss of intravascular volume early in the course of the burn. The primary goals of fluid resuscitation are to restore and maintain adequate tissue perfusion without inducing fluid overload. Indeed, hypovolemia would lead to decreased cardiac preload, which would in turn lead to lower cardiac output and ultimately decrease oxygen delivery. Therefore, inadequate resuscitation leads to poor perfusion to the body's organs and to the zone of microcirculation stasis, which can lead to progression of superficial burns and/or tissue necrosis. Excessive resuscitation, on the other hand, can lead to fluid overload, which ultimately puts patients at higher risk for respiratory failure secondary to pulmonary edema, infection, multi-organ failure, as well as compartment syndrome (Fuhrman; Stutchfield). Children have higher fluid needs relative to adults: they have a greater surface area to weight ratio and greater relative burn-related fluid losses (Romanowski).

The American Burn Life Support (ABLS) program, sponsored by the American Burn Association, recommends fluid resuscitation for children with >10% TBSA burns. While there are several formulas designed to help calculate the fluid needs of severely burned children, all formulas take into account the child's weight and percentage of burns, in addition to a maintenance fluid. All of these formulas are a starting point for resuscitation that requires hourly monitoring and adjustment. The resuscitation fluid is given continuously over a 24-hour period, rather than via bolus fluids. Titration of the fluid rate is based on urine output.

The ABLS recommendations are as follows (ABLS manual):

- Resuscitation fluid: 3-4mL x weight in kg x %TBSA burned, administered as Ringer's Lactate solution
  - o One half of this amount is to be given in the first 8 hours from the time of injury
  - o The remainder is to be given in the next 16 hours
  - o These are general goals which may not necessarily be how the patient responds clinically. Fluid titration is ultimately based on urine output. The fluid rate is not always cut in half after the initial 8 hours from the burn.
  - o Resuscitation begins at the time of the injury. It is important to start fluid resuscitation as soon as is possible as a delay may worsen outcome.
- Maintenance fluid: standard calculation of pediatric maintenance fluids using Ringer's Lactate, with the addition of dextrose for infants and young children
- The resuscitation fluid rate is added to the maintenance fluid rate to give the final total fluid infusion volume to be given over the first 24 hours.

There is some debate in the literature regarding additional measures to target, including lactate and invasive cardiac output monitoring (Stutchfield; Romanowski; Sanchez; Kraft). Indeed, low urine output could be a result of other etiologies, including antidiuretic hormone (ADH) release in response to the burn or Syndrome of Inappropriate Antidiuretic Hormone (SIADH) secretion, caused by the pain. For example, one study in adults with a mean burned surface of 35% TBSA showed that urine output was not associated with preload, cardiac output, or lactates (Sanchez). In a study of children with burns > 30% TBSA, the use of invasive cardiac output monitoring was associated with improved clinical outcome. Additionally, the authors also showed that urine output was not associated with cardiac output or preload (Kraft). These preliminary results indicate the need for future research on a more physiologic target for fluid resuscitation than urine output.

WOUND CARE AND INITIAL CONSIDERATIONS

Initial steps of caring for the wound should focus on stopping the burning process. In general, this means putting out active burns, removal of burned clothing, and copious amounts of irrigation for chemical exposures. The most effective and safest way of achieving this is to flush the wound with lukewarm water, which will also assist with pain control. It is important to avoid ice or cold water, as this can cause further damage to the burned area. One should also avoid wrapping the patient in wet dressings as this will inevitably cause their body temperature to drop, and lead to increased skin damage from maceration.

Hypothermia should be avoided, and body temperature monitored closely as children are less able to maintain body temperatures compared to adults.

Derangements in glucose are another common complication from large burns, and glucose levels should be monitored and treated accordingly. Pain control is also an essential aspect of the care of patients with significant burns. Options include NSAIDs, intravenous or intranasal opioids, and consideration of procedural sedation in the event the patient requires significant debridement and wound care. NSAIDs may lead to platelet inhibition and should be avoided in any patients who may need surgical intervention.

In the case of a patient who requires transfer to a burn center, the use of ointments or creams prior to dressing the wound should be avoided. Application of these ointments may affect the ability of the burn center to further evaluate the burn. Rather, the burn should be covered with a nonadherent dressing such as Xeroform gauze, then loosely wrapped with gauze. Other alternative nonadherent dressings include Telfa, Adaptec, or a silicone lined foam product (Meplite). This will protect the wound from contamination and further trauma.

The question of whether or not one should debride burn blisters remains somewhat controversial in burn literature. On one hand, the true thickness of the burn cannot be assessed with the blister intact, blisters may exacerbate continued thermal damage after initial contact, and most large blisters will rupture on their own increasing the risk of infection. Others argue that the fluid contained in blisters can be protective and promote healing of the underlying burn. Generally, it is recommended that small blisters <6mm in diameter be left intact, but larger blisters should be debrided using saline soaked gauze to gentle rub and remove devitalized skin (Baartmans, 2016). We recommend avoidance of debridement in situations where the practitioner is not comfortable with this process or unable to attain adequate pain control. This would necessitate a transfer to a specialty burn center in this situation.

Technological improvements and better understanding of burn physiology have modernized the approach to burn dressings. Silver sulfadiazine (Silvadene) was considered the standard of care for topical burn therapy in the past. Current literature shows that Silvadene causes wound sloughing which makes burn reassessment difficult, demonstrates poorer healing outcomes, and requires more frequent, painful dressing changes (Wasaik, 2013; Muangman 2010). Therefore, Silvadene cream is no longer recommended for topical therapy of burns. Biosynthetic, silicone-coated, silver-impregnated or hydro-gel dressings such as Aquacel Ag or Mepilex lite are non-adherent, absorb drainage, reduce pain and allow for easier dressing changes while reducing infection rates (when silver is present in the dressing).

INDICATIONS FOR TRANSFER

Per the American Burn Association, transfer criteria to a burn center includes--

- Partial thickness or moderate burns >10% TBSA

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- Any significant burn to face, hands, feet, genitalia, perineum or major joints
- Full thickness burns of any size in any age group
- Chemical burns
- Inhalation injury
- Any burns with concomitant trauma
- Burns in children with pre-existing conditions that predispose poor healing
- Burned children in hospitals without qualified personnel or equipment for the care of children
- Children requiring social, emotional or rehabilitation factors

VCU is Virginia's only burn center verified by the American Burn Association. For transfers or consultation, the One Call Center is available 24/7 at (804) 828-2638.

INFECTION MANAGEMENT

Infection in pediatric burn patients remains a significant cause of morbidity and mortality owing to several risk factors including disruption of the skin barrier, impaired immunity, and exposure to nosocomial devices (urinary bladder catheterization, endotracheal tubes) and procedures (frequent manipulation of open burn wounds). Fever in a burn patient is not a reliable marker of infection as these patients have a hyper-inflammatory and hypermetabolic state secondary to their injuries. Therefore, the classic SIRS criteria cannot be easily utilized in predicting outcomes or guiding workup in these patients.

The American Burn Academy, in response to this issue, has created modified criteria that can aide in early detection of infection and is based on worsening or progression from already altered baseline values (Greenhalgh):

- Tachycardia > 2 SD above age-specific norms
- Tachypnea > 2 SD above age-specific norms
- Thrombocytopenia (applicable only 3 days after initial resuscitation) < 2 SD below age-specific norms
- Hyperglycemia (without pre-existing diabetes mellitus) > 200 mg/dL OR insulin resistance: >25% increase in insulin requirements in 24 hours
- Inability to continue enteral feedings > 24 hours as marked by abdominal distension, enteral feeding intolerance (residual > 150mL/hour), or uncontrollable diarrhea

While these parameters may aide in the identification of at-risk patients, some studies have shown that the risk profile for pediatric burn patients who go on to develop serious bacterial infections during their treatment course should take into account more than observed vital sign changes (Gastmeier; Rodgers; Vyles). These studies show that the following situations indicate higher risk and therefore greater need for infectious workup in response to clinical changes:

- Larger total body surface area (TBSA) involvement
- Deep partial-thickness or full thickness burns
- Exposure to flame or inhalational injury as source of burn
- Presence of a central line
- Mechanical ventilation
- Urinary catheter use

Though this list and the previously mentioned clinical signs are not all-inclusive and certainly more studies are needed within the pediatric population, they can serve as a guide when approaching a febrile pediatric burn patient. In otherwise well-appearing children without significant risk-factors, a fever may not truly indicate infection. Serial examinations and time can be useful in place of the immediate administration of antimicrobials.

REFERENCES

1. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS) fatal injury data. 2016.
2. Goverman J, Bittner EA, Friedstat JS, Moore M, Nozari A, Ibrahim AE, Sarhane KA, Chang PH, Sheridan RL, Fagan SP. Discrepancy in Initial Pediatric Burn Estimates and Its Impact on Fluid Resuscitation. J Burn Care Res. 2014 Nov 18.
3. Hettiaratchy S, Papini R. Initial management of a major burn: II—assessment and resuscitation. BMJ : British Medical Journal. 2004;329(7457):101-103.
4. Fuhrman BP and Zimmerman JJ, Pediatric Critical Care, 5th edition. Philadelphia: Elsevier, 2017.
5. Stutchfield C, Davies A, Young A. Fluid resuscitation in pediatric burns: how do we get it right? A systematic review of the evidence. Arch Dis Child 2018; 0:1-6.
6. Romanowski KS, Palmieri TL. Pediatric burn resuscitation: past, present, and future. Burns and Trauma 2017; 5:26.
7. Advanced Burn Life Support Course Provider Manual. American Burn Association 2007. http://ameriburn.org/education/abls-program/. Accessed 8/24/18.
8. Sánchez M, García-de-Lorenzo A, Herrero E, et al. A protocol for resuscitation of severe burn patients guided by transpulmonary thermodilution and lactate levels: a 3-year prospective cohort study. Crit Care 2013 Aug 15;17(4):R176
9. Kraft R, Herndon DN, Branski LK, et al. Optimized fluid management improves outcomes of pediatric burn patients. J Surg Res. 2013 May 1;181(1):121-8
10. Baartmans MGA , de Jong AAE, van Baar ME, Beerthuizen G, van Loey N, Tibboel D, Nieuwenhuis MK, Early management in children with burns: Cooling, wound care and pain management, Burns, 2016. 42 (4) 777-782, ISSN 0305-4179
11. Wasiak J, Cleland H, Campbell F, Spinks A. Dressings for superficial and partial thickness burns. Cochrane Database of Systematic Reviews 2013, Issue 3. Art. No.: CD002106. DOI: 10.1002/14651858.CD002106.pub4.
12. Muangman, P. , Pundee, C. , Opasanon, S. and Muangman, S. (2010), A prospective, randomized trial of silver containing hydrofiber dressing versus 1% silver sulfadiazine for the treatment of partial thickness burns. International Wound Journal, 7: 271-276. doi:10.1111/j.1742-481X.2010.00690.x
13. Greenhalgh DG, Saffle JR, Holmes JH, Gamelli TLP, et al. (2007). American Burn Association consensus confrerence to define sepsis and infection in burns. J Burn Care Res, 28(6):776-790. https://doi.org/10.1097/BCR.0b013e3181599bc9
14. Gastmeier, P., Weigt, O., Sohr, D., & Rüden, H. (2002). Comparison of hospital-acquired infection rates in paediatric burn patients. Journal of Hospital Infection, 52(3), 161–165. https://doi.org/10.1053/jhin.2002.1292
15. Rodgers, G. L., Mortensen, J., Fisher, M. C., Lo, a, Cresswell, a, & Long, S. S. (2000). Predictors of infectious complications after burn injuries in children. The Pediatric Infectious Disease Journal, 19(10), 990–995. https://doi.org/10.1097/00006454-200010000-00010
16. Vyles, D., Sinha, M., Rosenberg, D. I., Foster, K. N., Tran, M., & Drachman, D. (2014). Predictors of serious bacterial infections in pediatric burn patients with fever. Journal of Burn Care and Research, 35(4), 291–295. https://doi.org/10.1097/BCR.0b013e3182a23211

Quiet Please! A Quality Improvement Project to Minimize Nighttime Sleep Disruptions in the Stable Inpatient Pediatric Population

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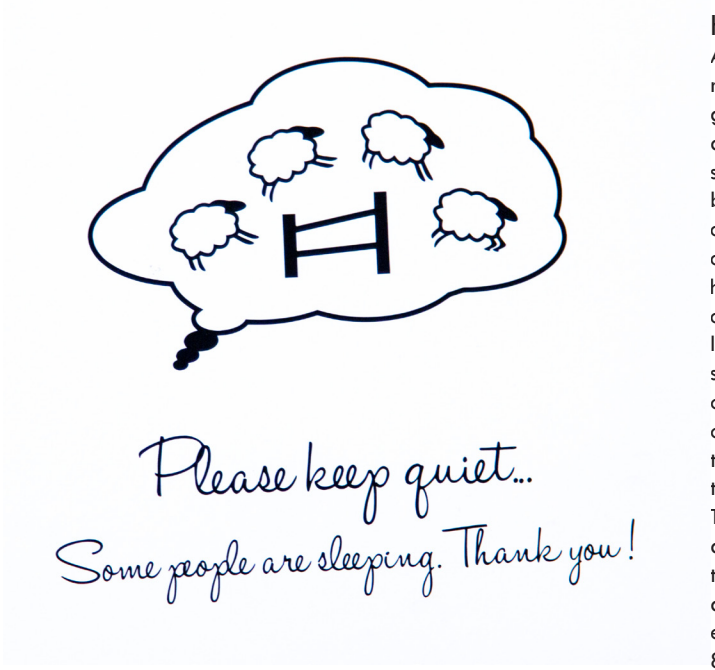
***Objective**: Reader will be able to: 1. Recognize that sleep is crucial for mental and physical health; 2. Demonstrate the adverse health effects from lack of sleep; 3. Appreciate that allowing passive vital signs checks to eligible patients had no adverse clinical outcomes.*
***ACGME Competencies**: Practice-based Learning and Improvement, Systems-based Practice*

Why is the topic of sleep so important?

Sleep serves as a restorative function and is crucial for mental and physical health. In 2016, the American Academy of Pediatrics and the American Academy of Sleep Medicine have recommended 9-12 hours of sleep for ages 6-12 years and 8-10 hours of sleep for ages 13-18 years. However, sleep is a significant component of health that is often overlooked in hospitalized patients. Lack of sleep has numerous adverse health effects including impaired healing, increased stress hormone levels, altered immune function, and cognitive dysfunction. These patients also experience increased hyperalgesia resulting in significantly more pain.[1] Sleep disturbance is a major source of stress and anxiety for hospitalized patients.[2] Hospitalized pediatric patients suffer from sleep disruptions for many reasons. These factors include provider rounding, diagnostic testing, medication administration, alarms and other ambient noise, pain leading to stress and anxiety, overnight vital signs and blood draws for laboratory testing. Current practice in many hospitals is to assess vital signs every four hours and perform routine blood draws at 3 am despite clinical indication. Vital signs can be modified when the patient is more clinically stable, and routine blood draws can be delayed. However, these practices still remain. In addition, there is limited evidence supporting the benefits of such practice. Recent evidence has shown that high risk patients can be identified with Early Warning Scores. A 2013 prospective study looked at over 50,000 patients and determined that 45% of patients awakened for vital sign checks overnight had Medical Early Warning Score (MEWS) of ≤ 1. The same study concluded that patients with MEWS ≤ 1 had less than 1% chance of an adverse event.[3] Overnight vital signs and routine lab draws are two factors that could be altered to promote rest. As a result, a quality improvement collaboration between medical and nursing staff was created to minimize nighttime interruptions in a low risk subset of hospitalized patients.



How did we accomplish this?

An interdisciplinary group, which included a Pediatric Hospitalist, two Pediatric residents, a Nurse Clinician, and two Pediatric nurses, was formed with the goal of creating a quality improvement (QI) project. Our purpose was to determine if there was a way to minimize nighttime interruptions in a low risk subset of patients without compromising patient safety. First, we collected baseline data from June 21 to July 18, 2016. There were 166 patient encounters identified using the eligibility criteria. None of the 166 patient encounters had a significant clinical event and could have had overnight vitals held. Based on this information, we developed the inclusion and exclusion criteria. Pediatric Early Warning Score (PEWS) was used as the indicator of low versus high risk patients. Low risk patients would receive "passive" vital signs at 4 am, and the routine morning labs would be drawn at 12 midnight or 6 am to provide minimal sleep interruptions. The "passive" vitals consisted of heart rate, respiratory rate, and pulse oximetry measurements. Temperature and blood pressure measurements were withheld. We determined that the above measurements can be performed without waking up the patient. The physicians would enter a Clinical Communication order for passive vitals at 4 am, and the nurses would perform the orders. Furthermore, nurses had the option to drawing the eligible patient's routine labs at 12 midnight or 6 am. Patients who met all of the following inclusion criteria were considered eligible: patients > 10 years old, on the general floor, and PEWS of < 2 at 8 pm and 12 midnight. Patients with any of the following were excluded: <10 years old, admitted to intermediate unit or PICU, on a surgical service, opiate use in prior 12 hours, medications or infusions requiring frequent vitals, any clinical changes, or physician or parental request for active vitals at 4 am.

The following data was collected and entered into a REDCap survey: the number of eligible patients, Clinical Communication order placement, type of vitals recorded, PEWS at 8 pm, 12 midnight, and 4 am, and timing of blood draws. The QI team aimed to achieve 80% compliance on order entry and 90% compliance on appropriate 4 am vitals and appropriate laboratory orders by one year from the start of the project. The primary outcome was to determine the number of eligible patients who needed higher level of care transfer or Rapid Response Team (RRT) activation.

To accomplish this, we planned for education sessions for physicians and nurses. The QI group utilized the Plan, Do, Study, Act (PDSA) approach to increase project compliance among the medical and nursing teams. During the first PDSA cycle, the physician team disseminated the project information to the hospital medicine attendings and residents via daily reminder emails. The Nurse Clinician and floor nurses educated the nursing staff about the Clinical Communication order, how to determine if their patients were eligible for passive vitals, and appropriate rescheduling of blood draws for

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routine laboratory studies. A patient eligibility algorithm was created and disseminated to both resident physicians and nurses. This was posted in resident work rooms and nursing stations on Acute Care Pediatric units. Nurses were empowered to ask physicians for the Clinical Communication order on eligible patients. The second PDSA cycle expanded the exclusion criteria. Patients receiving every four hour neurologic checks and scheduled Albuterol were excluded. Reminder emails continued to be sent to resident and nursing teams. A parent from the Children's Hospital of Richmond Family Advisory Network was added to the QI group to get parent's perspectives regarding the QI project. During the third PDSA cycle, nursing discussed the need for passive vital signs during daily safety huddles and monthly staff meetings. Reminder emails were sent to residents and nursing to discuss passive vital signs during sign out. The fourth PDSA cycle marked the second year of data collection, and the inclusion age was lowered to 5 years. Also during this time, a clinical order for passive vital signs was embedded into the Heme/Onc admission order set. During the fifth and final PDSA cycle, the clinical order for passive vital signs was embedded into the General Pediatric admission order set.

What were the results?

We conducted daily patient census review from project start date of September 7, 2016. In total, 2,138 data points have been included for analysis. Compliance was tracked, in percent of eligible patients, for clinical order placement by residents, appropriate vital signs done at 4 am, and appropriate timing of blood draws for routine laboratory testing. Based on the daily data collected, run charts were constructed weekly to follow progress.

Compliance for order placement during the first two weeks was excellent; however, in the ensuing four weeks dipped to a median of 53.5%. This was assessed to be due to the turnover in residents every two weeks. In response, daily emails were sent out from the members of the QI workgroup, and real time reminders were sent throughout the weeks to the medical and nursing teams, reminding both residents and nurses to discuss the eligibility of each patient for the QI project. This resulted in an increase to a median of 79.3% compliance with order placement, just under the initial goal of 80%. Compliance increased further to a median of 85% after third PDSA cycle was implemented. This also correlated with presentation of the QI project at the annual pediatric department QI grand rounds. Decreasing the age of inclusion from 10 to 5 years of age did not significantly change order placement compliance. Lastly, after inclusion of an electronic order in the pediatrics general admission order set in fifth PDSA cycle, order placement compliance increased further to a median of 93%.

Compliance with appropriate vital signs was high initially with a median that stayed within 70-80% during the first two PDSA cycles. The third PDSA cycle encouraged the discussion of the QI project during the nightly nursing safety huddles after which compliance improved to a median of 83-85%. Decreasing the age of inclusion once again did not significantly influence the trend of compliance with appropriate vital signs. Finally, after the fifth PDSA cycle, compliance increased to a median of 89%.

Compliance with blood draw also started out high at a median of 89-90% but dropped to 80-85% over most of the ensuing year. Decreasing the age of inclusion actually brought up the median to 91-93%, where it has remained since that time.

Retrospective chart reviews of Rapid Response Team (RRT) records revealed that there were no rapid response team activation or unplanned transfers to PICU on eligible patients who had passive vital sign checks performed the preceding night.

What have we learned?

Through this QI project, we were able to show that minimizing nighttime interruption in a low risk subset of hospitalized patients is possible and potentially beneficial. Avoiding active vital signs and routine blood draws between midnight and 6 am appears to be a safe and more patient-centered option for those children meeting inclusion criteria. Through PDSA cycles involving timely feedback to residents and nursing, we were able to achieve significant improvements in compliance to order entry rate and maintain high levels of nursing participation in rescheduling of routine blood draws. None of the eligible patients required higher level of care or RRT activation. Next steps for the QI project will be to assess quality of sleep via patient survey and lower the eligible patient age to pre-school age population.

Sleep is an important factor in the overall healing process. Through this QI project, we were able to demonstrate that we can maintain high level of care delivery by safely doing less. So next time you are caring for a patient, think about what we can do to promote rest and more sleep. Your patient and the family will thank you!

References:

1. *Menefee LA, Cohen M, Anderson WR et al. Sleep Disturbance and Nonmalignant Chronic Pain: A Comprehensive Review of the Literature. Pain Medicine. 2000;1(2): 156-172.*
2. *Kamdar BB, Needham DM Collop NA. Sleep Deprivation in Critical Illness. Journal of Intensive Care Medicine. 2012;27(2): 97-111.*
3. *Yoder JC, Yuen TC, Churpek MM et al. A Prospective Study of Nighttime Vital Sign Monitoring Frequency and Risk of Clinical Deterioration. JAMA Internal Medicine. 2013;173(16): 1554-1555.*

Pediatric Isolated Linear Skull Fractures: What does a neurosurgeon REALLY do?

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***Objective**: To educate pediatrician on the need for neurosurgical intervention in pediatric population with isolated skull fractures.*
***ACGME Competencies**: Practice-based Learning and Improvement; Medical Knowledge; Systems-based Practice.*

In children, 2-20% of head injuries result in skull fractures, with the highest risk occurring in children under one year of age. Isolated linear skull fractures (ILSF) account for well over 75% of all pediatric skull fractures[1,2]. Numerous large pediatric studies have demonstrated that ILSF with Glasgow Coma Scale (GCS) scores of >14 have little risk for complications[2-8]. Nevertheless, the management of pediatric ILSF commonly includes admission and pediatric neurosurgical consultation[2–9]. We performed a literature review on this topic, and summarize relevant findings below.

Papers dating as far back as 1997 have suggested that neurosurgical intervention in ILSF is unnecessary[3,4,7,9–11]. The two largest studies in this group report data from the Pediatric Health Information System database and the Pediatric Emergency Care Applied Research Network (PECARN). In the former, 3916 ILSF (7.6%) were found in 51,425 children less than 19 years of age. Only one patient underwent repair of dural tear and this is unlikely a true ILSF. The latter paper described 350 ILSK (0.79%) in 43,904 children under two years of age. None required neurosurgical intervention[7]. Smaller single center investigations consistently established that no neurosurgery intervention was needed in ILSF.

Other studies have evaluated outcomes following the transfer of pediatric patients with ILSF to tertiary care centers. Common reasons for transfer included neurosurgery evaluation or lack of confidence in caring for this patient population in a smaller hospital without neurosurgical care readily available[3,9,12,13]. Of all pediatric neurosurgical transfers, ILSF was the most common single diagnosis at the time of transfer to a tertiary care hospital. It was also the most frequent diagnosis in patients directly discharged from the ED of the tertiary facility[12]. ILSF represented roughly one-quarter of potentially avoidable transfers that were discharged within one day of hospital admission without neurosurgical intervention[9]. The cost of these transfers is significant. In fact, cost for admitted patients can be three times as high when compared to costs of those patients discharged from the ED[9,13].

So, what fractures should the primary care or emergency room physician be concerned with? Thankfully, the need for neurosurgery intervention after pediatric head trauma is very low and ranges from 0% - 8%[9–11,14–17,12]. Data suggest that 4-6% of pediatric patients with a skull fracture will need a neurosurgical procedure[3,14]. The severity of the mechanism of injury (running, biking, fall onto protruding instrument) combined with a clinically evident skull fracture, neurological deficit, altered mental status and severe headache will identify most patients who require intervention[16]. Fractures that require neurosurgical assessment include those involving the frontal sinus, open fractures, depressed fractures with dural laceration or one that involves two bones, specifically the temporal bone[14]. The presence of an epidural hematoma, intraventricular hemorrhage, coagulopathy, or significant comorbid neurosurgical lesion confers a higher risk for clinically important neurologic decline and need for neurosurgical intervention[11]. It is important to note that, by definition, presence of other intracranial pathology necessitates an alternate diagnosis than of an ILSF. Additionally, any child with suspected non-accidental trauma should be transferred to a hospital that offers appropriate medical and social resources.

There is an extensive amount of literature regarding ILSF and this short review was meant to highlight the clinical stability of this population and identify qualities of pediatric head injuries that may warrant neurosurgical intervention. We propose that admission or transfer of pediatric patients < 18 years with an ILSF and GCS > 14 to a tertiary center may not be necessary. To answer the question, what does a neurosurgeon *REALLY* do for patients with ILSF? We suggest that neurosurgeons do very little in the clinical management of these patients and should not be considered routine in ILSF. At The Children's Hospital of Richmond, we have created an algorithm for the safe discharge of ILSF from the emergency room while encouraging sensible neurosurgical consults. Similar prospectively validated algorithms have established an 18-25% reduction in admissions without adverse effects[18,19]. We understand that social factors and non-accidental trauma may supersede other clinical considerations.

References

1. Mannix R, Monuteaux MC, Schutzman SA, 3rd WPM, Nigrovic LE, Neuman MI. Isolated skull fractures: trends in management in US pediatric emergency departments. Ann Emerg Med. 2013;62(4):327-331. doi:10.1016/j.annemergmed.2013.02.027 [doi]
2. Schutzman SA, Barnes P, Duhaime AC, et al. Evaluation and management of children younger than two years old with apparently minor head trauma: proposed guidelines. Pediatrics. 2001;107(5):983-993.

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3. Arrey EN, Kerr ML, Fletcher S, Cox CSJ, Sandberg DI. Linear nondisplaced skull fractures in children: who should be observed or admitted? J Neurosurg Pediatr. 2015;16(6):703-708. doi:10.3171/2015.4.PEDS1545
4. Blackwood BP, Bean JF, Sadecki-Lund C, Helenowski IB, Kabre R, Hunter CJ. Observation for isolated traumatic skull fractures in the pediatric population: unnecessary and costly. J Pediatr Surg. 2016;51(4):654-658. doi:10.1016/j.jpedsurg.2015.08.064 [doi]
5. Greenes DS, Schutzman SA. Infants with isolated skull fracture: what are their clinical characteristics, and do they require hospitalization? Ann Emerg Med. 1997;30(3):253-259. doi:S0196064497002722 [pii]
6. Hassan SF, Cohn SM, Admire J, et al. Natural history and clinical implications of nondepressed skull fracture in young children. J Trauma Acute Care Surg. 2014;77(1):166-169. doi:10.1097/TA.0000000000000256 [doi]
7. Powell EC, Atabaki SM, Wootton-Gorges S, et al. Isolated linear skull fractures in children with blunt head trauma. Pediatrics. 2015;135(4):e851-7. doi:10.1542/peds.2014-2858 [doi]
8. Rollins MD, Barnhart DC, Greenberg RA, et al. Neurologically intact children with an isolated skull fracture may be safely discharged after brief observation. J Pediatr Surg. 2011;46(7):1342-1346. doi:10.1016/j.jpedsurg.2010.12.019
9. Mackel CE, Morel BC, Winer JL, et al. Secondary overtriage of pediatric neurosurgical trauma at a Level I pediatric trauma center. J neurosurgeryPediatrics. June 2018:1-9. doi:10.3171/2018.5.PEDS182 [doi]
10. Addioui A, Saint-Vil D, Crevier L, Beaudin M. Management of skull fractures in children less than 1 year of age. J Pediatr Surg. 2016;51(7):1146-1150. doi:10.1016/j.jpedsurg.2016.01.007 [doi]
11. Greenberg JK, Stoev IT, Park TS, et al. Management of children with mild traumatic brain injury and intracranial hemorrhage. J Trauma Acute Care Surg. 2014;76(4):1089-1095. doi:10.1097/TA.0000000000000155 [doi]
12. Vedantam A, Hansen D, Briceno V, Moreno A, Ryan SL, Jea A. Interhospital transfer of pediatric neurosurgical patients. J neurosurgeryPediatrics. 2016;18(5):638-643. doi:10.3171/2016.5.PEDS16155 [doi]
13. White IK, Pestereva E, Shaikh KA, Fulkerson DH. Transfer of children with isolated linear skull fractures: is it worth the cost? J Neurosurg Pediatr. 2016;17(5):602-606. doi:10.3171/2015.9.PEDS15352
14. Bonfield CM, Naran S, Adetayo OA, Pollack IF, Losee JE. Pediatric skull fractures: the need for surgical intervention, characteristics, complications, and outcomes. J neurosurgeryPediatrics. 2014;14(2):205-211. doi:10.3171/2014.5.PEDS13414 [doi]
15. Shane SA, Fuchs SM. Skull fractures in infants and predictors of associated intracranial injury. Pediatr Emerg Care. 1997;13(3):198-203.
16. Tavor O, Boddu S, Kulkarni A V. Presenting characteristics of children who required neurosurgical intervention for head injury. Childs Nerv Syst. 2016;32(5):827-831. doi:10.1007/s00381-016-3030-5 [doi]
17. Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet (London, England). 2009;374(9696):1160-1170. doi:10.1016/S0140-6736(09)61558-0 [doi]
18. Lyons TW, Stack AM, Monuteaux MC, et al. A QI Initiative to Reduce Hospitalization for Children With Isolated Skull Fractures. Pediatrics. 2016;137(6):10.1542/peds.2015-3370. Epub 2016 May 11. doi:10.1542/peds.2015-3370 [doi]
19. Metzger RR, Smith J, Wells M, et al. Impact of newly adopted guidelines for management of children with isolated skull fracture. J Pediatr Surg. 2014;49(12):1856-1860. doi:10.1016/j.jpedsurg.2014.09.038 [doi]

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Red Blood Cell Transfusion Strategies in Children

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***Objective**: Provide information on the latest recommendation regarding Red Blood Cell transfusion strategies in children.*
***ACGME Competencies**: Patient Care, Medical Knowledge.*

Blood has a very strong symbolic meaning. It has been recognized as early as the fifth century BC, when the book of Leviticus states, "the life of all flesh is in the blood". However, it was only in 1666 that a British physician, Richard Lower, describes the first blood transfusion from one dog to another. A year later, in 1667, a French physician, Jean-Baptiste Denys, uses blood from lambs to cure humans with mental illness.

Two hundred years ago, in 1818, James Blundell, an obstetrician at Guy's Hospital in London, transfuses blood from a patient's husband into his wife in post-partum hemorrhage. Over the next five years, Blundell transfused ten patients, half of which seemed beneficial. It wasn't until the discovery of the blood groups in 1902 that blood transfusions became safe and reliable. Although the blood had to be transfused immediately as efficient anticoagulation and storage were not discovered until 1916.

In 1918, American physician Oswald Robertson, published his experience transfusing wounded soldiers in Europe's battlefields with whole blood stored for up to 26 days. Over the last hundred years, transfusion medicine has greatly progressed. The ability to separate whole blood into individual products (red blood cell (RBC), plasma, platelets, cryoprecipitate, etc.), the move from the use of bottles to plastic storage containers and the improvements of storage solutions have led to modern era blood banking.

The objective of this review is to describe the current knowledge on red blood cell transfusions in children. I will summarize the Transfusions and Anemia Expert Initiative recommendations[1], as I was fortunate to participate in this process as an expert.

The Transfusion and Anemia Expert Initiative was a consensus conference series of 38 international, multidisciplinary experts in RBC transfusions. To formulate evidence-based recommendations, our first step was a systematic review. We screened 47,086 abstracts, read 1,033 full texts, and included 159 studies in the systematic review. We then met during three conferences over the course of two years, during which we developed our recommendations, informed by the results of the systematic review.

Although some of these recommendations are specific to pediatric critical care, most can be generalized to less sick children.

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We recommend a RBC transfusion if the hemoglobin (Hb) concentration is less than 5 g/dL. This is based on observational studies in Africa and in Jehovah Witnesses, for whom the risk of mortality increases when the Hb is below 5 g/dL.

On the other hand, we recommended not to transfuse if the Hb concentration is greater than or equal to 7 g/dL, in most clinical situations (see exceptions below). This is based on the TRIPICU (Transfusion Requirements in Pediatric Intensive Care Units), a randomized controlled trial in which 637stabilized critically ill children were randomized to a RBC transfusion hemoglobin threshold of 7 g/dL (restrictive strategy) versus a hemoglobin threshold of 9.5 g/dL (liberal strategy)[2]. This study showed that a restrictive transfusion strategy decrease the number of transfusions by 44% without an increase in morbidity or mortality.

Based on sub-group analyses of the TRIPICU trial, we recommended not to transfuse if the Hb concentration is greater than or equal to 7 g/dL in some specific sub-populations, i.e. post-operative, stabilized severe sepsis and septic shock (no change in vasopressors or fluid resuscitation within the last two hours), bleeding other than hemorrhagic shock, or after biventricular cardiac repair.

In patients with acute brain injury, we recommended to consider RBC transfusion if the Hb concentration was between 7 and 10 g/dL.

We recommended to consider RBC transfusion if the Hb concentration was below 7 to 8 g/dL in patients with oncologic diagnoses or undergoing hematopoietic stem cell transplant,

After biventricular repair, it is not recommended to administer a RBC transfusion if the Hb concentration was above 7 g/dL. In patients with uncorrected congenital heart disease, the recommended transfusion threshold was 7 to 9 g/dL, depending on the degree of cardiopulmonary reserve. The recommendations are to avoid RBC transfusions if the Hb concentration is >9.0 g/dL in infants with cyanotic heart disease undergoing stage 1 palliation procedures (Norwood, Damus-Kaye-Stansel, Blallock-Taussig or central shunt, or pulmonary artery band) for single ventricle physiology, who have adequate oxygenation (for their cardiac lesion). The same threshold was recommended for patients undergoing stage 2 and 3 procedures. The thresholds for children with cyanotic heart disease were supported by two randomized controlled trials[3, 4].

In non-surgical cardiac patients, such as those with myocardial dysfunction or pulmonary hypertension, there was insufficient evidence to support transfusion to target a specific Hb concentration. However, there was no evidence that transfusion for a Hb level > 10 g/dL is beneficial.

The Transfusion and Anemia Expert Initiative also recommended many research objectives. In particular, an emphasis was made on the need to evaluate anemia tolerance, as well as finding other triggers of RBC transfusion besides hemoglobin. Some limitations must also be acknowledged, most importantly the paucity of pediatric data in many subpopulations, which led to substantial reliance on a few important articles.

In conclusion, although these recommendations were designed to guide transfusion strategies in critically ill children, they are likely to be generalizable to other less sick patients. In most clinical situations outside of the pediatric critical care unit, it seems wise not to transfuse if the Hb is above 7.0 g/dL.

References

1. Valentine SL, Bembea MM, Muszynski JA, et al. Consensus Recommendations for RBC Transfusion Practice in Critically Ill Children From the Pediatric Critical Care Transfusion and Anemia Expertise Initiative. Pediatr Crit Care Med. 2018;19(9):884-898

2. Lacroix J, Hébert PC, Hutchison JS, et al. Transfusion strategies for patients in pediatric intensive care units. N Engl J Med. 2007;356:1609-1619.

3. Cholette JM, Rubenstein JS, Alfieris GM, et al: Children with single-ventricle physiology do not benefit from higher hemoglobin levels post cavo-pulmonary connection: Results of a prospective, randomized, controlled trial of a restrictive versus liberal red-cell transfusion strategy. Pediatr Crit Care Med 2011; 12:39–45

4. Cholette JM, Swartz MF, Rubenstein J, et al: Outcomes using a conservative versus liberal red blood cell transfusion strategy in infants requiring cardiac operation. Ann Thorac Surg 2017; 103:206–214

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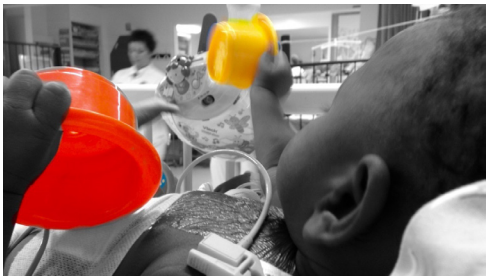

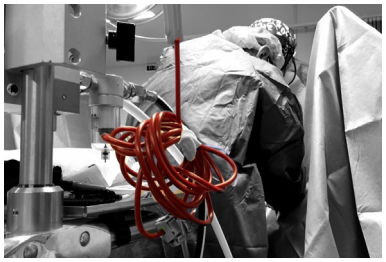

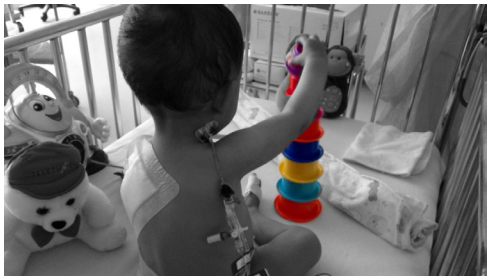

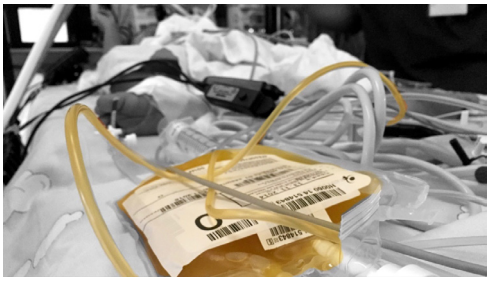

Revised Guidelines for the Use of Metabolic and Bariatric Surgery in Children and Adolescents with Severe Obesity

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***Objective**: Inform pediatricians of new ASMBS guidelines.*
***ACGME Competencies**: Patient Care, Medical Knowledge.*

The average weight of children in the United States has increased by more than 5 kilograms over the past three decades.[1] Despite concerted efforts to combat the obesity epidemic, the prevalence and severity of all classes of pediatric obesity continue to show significant upward trends compared with the late 1990s.[2, 3] Although previous trends had suggested that obesity rates were beginning to plateau in certain groups (children aged 2-5 years), the most recent estimates from National Health and Nutrition Examination Survey (NHANES) data demonstrated that the prevalence of obesity, particularly severe obesity, is increasing across all age groups.[2] Furthermore, the National Longitudinal Study of Adolescent Health demonstrated that obesity in adolescence is strongly associated with increased risk of severe obesity in adulthood.[4] Individuals with severe obesity are predisposed to numerous comorbid conditions including type 2 diabetes mellitus, hypertension, hyperlipidemia, obstructive sleep apnea, and arthritis, in addition to decreased life expectancy.[4,5] In fact, obesity has emerged as the second leading cause of preventable premature death in the United States.[6] Prevention and treatment of obesity are therefore key to reducing morbidity and mortality among affected youth. Yet, among adolescents with severe obesity, metabolic and bariatric surgery (MBS), when combined with comprehensive lifestyle modification, remains the only method demonstrated to effect sustainable weight loss and comorbidity reduction to date.[7,8] The efficacy and safety of MBS among adolescents with severe obesity was further supported by a recent, prospective, multi-institutional observational study of 242 adolescents who completed MBS as part of the Teen-Longitudinal Assessment of Bariatric Surgery (Teen-LABS) study. Importantly, the ongoing cohort study demonstrated significant and sustained reductions in body mass index (BMI; mean BMI reduction of 15 kg/m2; 95% confidence interval: -16 to -13 kg/m2) over the 3-year follow up period, with low complication rates. Moreover, adolescent MBS was associated with a 95% remission rate for type 2 diabetes mellitus as well as significant improvements in blood pressure, dyslipidemia, renal function and quality of life. [9] In contrast, nonsurgical treatments alone, such as dietary modification, exercise, and behavior modification, continue to have suboptimal results. Leading experts now argue that physicians should more readily refer adolescents with severe obesity for consideration of MBS, in conjunction with behavior modification treatment, and that MBS should not be consigned to the treatment of last resort.

In light of growing data regarding the efficacy and safety of MBS surgery in adolescents with severe obesity, the American Society for Metabolic and Bariatric Surgery (ASMBS) Pediatric Committee updated their evidence-based guidelines in 2018.[10] Modifications to the guidelines, which were initially published in 2012, were based on an extensive literature review and include less stringent criteria as indications for surgery in children with severe obesity. The guidelines support the application of revised cutoffs for severe obesity during childhood and adolescence to include both Class 2 obesity (defined as BMI ≥35 kg/m2 or 120% of the 95th percentile for BMI for age and sex) and Class 3 obesity (defined as a BMI ≥40 kg/m2 or 140% of the 95th BMI percentile). Using these definitions, the revised 2018 ASMBS Pediatric Guidelines state that MBS may be an appropriate part of a comprehensive treatment plan for youth with 1) Class 2 obesity *and* clinically significantly weight related co-morbidities including type 2 diabetes, obstructive sleep apnea, idiopathic intracranial hypertension (pseudotumor cerebri), non-alcoholic steatohepatitis, gastroesophageal reflux, hypertension or weight-related orthopedic conditions, or 2) Class 3 obesity regardless of additional comorbidities. Appropriate pediatric MBS candidates should also demonstrate "the ability and motivation to adhere to recommended treatments pre- and postoperatively, including consistent micronutrient supplements." The guideline authors contend that because of the higher health risk of adult obesity that initially develops in childhood, MBS should not be withheld from adolescents with Class 3 obesity even when other co-morbidities have not yet developed. Importantly, the revised guidelines no longer propose that a specific age or attainment of physical maturity are required for adolescents to be considered appropriate candidates for MBS, noting that early intervention can reduce

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the risk of persistent obesity as well as end organ damage from long standing co-morbidities. Developmental delay, autistic spectrum and syndromic etiologies of obesity are also no longer considered absolute exclusion criteria for MBS according to the 2018 revision. However, contraindications for adolescent MBS continue to include "a medically correctable cause of obesity" such as hypercortisolemia (Cushing's syndrome), "active substance abuse within the past year; a medical, psychiatric, psychological or cognitive condition that prevents adherence to postoperative dietary and medication regimens; or current or planned pregnancy within 12-18 months of MBS." Despite expanded definitions of youth that might benefit from surgery, the guidelines continue to recommend that adolescent MBS should be performed by multidisciplinary teams with specific pediatric expertise.

A central theme to the revised guidelines (as well as the emerging field of obesity medicine) is that obesity represents a chronic disease which results from the complex interaction of a myriad of genetic, environmental and metabolic factors; and, the condition cannot be reduced to the product of "poor" dietary, physical activity and behavioral patterns that are simply addressed by expectations of greater patient (and parent) motivation and will-power.[11] Similar to other such conditions, the successful treatment of severe obesity in childhood will likely require an ongoing multidisciplinary, multimodality, and, importantly, patient- and family-centric approach that includes individualized combinations of evidence-based behavioral interventions, pharmacotherapy and MBS.

The Healthy Lifestyles Center (HLC) at the Children's Hospital of Richmond (CHoR) at Virginia Commonwealth University offers comprehensive, compassionate, family-based Stage 3 and 4 care for children and adolescents with severe obesity, including evaluations for MBS when appropriate.[12] To date, the pediatric obesity medicine team at CHoR's HLC has successfully performed over two dozen metabolic and bariatric operations as part of comprehensive and individualized care plans for adolescent patients with severe obesity throughout the state. Many of these patients have lost over 45 kilograms following MBS and reported significant improvements in multiple comorbidities as well as quality of life.

In summary, data support the role of MBS, in addition to intensive lifestyle modifications and behavioral support, in appropriately selected adolescents with severe obesity. Recent modifications in pediatric guidelines by the ASMBS Pediatric Committee highlight the efficacy and safety of MBS in this population, revise recommended criteria for pediatric patients who might benefit from surgery, and advocate for earlier referral of adolescents with severe obesity to a multidisciplinary group with expertise in managing the condition. Following MBS, patients require ongoing life-long multidisciplinary care that continues to address physical, emotional, and metabolic changes that occur after the procedure, promote ongoing support in sustained behavior change, and prevent weight regain.

References

[1] Lobstein T, Jackson-Leach R, Moodie ML, Hall KD, Gortmaker SL, Swinburn BA, et al. Child and adolescent obesity: part of a bigger picture. Lancet 2015;385(9986):2510-20.
[2] Skinner AC, Perrin EM, Skelton JA. Prevalence of obesity and severe obesity in US children, 1999-2014. Obesity (Silver Spring) 2016;24(5):1116-23.
[3] Samuels PJ, Sjoblom MD. Anesthetic considerations for pediatric obesity and adolescent bariatric surgery. Curr Opin Anaesthesiol 2016;29(3):327-36.
[4] The NS, Suchindran C, North KE, Popkin BM, Gordon-Larsen P. Association of adolescent obesity with risk of severe obesity in adulthood. Jama 2010;304(18):2042-7.
[5] Michalsky M, Reichard K, Inge T, Pratt J, Lenders C. ASMBS pediatric committee best practice guidelines. Surg Obes Relat Dis 2012;8(1):1-7.
[6] Stein CJ, Colditz GA. The epidemic of obesity. J Clin Endocrinol Metab 2004;89(6):2522-5.
[7] Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, et al. Bariatric surgery: a systematic review and meta-analysis. Jama 2004;292(14):1724-37.
[8] Michalsky MP, Inge TH, Jenkins TM, Xie C, Courcoulas A, Helmrath M, et al. Cardiovascular Risk Factors After Adolescent Bariatric Surgery. Pediatrics 2018.
[9] Inge TH, Courcoulas AP, et al. Weight Loss and Health Status 3 Years after Bariatric Surgery in Adolescents. N Engl J Med. 2016 Jan 14;374(2):113-23.
[10] Pratt JS, Browne A, et al. ASMBS pediatric metabolic and bariatric surgery guidelines, 2018, SOARD 2018;14:882-901.
[11] Upadhyay et al. Obesity as a Disease. Med Clin North America. 2018;102(1):13-33.
[12] Barnett SJ. Bariatric surgical management of adolescents with morbid obesity. Curr Opin Pediatr 2013; 25:515-520.

Development of a standardized approach to CF care at the Children's Hospital of Richmond at VCU

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***Objective**: Describe the impact of a quality improvement project at CHoR at VCU to standardize approaches to acute drops in lung function and too poor nutritional status in patients with cystic fibrosis.*
***ACGME Competencies**: Patient Care, Medical Knowledge.*

Treatment advances have dramatically improved patient survival in Cystic Fibrosis (CF) since it initial recognition in 1938, changing the face of the disease in a relatively short period of time. The median predicted survival age is now nearly 45 years, and over half of the population of people with CF is over the age of 18[1]. Nonetheless, there is considerable variation in age at death and quality of life among the CF population. Much of this variation can be explained by individual patient differences in genetic constitution and environmental or sociodemographic exposures, but for some time now it has been appreciated that average patient outcomes differ among CF Foundation accredited care centers, even when adjusted for case mix severity[2]. CF Centers that achieve superior results in various performance measures are not necessarily the largest or best known, they differ in size and geographic location, and they do not share a specific unique treatment method. What they have in common is a highly developed system of care that is well adapted to local conditions and allows the consistent and methodical application of therapies based on the best evidence available[3].

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Following a review of reports from the CF Foundation showing that the average lung function and nutritional status of patients attending our CF Center were lower than we liked, the pediatric program initiated a quality improvement program whose specific aim was to improve the average Forced Expiratory Volume in 1 Second (FEV1) of our patients and the proportion with low Body Mass Index (BMI) to the top quartile. We describe here the development and impact of a long term Quality Improvement program at the Children's Hospital of Richmond at Virginia Commonwealth University (CHOR at VCU). In order to accomplish this goal, the team set out to adopt systematic approaches to care that we believed would allow us to be more successful at preserving lung function and eliminating malnutrition, particularly focusing on increasing the consistency of our treatment and follow-up of identified problems[4].

Methods

The reorganization of CF care at CHOR at VCU began in 2013 to include:

• Initiation of weekly pre-clinic meetings of the entire care team during which each team member (nurse, respiratory therapist, dietitian, social worker, mental health coordinator, pharmacist, research coordinator, physician) provides a brief overview of the goals of the visit. During this meeting, the team reviews individual patient reports downloaded from the CF Foundation Registry that provide a visual display of longitudinal trends in percent predicted FEV1 (ppFEV1) and weight, height, and BMI (or, in children under 2 years of age, weight for length) percentile (Figure 1). Printed copies of these reports are distributed to patients and families during their clinic visit, and discussed with them as well.

• Development of algorithms to define mutually agreed upon therapeutic responses to pulmonary exacerbations (acute drops ppFEV1) and to patients with less than satisfactory nutritional status (BMI or weight for length <50%ile) (Figure 2A and 2B). Each component of the algorithms required a consensus agreement among the primary CF physicians with an expectation that it would represent the minimum default response to different scenarios, but not one that would be expected in 100% of patients. During the first few years after its adoption, printed copies of the algorithm were posted to the walls in each patient room for easy reference by the physician and discussion with the patient and family.

• Creation of tools to ensure that any acute drop in FEV1 or deficiency in nutritional status is taken note of by the responsible clinicians.

• Creation of Statistical Process Control (SPC) charts (which allow the combination of time series analysis with graphical presentation of the data) to track physician adherence to the algorithms as our process measures[5]. The primary measures that we tracked are described below in their respective sections.

• Creation of run charts to track population-based measures of lung function and nutritional status as our outcome measure. We calculated the mean of the best FEV1 measured over the previous 12 months for all patients seen during that 12 month period, and the percent whose best BMI or weight for length percentile over the previous 12 months was less than satisfactory, and tracked this monthly, allowing us to follow changes in a timely manner rather than depending upon and waiting for yearly summary reports from the CFF Registry[6].

Pulmonary Care

The lung disease of CF is characterized by chronic persistent infection and inflammation that is punctuated by intermittent episodes of worsening signs and symptoms that are labeled as pulmonary exacerbations and typically treated with systemic antibiotics. Surveillance for and treatment of pulmonary exacerbations is a cornerstone of contemporary CF care[7]. However, several observational database analyses have found that this is done inconsistently, especially among patients with higher baseline FEV1, and that the consequence of missed diagnosis and non-treatment is a subsequent loss of lung function[8,9]. Moreover, several studies have found that CF centers that have greatest success in preserving patients' lung function are more consistent and possibly more aggressive in their treatment of pulmonary exacerbations[10,11]. The CFF Benchmarking Project concluded that centers with better outcomes exhibited a systematic approach to ensuring reliable care, high expectations, early and aggressive management of clinical declines, and patient/family engagement in disease management[3].

Given this, we created an algorithm for care that included the following components:

o Treatment with chronic therapies according to the recommendations of the CFF pulmonary guidelines[12].

o Antibiotic treatment of any new pulmonary signs and symptoms or drop in ppFEV1 with a goal of returning ppFEV1 to baseline. We define baseline ppFEV1 as the best ppFEV1 in the previous 12 months or since the last hospitalization, whichever period was shorter. Patients with a drop of 5-10% were differentiated from those with a drop of 10% or more.

o Follow up in no more than 6 weeks following treatment to ensure that treatment was successful (signs and symptoms resolved, or ppFEV1>95% of baseline).

We used statistical process control charts to track the percentage of patients with a drop in FEV1 who were treated with antibiotics, and the percentage of patients who were given appropriate follow-up appointments (independently of whether these appointments were actually kept).

Results

Process measures

Figure 3 shows SPC charts tracking activities related to implementation of our pulmonary algorithm. Process measures were all relatively flat during the baseline period in 2012 prior to the initiation of our QI program. After that, there was a notable increase in percentage of visits at which drops in ppFEV1 were treated with antibiotics and follow-up appointments, all of which qualify as showing "special cause variation", the QI version of statistical significance

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Outcome measures

Figure 4 (top panel) shows the change in rolling average of FEV1 among our patients, which increased substantially during the 5 year period. In particular, the gap in FEV1 between adolescents 13-18 years of age and younger children 6-12 narrowed considerably, demonstrating our ability to impact on the rapid decline in lung function typically seen during adolescence. Figure 4 (bottom panel) shows the relative change in average FEV1 of our patients compared to other CF Centers nationally. CHOR at VCU rose from the lowest decile among US CF care centers in 2012 to the highest decile in the years 2015-2017 for average FEV1 of our patients.

Nutritional care

There is a strong correlation between BMI and lung function as well as quality of life in children and adults with CF. Because of this, the CF Foundation nutritional guidelines suggest that our goal should be for all children with CF to have a BMI above the 50th percentile[13]. Despite the innate contradiction inherent in this recommendation (reminiscent of Lake Woebegon, "…where all the children are above average"), CF caregivers nationally have made great strides in nutrition – the median BMI of children with CF in the US was 56%ile in 2017[1]. Nonetheless, a significant proportion is not only below the 50%ile, but below the 25%ile and 10%ile as well. These are patients whose long term prognosis is clearly worse, and that we attempted to focus on. Data suggest that CF centers with better nutritional outcomes have higher expectations than CF programs with less favorable nutritional outcomes regarding nutritional status of their patients, and a systematic approach that ensures a consistent response to small falloffs in BMI, including the use of higher doses of pancreatic enzyme supplements and appetite stimulants (especially cyproheptadine, but others as well)[3]. We constructed a nutritional algorithm analogous to the abovementioned pulmonary algorithm, focusing on the identification of patients with low BMI or weight for length percentile, ensuring that malabsorption is minimized through optimization of pancreatic enzyme dosing and other techniques, and that caloric intake is maximized by the use of high calorie supplementation, appetite stimulants and identification of any other comorbidities. The nutritional algorithm is shown in Figure 2B.

Results

Process measures

Figure 5 shows run charts tracking activities related to implementation of our nutrition algorithm. Process measures were all relatively flat during the baseline period in 2012 prior to the initiation of our QI program. After that, there was a notable increase in percentage of visits at which appetite stimulants and/or appropriate dosing of pancreatic enzymes was provided, and earlier follow-up appointments were given.

Outcome measures

Figure 6 shows that the percentage of patients whose best BMI in the previous 12 months was less than satisfactory decreased substantially during the 5 year period. In particular, the proportion of patients at highest risk – those whose BMI was <10%ile – was reduced to nearly zero, and the proportion with a BMI less than 25%ile also dropped considerably. The proportion of infants <2 years of age, which tends to be more labile because the numbers are smaller and there is rapid turnover of patients, dropped from well over 50% to about 10% (not shown). This is particularly important because nutrition in the first years of life plays an important role setting the stage for lung growth and later nutritional status.

Discussion

This report demonstrates that improvements in CF outcomes can be accomplished relatively rapidly using basic QI principles, including interdisciplinary team goal setting, standardized and proactive approaches that ensure consistent recognition and treatment of patients whose status is suboptimal, incorporation of patients and families into the effort, and the use of data to follow the effectiveness of the process.

The documentation of significant inconsistencies in care was a starting point of the National CF Foundation Quality Improvement program, with a reduction in treatment variations its goal[14]. The CF Foundation benchmarking project from a decade ago found a number of key characteristics of programs with top-quintile clinical outcomes, including strong leadership, close tracking of clinical details and outcomes, high expectations and low thresholds for treatment, team consensus on standard approach to care, and education of patients/families on high outcome expectations and need for early aggressive intervention for declines[3]. We attempted to integrate all of these steps and characteristics into our approach to CF care.

It is important to point out that our treatment algorithms were successful because they were placed in the context of other transformative changes in the way we restructured our microsystem. Furthermore, while the algorithms were meant to configure typical default responses to acute drops in ppFEV1 or to nutritional deficiencies, these interventions were not expected to be universally appropriate for all patients, so there was no intention to see any of our process measures reaching 100%.

The primary outcome measures that we used and report on for this effort were FEV1 and BMI. We did not measure impact on quality of life, as this is not part of our usual monitoring routine, but ppFEV1 and BMI are important determinants of quality of life in CF15. Similarly, we did not attempt to measure impact on mortality, which is a rare event in most pediatric CF programs, but there is a longstanding literature on FEV1 and BMI as predictors of mortality[16]. Therefore, we believe that we likely impacted on all of these outcome measures in our patients.

In summary, we describe how the adoption of systems-based methods to ensure the consistent treatment and follow-up of drops in FEV1 and BMI led to significant improvements in the overall outcomes of pediatric CF patients followed at the Children's Hospital of Richmond at VCU. We believe that this approach, using treatments that are well established and accepted for CF care, can be easily disseminated to other care centers in the form of a "bundle"[17] and can lead to substantial improvements in lung function, and presumably quality of life and life expectancy for people with CF, while newer treatments targeting the underlying defect continue to be developed.

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1. Cystic Fibrosis Foundation. Cystic Fibrosis Foundation Patient Registry, 2016 Annual Data Report. Bethesda, Maryland2017.
2. Schechter MS. Nongenetic influences on cystic fibrosis outcomes. Curr Opin Pulm Med. 2011;17(6):448-454.
3. Boyle MP, Sabadosa KA, Quinton HB, Marshall BC, Schechter MS. Key findings of the US Cystic Fibrosis Foundation's clinical

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practice benchmarking project. BMJ Qual Saf. 2014;23 Suppl 1:i15-i22.
4. Schechter MS, Schmidt HJ, Williams R, Norton R, Taylor D, Molzhon A. Impact of a Program Ensuring Consistent Response to Acute Drops in Lung Function in Children with Cystic Fibrosis. Journal of Cystic Fibrosis. 2018.
5. Benneyan JC, Lloyd RC, Plsek PE. Statistical process control as a tool for research and healthcare improvement. Qual Saf Health Care. 2003;12(6):458-464.
6. Amin SG. Control charts 101: a guide to health care applications. Qual Manag Health Care. 2001;9(3):1-27.
7. Schechter MS. Reevaluating approaches to cystic fibrosis pulmonary exacerbations. Pediatr Pulmonol. 2018;53(S3):S51-S63.
8. Morgan WJ, Wagener JS, Pasta DJ, et al. Relationship of Antibiotic Treatment to Recovery after Acute FEV1 Decline in Children with Cystic Fibrosis. Annals of the American Thoracic Society. 2017;14(6):937-942.
9. Morgan WJ, Wagener JS, Yegin A, et al. Probability of treatment following acute decline in lung function in children with cystic fibrosis is related to baseline pulmonary function. J Pediatr. 2013;163(4):1152-1157 e1152.
10. Schechter MS, Regelmann WE, Sawicki GS, et al. Antibiotic treatment of signs and symptoms of pulmonary exacerbations: a comparison by care site. Pediatr Pulmonol. 2015;50(5):431-440.
11. Johnson C, Butler SM, Konstan MW, Morgan W, Wohl ME. Factors influencing outcomes in cystic fibrosis: a center-based analysis. Chest. 2003;123(1):20-27.
12. Flume PA, O'Sullivan BP, Robinson KA, et al. Cystic fibrosis pulmonary guidelines: chronic medications for maintenance of lung health. Am J Respir Crit Care Med. 2007;176(10):957-969.
13. Stallings VA, Stark LJ, Robinson KA, Feranchak AP, Quinton H. Evidence-based practice recommendations for nutrition-related management of children and adults with cystic fibrosis and pancreatic insufficiency: results of a systematic review. J Am Diet Assoc. 2008;108(5):832-839.
14. Marshall BC, Nelson EC. Accelerating implementation of biomedical research advances: critical elements of a successful 10 year Cystic Fibrosis Foundation healthcare delivery improvement initiative. BMJ Qual Saf. 2014;23 Suppl 1:i95-i103.
15. Quittner AL, Schechter MS, Rasouliyan L, Haselkorn T, Pasta DJ, Wagener JS. Impact of socioeconomic status, race, and ethnicity on quality of life in patients with cystic fibrosis in the United States. Chest. 2010;137(3):642-650.
16. McColley SA, Schechter MS, Morgan WJ, Pasta DJ, Craib ML, Konstan MW. Risk factors for mortality before age 18 years in cystic fibrosis. Pediatr Pulmonol. 2017;52(7):909-915.
17. Resar R, Griffin FA, Haraden C, Nolan TW. Using Care Bundles to Improve Health Care Quality. IHI Innovation Series white paper. 2012.

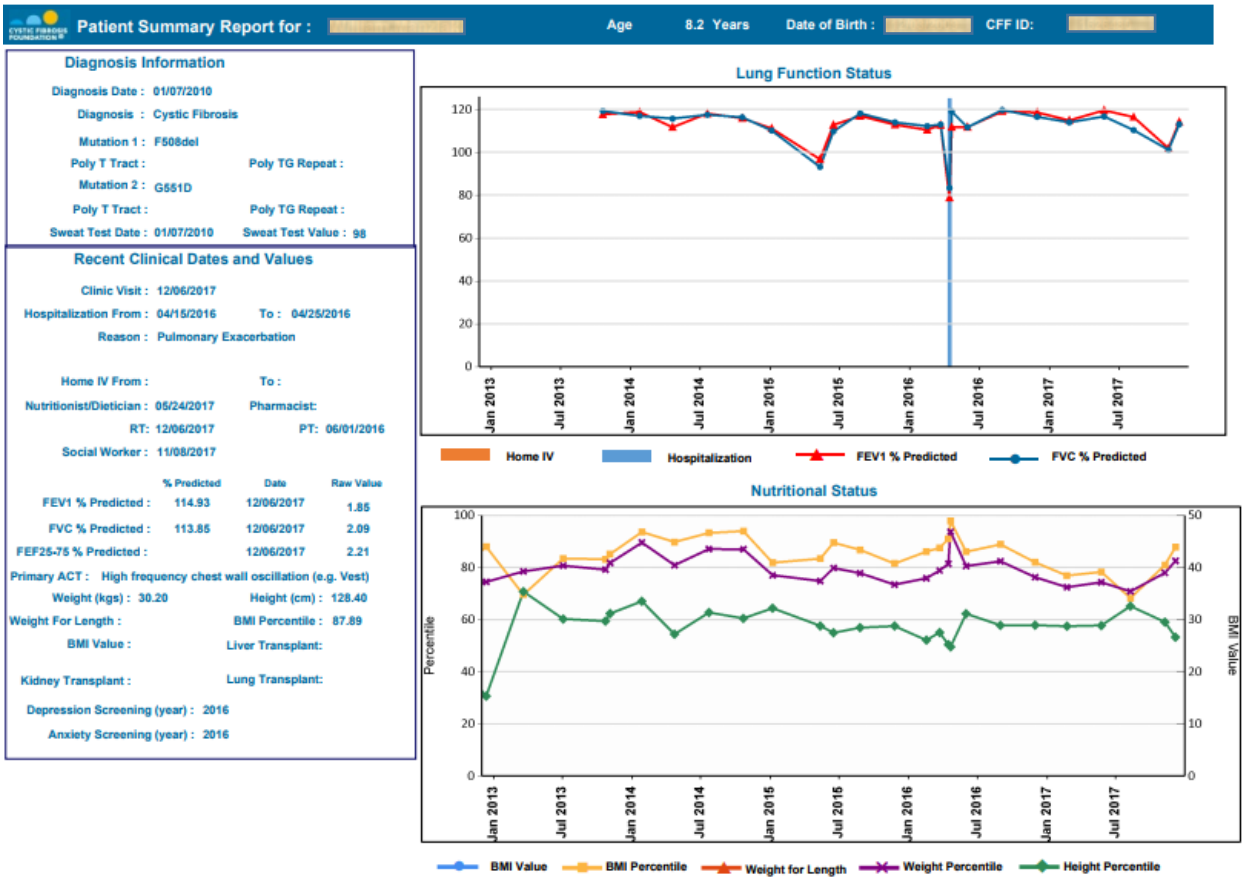
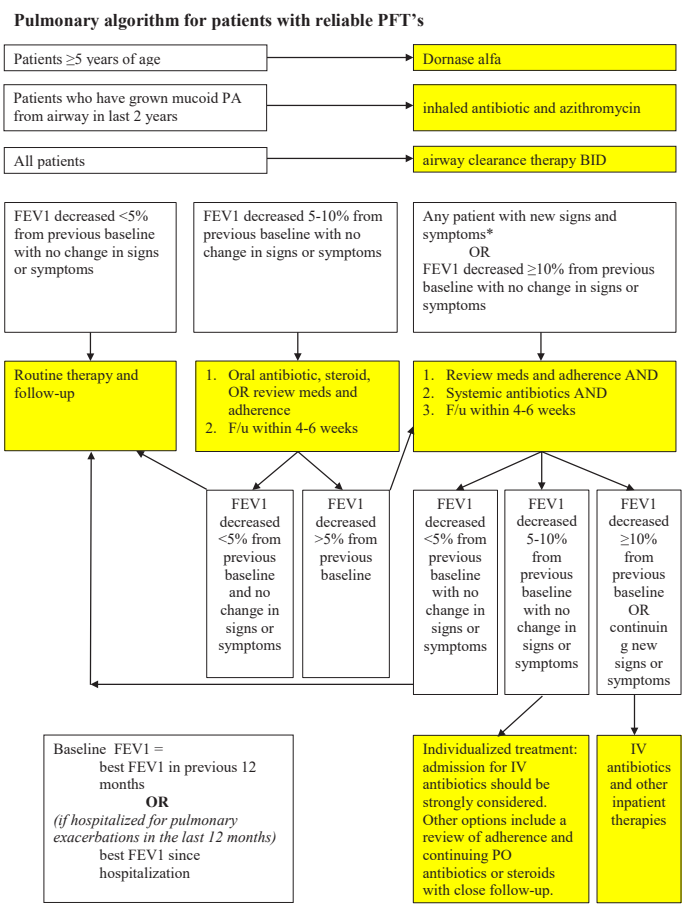
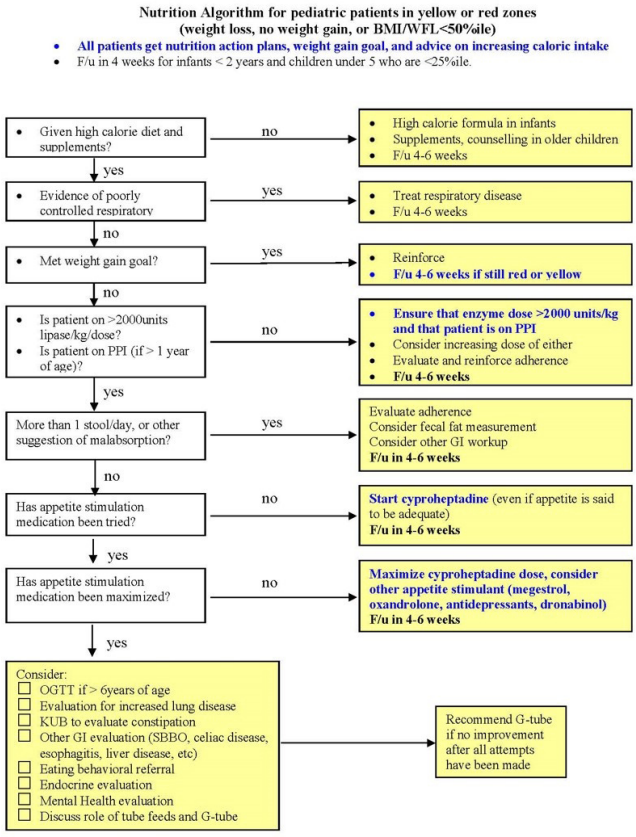
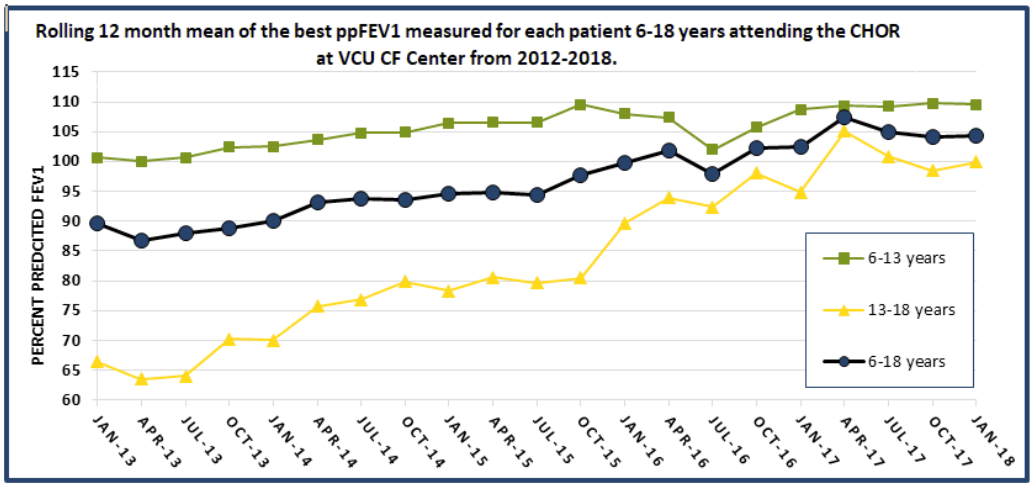


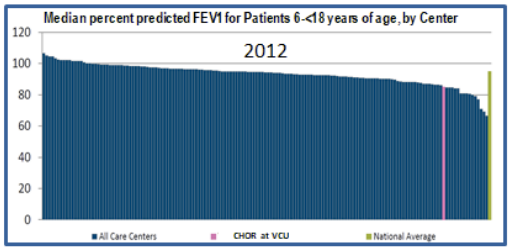
Figure 1A – online Appendix. Downloadable summary report from PortCF that is used during CF care team preclinic visits.

Five year longitudinal changes in percent predicted FEV1 are shown, along with markers of previous hospitalizations and course of home IV antibiotics (upper right panel). Longitudinal anthropometric measures are also shown, along with a number of other relevant patient and care process characteristics.









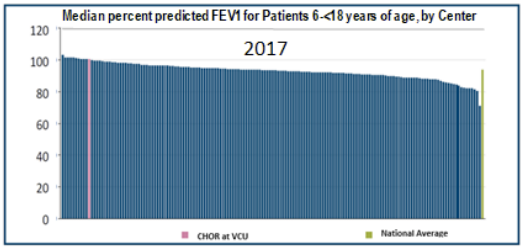


Figure 3 upper panel. Rolling 12 month mean of the best ppFEV1 measured for each patient 6-18 years attending the CHOR at VCU CF center from 2012-2018. Each point represents the mean of each patient's best ppFEV1 over the previous 12 months.
Figure 3 lower panels. Median ppFEV1 for patients 6-<18 years of age in 2012 and in 2017, by Center, as reported by the CF Foundation. The blue vertical lines represent the median at each CFF accredited care centers following at least 10 children in this age group; the green vertical line shows the national average; the red vertical line represents the median at CHOR at VCU.

Screening for Social Determinants in Pediatric Primary Care: Parent Perspectives

Bergen B. Nelson, MD, MS | Assistant Professor
Children's Hospital of Richmond at VCU

***Objective**: Review current guidelines and existing research on social needs screening in outpatient pediatrics; Report on original qualitative research to understand parent perspectives on social needs screening in pediatric primary care.*
***ACGME Competencies**: Patient Care, Interpersonal Communication Skills.*

During the past half century since Michael Marmot's Whitehall I report in the UK, there has been growing awareness about the social determinants of health. The Institute of Medicine has made recommendations for adding social domains to electronic health records,[1] and the AAP has recommended routine screening for family psychosocial factors that could affect children.[2-4] Household income, housing conditions, and neighborhood safety, along with parental education, health and mental health, are key factors in early childhood development.[5] Along with this growing awareness among medical professionals, screening for social determinants and social needs in clinical settings has exploded in recent years. Rigorous research studies have shown the effectiveness of screening tools and approaches,[6] and wide-spread initiatives like Accountable Health Communities (AHC), funded by the Centers for Medicare and Medicaid Services (CMS), are putting social needs screening into practice across the nation.

Despite this explosion in awareness and practice, very little is known about how parents feel about social needs screening in the context of a pediatric primary care encounter. Do parents feel that it is acceptable or not acceptable for a pediatric practice to ask about their income, education, housing, or mental health, while their child is the patient being treated? While previous studies have shown that parents generally report in surveys that social needs screening is acceptable in both inpatient and outpatient pediatric settings,[7,8] we sought to collect rich, qualitative data about their perspectives, in a series of focus groups. Thanks to a grant from the Children's Hospital Foundation Research Fund through the Children's Hospital of Richmond at VCU, we spoke with 10 groups of parents, with a total of 32 parents whose children receive primary care at VCU. Groups were conducted between December 2017 and May 2018. Six of these groups were in English (with a total of 19 participants) and four were in Spanish (13 participants). Focus groups were recorded and transcribed, then coded for thematic analysis using ATLAS.ti software.

We found a few interesting themes which we think are important to share:
• Parents generally found questions about their home, health, and socio-economic situation to be acceptable when they saw a direct connection to their children's health. For example, when housing conditions might expose children to toxins such as lead, mold, or cigarette smoke, or when food insecurity could affect a child's growth, parents felt that it was acceptable to ask.
• Parents also reported questions as acceptable to ask when they or the clinic staff and child's providers had some control over that issue, or could offer a resource for helping the family.
• Conversely, parents described feeling that it is NOT acceptable for a practice to ask questions when there is no direct connection to child health, or there is no solution or resource available to help. One parent summed this sentiment up nicely: "If you're not benefiting me…then there's no reason for you to ask."

Of note, several social domains that were seen initially as not acceptable, such as parental income or education, were later seen as acceptable when there was a connection to resources, such as understanding services or benefits for which a family might be eligible, or connecting parents to GED or ESL classes. While some parents expressed hesitancy or mistrust with certain specific resources such as home visitation or social workers, they expressed appreciation for these services when delivered in the context of caring and trusted continuity provider relationships.

In summary, parents are very receptive to responding to questions about their family psycho-social circumstances when the connection to child health is clear, the path to helpful resources is clear, and the relationships with the clinic staff and providers are positive. While this study was conducted at VCU, we believe these lessons could be widely applicable for child health providers. Our next steps are to collect staff and provider perspectives on this issue, then develop or modify screening tools and care coordination processes that are helpful to all stakeholders. Ultimately, we hope that identifying and addressing social needs will be a family-centered process that has the potential to improve child health and developmental outcomes, and reduce inequities.

References:
1. IOM (Institute of Medicine). 2014. Capturing Social and Behavioral Domains and Measures in Electronic Health Records: Phase 2. Washington, DC: The National Academies Press.
2. Hagan JF, Shaw JS, Duncan PM, eds. Bright Futures: Guidelines for Health Supervision of Infants, Children and Adolescents. 3rd ed. Elk Grove, IL: American Academy of Pediatrics; 2008.
3. Weitzman C, Wegner L, Section on Developmental and Behavioral Pediatrics, Committee on Psychosocial Aspects of Child and Family Health. Promoting Optimal Development: Screening for Behavioral and Emotional Problems. Pediatrics. 2015; 135(2):385-395.
4. AAP Council on Community Pediatrics. Poverty and Child Health in the United States. Pediatrics. 2016; 137(4):e20160339
5. Nelson BB, Dudovitz RN, Barnert E, Li N, Biely C, Szilagyi P, Larson K, Halfon N, Chung PJ. Predictors of Poor School Readiness in Children without Developmental Delay at Age 2. Pediatrics 2016; 138(2). pii:e20154477.
6. Gottlieb LM, Hessler D, Long D, Laves E, Burns AR, Amaya A, Sweeney P, Schudel C, Adler NE. Effects of Social Needs Screening and In-Person Service Navigation on Child Health: A Randomized Clinical Trial. JAMA Pediatrics. 2016; 170(11):e162521.
7. Garg A, Butz AM, Dworkin PH, Lewis RA, Serwint JR. Screening for Basic Social Needs at a Medical Home for Low-Income Children. Clinical Pediatrics. 2009; 48(1):32-36.
8. Colvin JD, Bettenhausen JL, Anderson-Carpenter KD, Collie-Akers V, Chung PJ. Caregiver Opinion of In-Hospital Screening for Unmet Social Needs by Pediatric Residents. Academic Pediatrics. 2016; 16(2):161-167.

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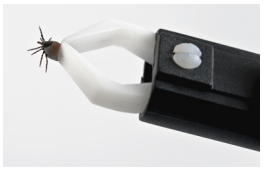
Primer on Tickborne Ricket

José L. Muñoz, MD, Professor of Pediatrics |Children's Hospital of Richmond at VCU Health



Objective: *Increase recognition and understanding of rickettsial illinesse.*
ACGME Competencies: *Patient Care; Practice-based Learning and Improvement; Medical Knowledge.*

With our beautiful, lush wooded habitats in Virginia come a variety of tickborne rickettsial illnesses. These infections are not very common but the pediatrician needs to be keenly aware of them, as failure to recognize and treat appropriately can have dire consequences. These illnesses all have several features in common: 1) they are transmitted by ticks, there is thus usually a history of a tick bite or exposure to natural habitats where ticks are present; 2) They are all caused by obligate intracellular bacteria that are transmitted by the tick when they bite; 3) infection and clinical illness are more common from spring through early fall; 4) initial presentation is fairly non-specific, and includes fever, malaise, headache and myalgia- symptoms which are also very common in some viral illnesses; 5) as opposed to most viral illness, when untreated these tickborne infections tend to progress in severity, thus prompting the family to seek medical attention; 6) diagnosis has to be suspected based on clinical presentation, geography and exposure history, confirmatory tests are not available in a timely fashion to aid in diagnosis; 7) treatment is with doxycycline regardless of age, the old age restrictions for using doxycycline have been removed. This review will focus on the rickettsial illnesses the pediatrician is more likely to encounter in Virginia: Rocky Mountain Spotted Fever, Ehrlichiosis and Anaplamosis. There are other less frequent rickettsial-like infections that will not be discussed, but can be reviewed in reference 1&2.

Rocky Mountain Spotted fever (RMSF) is the most serious of these disorders. It is caused by infection with *Rickettsia rickettsii,* an obligate intracellular gram negative bacillus with a predilection to infect endothelial cells and cause an intense systemic febrile vasculitis. Infection is transmitted by *Dermacentor variabilis,* the common dog tick. The disease has been reported from all the lower 48 states, but the highest incidence is in the Southeast, especially from the Carolinas through Oklahoma. Incubation period is 3-12 days, with a median of 4 days. There were 250 probable or confirmed cases in Virginia in 2017. The illness begins with fever, malaise, headache and myalgia; after a few days a centripetal rash may appear, it is initially maculopapular but can become petechial or purpuric. Children appear quite ill as the disease progresses. Untreated RMSF can evolve into a full-blown purpura fulminans syndrome which is often fatal. Patients will usually seek medical attention after appearance of the rash or because of worsening clinical illness. Laboratory abnormalities include thrombocytopenia, coagulation abnormalities, hyponatremia, elevated AST and ALT, leucopenia or mild leukocytosis. Mortality can be over 25% if not treated early, it is essential to have a high index of suspicion based on geographical location or travel history, time of year, history of a tick bite or exposure to habitats where ticks can be present. Differential diagnosis includes other rickettsial or ehrlichia syndromes, meningococcemia, other sepsis syndromes with DIC, viral syndromes such as EBV, enterovirus (echovirus, coxsackievirus); other systemic vasculitis, and severe drug reactions. The diagnosis can be confirmed by measuring antibodies during the acute and convalescent phase but it is imperative to treat before laboratory confirmation, as delay in treatment is associated with higher mortality; a whole blood PCR is available but is not very sensitive. Treatment is with doxycycline regardless of age, the dose is 2.2 mg/kg/dose (maximum 100 mg/dose) every 12 hours for 5-7 days. Best outcomes are seen when children are treated within 5 days of illness. There is no vaccine for RMSF, as in all tick-borne illnesses, tick-bite precautions can reduce the risk of infection.

Human Monocytic Ehrilchiosis (HME) is caused by *Ehrichia chafeensis*, which has a predilection for infecting monocytes and macrophages. It is transmitted by a tick bite from *Amblyomma americanum*, the lone-star tick. The highest incidence is in the southeastern United States from April through September but infection can occur year round in high incidence areas. There were 97 probable or confirmed cases in Virginia in 2017. Clinical illness begins with fever, headache, myalgia and abdominal pain. The incubation period is 5-14 days. Rash appears in 60% of infected individuals, it can be similar to RMSF but petechiae and purpura are less common. Laboratory abnormalities are fairly characteristics and include thrombocytopenia, elevations of AST and ALT, leukopenia (<4000) and lymphopenia. Illness is not as severe as RMSF and it is recognized that self-limited cases occur, some patients will seek medical treatment because of worsening symptoms. Disease is more severe in those over 40, but likely more frequent in children. Diagnosis can be confirmed by measuring antibodies during the acute and convalescent stage, there is also a sensitive blood PCR test. Careful examination of a peripheral blood smear can occasionally reveal intracellular 'morulae' and can thus aid in the diagnosis. Treatment is with doxycycline, but rifampin is probably effective in patients who cannot tolerate doxycycline.

Human Granulocytic Anaplasmosis (HGA) is the clinical illness caused by *Anaplasma phagocytophilum*. Its transmission vector is *Ixodes scapularis*, the same black-legged tick that transmits Lyme disease and Babesisosis. Co-infections with Lyme and Babesia have been reported. The highest incidence is in the mid-Atlantic states and the northeastern United States. There were 12 probable or confirmed cases in Virginia in 2017, infections tend to be milder so many cases probably go unrecognized. The organism has a predilection for granulocytes and like *Ehrlichia* can often be seen in intracellular lipid bound vacuoles known as morulae. Illness begins fever, chills and headache; arthralgia and myalgia are common. Rash develops in less than 10% of patients. Congenital anaplamosis has been reported in infants born to mothers infected late in pregnancy. Characteristic laboratory findings include thrombocytopenia, leukopenia and elevated transaminase levels. Blood smear examination may reveal morulae. Diagnosis can be confirmed with whole blood PCR and/or acute and convalescent IgG levels. Treatment is with 10 days of doxycycline.

A series of steps can be taken to prevent these infections but these recommendations are not routinely followed. 1) Regular checks for ticks in humans and pets after spending time in tick-infested habitats. 2) Use of repellents containing DEET or picaridin (on the skin) or permethrin (on clothes), it is important to carefully follow application instructions- infants and young children should be sprayed sparingly with no more than 20% DEET, the face should not be sprayed. Families shout consult with their veterinarian for products to protect pets. 3) Limiting exposure to tick-infested habitats, although wide the wide diversity of such sites makes this practice difficult. Walking on cleared trails, sidestepping vegetation and creating tick-free zones in yards can help. 4) Tick removal- the preferred method is to grasp the tick close to the skin with tweezers and gently pull back with constant pressure; after removing the tick the skin should be cleaned with soap and water or alcohol. 5) Wearing protective clothing and long sleeves can help, although again, this may be difficult to practice in hot weather.

References:
1. Diagnosis and Management of Tickborne Rickettsial Diseases: Rocky Mountain Spotted Fever and Other Spotted Fever Group Rickettsioses, Ehrlichioses, and Anaplasmosis — United States
A Practical Guide for Health Care and Public Health Professionals.
MMWR Recommendations and Reports Vol. 65, No. 2 May 13, 2016
https://www.cdc.gov/mmwr/volumes/65/rr/rr6502a1.htm
2. Tickborne diseases of the United States. A Reference Manual for Healthcare Providers
Fifth Edition, 2018. CDC
https://www.cdc.gov/ticks/tickbornediseases/Tickborne-Diseases-P.pdf
Excellent guide, great pictures for identifying ticks
3. Red Book: 2018 Report of the Committee on Infectious Diseases. 31st ed. American Academy of Pediatrics.
Good recommendations on the three conditions discussed in this primer.

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Improving Access to Mental Health Services

The Children's Mental Health Resource Center (CMHRC), a free service under the Children's Hospital of Richmond at VCU (CHoR) and part of the VCU Medical Center Department of Child and Adolescent Psychiatry, fills a unique and critical role in Richmond and across Virginia. As a *GPS for Children's Mental Health*, they provide navigation services to help bridge the gap between primary care and mental health needs. Navigation services include both peer support and referral assistance. This service is provided free of charge and available to anyone in Virginia.

The CMHRC within the new VTCC lobby

The overall mission of the CMHRC is to improve access to high quality services for families of children with mental, emotional and behavioral health problems. The navigators connect families with appropriate specialty care in a timely and expedited manner and improve pediatricians' ability to care for their patients with mental health needs. During the last fiscal year (FY2018), 90% of the families who were provided with referrals attended their appointments and 81% of these families were also happy with their providers.

This navigation process is individualized for each family. Navigators utilize a robust database maintained by the CMHRC to connect children with psychiatrists, therapists, or other services that: 1) accept the child's insurance, 2) are geographically close to the family's home, and 3) are accepting new patients with minimal wait times. Navigators also connect families with resources such as support groups and special education assistance. A final important element of the navigation process includes follow-up calls to support families in every step along their journey.

Dr. Neil Sonenklar, interim division chair for child and adolescent psychiatry at VTCC, shares, "I have worked closely with the CMHRC in my clinical practice, referring numerous clients who are in need of resources. More specifically, one of the family navigators participates with me in a weekly autism clinic. She has been an invaluable support to those families who are struggling to locate appropriate services for their children as this can be a very challenging task for those clients."

Since this program began in the summer of 2011, more than 7,000 families have been referred to the CMHRC and received supports. About 35-40% of the referrals come directly from pediatricians, who receive a follow-up report from the navigator on the resources that were provided to each family. The CMHRC receives an average of 6 new referrals each day and navigators usually respond to families within 1 business day. To handle all of these contacts, the program is staffed by 1 full-time and 4 part-time navigators as well as a program manager who oversees operations, fiscal management, community engagement, and fund development.

For many years, the CMHRC operated out of a small office space in Richmond without strong connections to the VCU Health campus. However, in April 2018, the program moved into space in the new Virginia Treatment Center for Children (VTCC) building, a state-of-the-art mental healthcare facility. The CMHRC is conveniently positioned inside the building's main lobby, making it accessible to both patients of VTCC and the general public. This has greatly increased awareness of CMHRC services to providers within the Children's Hospital of Richmond community and also allows navigators to serve families in more face-to-face interactions (rather than only via phone).

Recently, one of the navigators worked with the VTCC inpatient team to help a teenager who survived a suicide attempt. The navigator listened to the mother's story and helped facilitate coordination of outpatient services for this family in the Fredericksburg area. The mom shared her experience in a recent letter to the team. *"I was dying inside but everyone treated me with such kindness. It was such a frightening time…Thank you for listening to my story. Now I can see that [my child] is a mental health success story and I'm ready to tell my side."*

The program is supported through grants and individual funding from organizations such as the Cameron Gallagher Foundation, the Healthy Minds Campaign, Richmond Memorial Health Foundation, Jackson Foundation, Jenkins Foundation, the Advisory Council of VTCC, and the City of Richmond, as well as in-kind assistance from the Child and Adolescent Division of the VCU Department of Psychiatry.

To refer a family for navigation assistance or to learn more about the CMHRC, visit their website at www.mentalhealth4kids.org.

Play - A critical skill for all infants and young children

Stacey C. Dusing, PT, PhD, Associate Professor,
Department of Pediatrics | Children's Hospital of Richmond at VCU

***Objective**: Describe the crucial benefits of play to children with or at risk of motor impairments and higtlight three ongoing research studies.*
***ACGME Competencies**: Systems-based Practice*

In September 2018 the American Academy of Pediatrics releases a Clinical Report entitled The Power of Play: A Pediatric Role in Enhancing Development in Young Children (if adding hyperlinks http://pediatrics.aappublications.org/content/pediatrics/early/2018/08/16/peds.2018-2058.full.pdf) . The statement raised awareness of the importance of play on social, motor, cognitive, and language development. Included in this report were highlights from the animal and early infancy literature on the importance of early play in promoting positive neuroplasiticy, supporting parent child engagement, self-regulation, and enhancing physical activity. While there is a plethora of evidence to support the need and benefits of play, in this electronic age parents are shifting away from play that requires active exploration and increasing passive opportunities. Active exploration in infancy may include banging toys or containers or playing in tummy time while interacting with a mirror. Parents play a role in setting up the environment to motivate the child and extend the duration and variability of the motor play including rolling, reaching, creeping etc in order to explore or play. In contrast, passive exploration includes showing infants toys that are out of reach or having the infant watch videos of toys moving or "educational" television. While both may engage the infant and prevent the infant from fussing, the active exploration allows the infant to learn the physical properties of the toy (what is heavy, what makes noises) and what happens when they drop or kick it. This early active exploration leads to an understanding of object permanence, cause and effect, and other cognitive constructs while supporting gross and fine motor development. While play becomes more complex in older children, the need for active exploration continues to be paramount as children learn the boundaries of the physical abilities, to communicate their wants and needs verbally, and build cognitive and social skills with reciprocal play.

While the AAP statement does an excellent job of highlighting the importance of play in typically developing children, it does not address the needs of children with delays or motor impairments. An infant born preterm or with a movement impairment resulting from a neonatal brain injury may have limited motor control or atypical movement patterns that impede their play. Lack of head control for example has a cascading effect, first limiting social engagement, then impacting reciprocal interactions, and likely limiting the parent's attempts to present opportunities for active exploration. This altered play opportunity tends to persist, especially in children who continue to have motor delays. While interventions such as physical or occupational therapy may be stated once an infant's delays are acknowledged, the infant has already lost 6-12 months of play opportunities needed to build their brain, parent child relationships, and the understanding of how their active movements, no matter how small, impact the world.

The Motor Development Lab within the Department of Physical Therapy at Virginia Commonwealth University (VCU), and Children's Hospital of Richmond at VCU are participating in 3 important studies to improve our understanding of Play. VCU will be one of 45 universities participating in the Play and Learning Across a Year (PLAY) project—a collaborative research initiative led by NYU researchers. (in case you can add hyper link https://www.nyu.edu/about/news-publications/news/2018/august/nyu-researchers-awarded--6-3-million-nih-grant-to-create-video-d.html) VCU is leading a 5 year clinical trial in collaboration with researchers at the University of Virginia to investigate the efficacy and ideal timing of providing a motor and cognitive intervention for infants born very preterm in the first months of life, Supporting Play Exploration and Early Development Intervention (SPEEDI). (press release is forthcoming in Oct 2018). Lastly, VCU has recently closed enrollment for a 4 year study entitled Sitting Together and Reaching to Play (START-Play), a physical therapy intervention for infants with motor impairments (http://start-play.unl.edu/). Results of this study are forthcoming.

While additional research in underway, we have an outstanding opportunity to integrate the current evidence and AAP recommendations on play into regular pediatric care. Encouraging parents to actively engage their infants with toys, vocalization, and during play on the floor in a variety of positions can set the stage for a lifetime of play. Early intervention (infantva.org) or physical therapy referrals for infants at risk for or presenting with limitations in play or motor impairments can give parents the ongoing support needed to learn how to encourage active play in their infant. We cannot assume all parents know how to play with a newborn, infant, toddler, or preschooler. Providing them with guidance on why and how to play is as important as introducing solids or reading. So when you see an infant for a will child checkup, ask the parent to show you how they usually play at home. Provide some resources on the importance of play and what play looks like at various stages of development. You could very well enhance that child's brain development, executive function, motor and social skills all with a little bit of fun through Play!

Contact: Stacey C. Dusing, PT, PhD | Board-Certified Clinical Specialist in Pediatric Physical Therapy
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scdusing@vcu.edu

New CHoR Guidelines Accessible to All!

Jonathan Silverman, MD, MPH
Assistant Professor | Virginia Commonwealth University

***Objective**: Describe new interdisciplinary clinical guidelines a CHoR.*
***ACGME Competencies**: Patient Care; Practice-based Learning and Improvement; Medical Knowledge; Systems-based Practice*

Guidelines-based care has been shown to decrease length of stay and halt rising hospital costs, without increasing readmissions or impacting physical functioning scores in children (Lion, 2016). With this in mind, we established the CHoR Clinical Guidelines Committee with the task of coordinating development of pediatric clinical guidelines to foster consistent, evidence-based CHoR-wide. We have focused on common presenting problems, such as asthma and diabetic ketoacidosis (DKA), where best practices are well supported by clinical research. A consistent approach to treatment spanning outpatient, ED, and inpatient has the greatest potential to improve patient care. Guidelines are developed at the grassroots level by multidisciplinary committees of nurses, physicians, advanced practice providers, respiratory therapists, pharmacists, and others. They are reviewed by the Clinical Guidelines Committee and receive final approval from division chiefs and the CHoR Quality Committee.

Currently, we have approved guidelines for gastroenteritis, pneumonia, sickle cell vaso-occlusive crisis, DKA, croup, asthma, bronchiolitis, migraine, neonatal fever, sepsis, and high-flow nasal cannula. We are looking forward to final approval for appendicitis, pancreatitis, and child abuse guidelines with many new proposals in the pipeline. These guidelines are publically accessible on the CHoR website at https://www.chrichmond.org/Clinical-Guidelines.htm. Check them out!

##

Studying Missed Well Child Care across the United States

Elizabeth Wolf, MD, MPH
Assistant Professor | Virginia Commonwealth University

***Objective**: Describe the methods, results and significance of a study of missed well-child care visits.*
***ACGME Competencies**: Systems-based Practice*

The American Academy of Pediatrics (AAP) recommends at least 13 well child visits (WCVs) between birth and 6 years of life. Missed WCVs have been associated with increased emergency department utilization and hospitalizations. WCVs contribute to improved health outcomes through: 1) timely receipt of age-appropriate vaccinations, 2) identification and management of acute and chronic illnesses, 3) education of parents about what to do for otherwise healthy children during such illnesses and 4) screening for and management of developmental delays. It is estimated that children miss about 1/3 of well-child visits with African-American children, uninsured and publicly-insured children, and children from low-income families missing even greater proportions of WCVs.

To study what ages children are most likely to miss WCVs, our Virginia Ambulatory Care Outcomes Research Network (ACORN) team partnered with the OCHIN network (formerly known as the Oregon Community Health Information Network) to gather data on children ages 0-6 years across 20 states. We found that visits in early infancy (2-, 4-, and 6- months) were most frequently attended whereas the 15- and 18- month visits and 4-year visit were least frequently attended.

Missing the 15- and 18- month visits may impair a provider's ability to detect speech and motor delay. Missing the 4-year WCV may hinder a provider's ability to assess school readiness and address any emerging behavioral problems that may impact school performance.
One explanation for poorer attendance at the 15- and 18- month WCVs is that fewer vaccinations are required at those visits compared with visits in early infancy. In addition, children between 1-2 years of age are frequently seen for sick visits and may be given vaccinations at that time. Children who are vaccinated at sick visits have been shown to be less likely to attend subsequent WCVs. Low attendance at the 4-year WCV may reflect the fact that families are waiting until 5-years of age to bring their child in for their "kindergarten" visit for completion of immunization requirements needed for school entry.

Our work was given the 2016 *Academic Pediatric Association's* Bright Futures Young Investigator Award. The results will be published in the November 2018 issue of *Pediatrics*. Our future research will focus on how to improve attendance of WCVs that are so critical to children's health. There may be opportunities to improve these WCVs at the level of the family, the health system, and nationally.

##

The Need for Multi-disciplinary Clinics in Pediatric Sub-specialties

Timothy Edward Bunchman, MD
Tenured Professor and Division Chief | Children's Hospital of Richmond at VCU

***Objective**: Explain rationale for complex care.*
***ACGME Competencies**: Patient Care*

As the complexity of disease processes in children has changed over time, the need to adjust the methodology of how to take care of these complicated cases needs to be addressed. This brings up the role of multi-disciplinary clinics, allowing for multiple sub-specialists to see the patient at the same time, in order to have a high level of cross communication as well as delivering patient care in a unified manner.
Advances at the Children's Hospital of Richmond, Virginia Commonwealth University in pediatric care has facilitated the development of multi-disciplinary clinics which are bring rolled out this year.

Urology Renal Clinics
As Pediatric Urology and Pediatric Nephrology have grown substantially at the Children's Hospital of Richmond at VCU, allowing for the combining of offices visits. These combined offices are on site at the downtown location, "The Pavilion" in our Stony Point office, and at our Fredericksburg office. These combined offices allow for children with complex urologic or renal disease to meet with both urology and nephrology and receive coordinated care. This is often supplemented with radiographic studies offered by our pediatric radiology group. This clinic set-up allows for one stop shopping; our patients come in to have their labs drawn, their ultrasound done, and are seen by both pediatric urology and pediatric nephrology on the same visit. This coordination of care and high level of professional communication between the pediatric urology sub-specialist and pediatric nephrology sub-specialist streamlines communication and clinical care in partnership with the family and their child's primary care physician. Referrals can be arranged via Jules or Jan at 804-827-2264.

Maternal Fetal Medicine Clinics
Our prenatal group (Maternal Fetal Medicine) along with pediatric urology and pediatric nephrology now offer a prenatal counseling for the parents of children with intrauterine renal (as well as other) diseases. These children often need to see the pediatric urologist, pediatric nephrologist, or both prior to delivery. The benefit of this combined care pathway is to improve the understanding and expectation pregnant women and their families will have regarding post-delivery care of the infant. This service is offered at any time throughout the week (both downtown and at Stony Point) and can be done rapidly at the last minute if needed. Referrals can be arranged via Vickie Weatherholtz at vickie.weatherholtz@vcuhealth.org or cell 804-350-8805.

Neuro Hem/Onc Renal Clinics.
Neuro renal abnormalities such as tubular sclerosis (TS) are now taken care of at a single office visit of the TS clinic. This clinic is offered every other month and is supported by the TS Alliance in State of Virginia. This clinic is staffed by pediatric neurologist, pediatric neuro oncologist and pediatric nephrologist as well as others supports a services to offer the excellent care of children with neuro renal clinics. There is a counterpart for the adult patients as well with a single coordinator for both programs, Laura Sutherland through the neurology clinic at 804-828-9350 but new pediatric patients can be scheduled through the main access line 804-828-2467. There is a neuroscience new patient coordinator. Future clinics in development includes neurofibromatosis as well as other neuro renal clinics are being considered.

##

Improving Care for Substance Exposed Infants in the Commonwealth

Robin Foster MD, FAAP
Tiffany Kimbrough MD, FAAP
Children's Hospital of Richmond at VCU

***Objective**: Discuss the changing landscape of NOWS (neonatal opioid withdrawal syndrome) in he central VA region, care delivery at CHoR and leveraged community partnerships bridge the care of this vulnerable patient population beyond the immediate postnatal period.*
***ACGME Competencies**: Systems-based Practice*

One children every 25 minutes is born suffering from opioid withdrawal in the United States. In the Commonwealth of Virginia, the rate of Neonatal Abstinence Syndrome (NAS), was reported to be 7.5 per 1000 live births in 2016 and had quadrupled since 2012. The rates of opioid use disorders in mothers has increased 910% in the last 10 years for pregnant patients from 2004-2014.

As we have seen the rising rates of infants affected by substance use disorders, hospitals across the country are struggling with what best practices are and how to implement them. There is wide variability in approach to care, which leads to evidenced based practices being implemented variably across institutions.

Children's Hospital of Richmond at VCU (CHoR) has been working to improve care for families affected by opioid use disorders. This begins with a prenatal consultation for pregnant women enrolling in substance use treatment by a member of our pediatrics team to discuss expectations at delivery and during the hospitalization. Once the baby is born, we practice the "Golden Hour" where stable infants immediately go skin to skin with their moth-

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ers post-delivery. We are a Baby Friendly hospital and this practice is standard of care for all of our mothers, but especially important for substance use disorder moms who often have a history marked by trauma and who are at risk for poor attachment with their babies.

We continue to foster attachment in the hospital setting by having all infants "room-in" with their mothers during the hospital stay. We provide all direct care to the infant in the patient room: from baths, hearing tests, blood draws, etc, the baby and mom are not separated. If a mother is enrolled in methadone maintenance therapy or buprenorphine for opioid use disorder treatment, that mom is encouraged to breastfeed to further promote bonding with her infant and help reduce effects of NAS, which is now referred to as Neonatal Opioid Withdrawal Syndrome (NOWS). As space allows, we offer our mothers to board with their infants through the observation period for NOWS and through treatment if that is needed. Boarding entails mother staying in the hospital after her own discharge and providing all hands-on care to her infant, which has been tremendous at reducing rates of pharmacologic treatment and length of stay for substance-exposed infants (SEI).

After the hospital stay, SEI are at increased risk for child maltreatment and return to care for failure to thrive, physical abuse and neglect. We are working to combat the continued effects of the opioid crisis beyond the neonatal period by leveraging our community partners in the process.

We are fortunate to be one of the partners in a program called the Central Virginia Family Resiliency project funded through the Richmond Memorial Health Foundation. Our community partners are Greater Metro Richmond SCAN and Family Lifeline. The pilot program which started this month will allow women with substance use disorder who reside in the Greater Metro Richmond area and are receiving care for substance use at VCU in the Motivate Clinic to participate. SCAN is offering a 16 week parenting curriculum that focuses on attachment. The participants are provided transportation and child care on the premises which allows time for observed interaction with the infants. Family Lifeline is providing a home visiting model using staff who have additional training in substance use disorder and NOWS. Peer mentors are also integrated into the program to work side by side with the infant caregivers. The participants are allowed to enroll in an either/or fashion with the programs offered to meet the needs of each individual. Caregivers can be referred at any time from the onset of pregnancy until the infant's three month birthday and can be referred from prenatal clinic, the nursery or a well child check for the infant. Objective outcome data will be collected from the two community programs to assess the utility of the model in an effort to develop similar sustainable programs across the Commonwealth.

##

Pediatrics Traumatic Brain Injury Program at CHoR

Nikki Miller Ferguson, MD, Assistant Professor | Pediatric Critical Care | Children's Hospital of Richmond

Objective: *Describe new Traumatic Brain Injury Program at CHoR, services offered, care pathways, research education. Describe impact of brain injury in pediatric population.*
ACGME Competencies: *Patient Care; Medical Knowledge; System-based Practice.*

The Children's Hospital of Richmond (CHoR) mission to establish a Pediatric Center of Excellence in pediatric neuroscience has led to several initiatives to provide coordinated, collaborative, cohesive clinical care and patient access, in addition to incorporating a cutting-edge translational research model. We will describe the latest program established under Pediatric Neuroscience for traumatic brain injury.

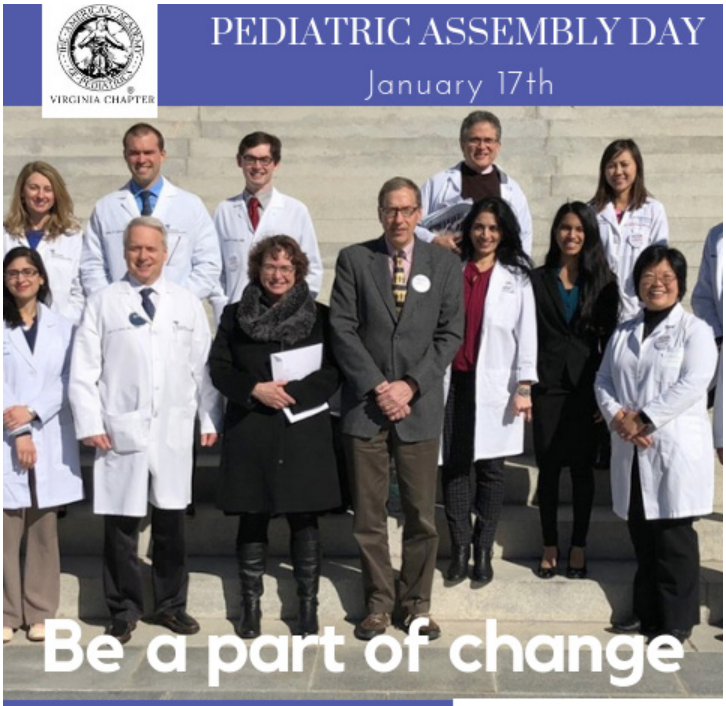
Brain injury, particularly as a result of trauma, is the leading cause of disability and death for children in the United States. Over 2 million concussions occur annually in children. There are large gaps in our full understanding of the effect of trauma on the dynamic neurodevelopment of childhood and adolescence. This knowledge gap hinders the development of new therapies to improve outcomes, and survivors are left with physical, cognitive, and psychological consequences that are not only borne by the child, but by their family and society as well. Average yearly costs are billions of dollars, compounded by lost potential and productivity. A coordinated, multi-disciplinary approach is needed to advance care and improve outcomes for children who sustain a brain injury.

With generous support from the Children's Hospital Foundation and the VCU Health System, the Traumatic Brain Injury Program at Children's Hospital of Richmond has been created within Pediatric Neuroscience to provide a continuum of care that is both on the cutting edge of the latest medical science and designed to facilitate access for patients and their families through the acute injury, recovery, and return to daily living. Through coordinated multi-specialty care, an inpatient team focused on all aspects of moderate to severe brain injury hospitalization, care coordination, research, and education is led by Drs. Nikki Miller Ferguson and Alia Iqbal O'Meara, while Dr. Katherine Dec leads an outpatient team to care for acute concussions, the ongoing outpatient care of children discharged from the hospital, related research, education, and community partnerships.

Children who sustain a significant enough brain injury to require hospitalization encounter multiple providers from multiple medical specialties as they transfer across units and clinics during their stay at CHoR/VCU. The Traumatic Brain Injury Program employs an inpatient nurse coordinator to serve as a consistent face, point of contact and support person for these families. In addition to educating and ushering families through their child's brain injury and recovery, the coordinator serves as point of contact for reaching out to community physicians to develop a partnership of care. System access navigators work closely with the inpatient nurse coordinator to seamlessly transition inpatients into outpatients, ensuring that these vulnerable patients are not lost to the follow up necessary to maximize their recovery from injury. A streamlined open referral and access pathway for pediatric brain injury expedites initial care of all children, whether they are within the CHoR catchment area or outside of the catchment area through virtual consultation. A direct line will reach dedicated, trained medical staff who ensure outpatient mild traumatic brain injury and concussion patients are triaged quickly and directed into the appropriate CHoR care pathway in the appropriate timeframe. In addition, athletic trainers are a key part of this team, as they provide with the physician clinical care; education, outreach, and assist with integration into the academic continuum after injury. This team is integral to the triage and outreach to schools, sports teams, community parks and recreation programming and community physicians.

Finally, the Traumatic Brain Injury Program will provide targeted community outreach, education, awareness, and community guidance for programs to integrate recovered patients into the community, as well as support ongoing research spanning from "bench to bedside", including outpatient care, pre-hospital care to discharge and long-term recovery.

This novel collaborative care program will enhance not only the patient and family experience at CHoR but also our community healthcare partners, as well as improve the outcomes of patients with brain injury.



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Have you ever met with your state or federal legislators before? ☐ Yes ☐ No

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