Featured Stories

• A PHM Journal Is Born
• Taking Off the Pulse Ox
• Adverse Events: We All Make Mistakes

You are the Hospitalist:
4-month old with rapidly spreading rash
Our Vision

The Section on Hospital Medicine of the American Academy of Pediatrics is dedicated to the health of all children in the hospital setting through advocacy, education and service—incorporating the core principles of safety, effectiveness, timeliness, efficiency and equitability in family-centered health care.

Our Mission

Advocacy
The Section is dedicated to being a leader in inpatient Pediatric Hospital Medicine in the Pediatric community—advocating for the health and safety of hospitalized children.

Education
The Section is dedicated to being a leader in educating health care providers, patients and families.

Service
The Section is dedicated to being a leader in identifying the professional needs of Pediatric Hospitalists.

Publication of this news journal is supported by Mead Johnson Nutrition.
LETTER FROM THE CHAIR OF SOHM

Hospitalist Admissions

Daniel Rauch, MD, FAAP
darauch@aap.net

By now you’ve heard that this news journal will become a full-fledged journal, the first dedicated to Pediatric Hospital Medicine. It will retain its title while adding the subtitle, Hospital Pediatrics: A Journal of the American Academy of Pediatrics. It marks just another step in the maturity of our field. We already have meetings (and I hope many of you will be there in Minneapolis July 22-25 for Pediatric Hospital Medicine 2010) and textbooks. We have venues for our research to be presented and published. The Section is working with the AAP to develop a PIM PREP product, and the AAP has approved the development of an inpatient manual. The inpatient asthma eQIPP module is available for those working on their MOC, and there is opportunity to develop more modules on other inpatient topics. It is fitting then, to start seriously talking about the possibility of attaining official recognition from the American Board of Pediatrics as a subspecialty. The ABP has a process for new and emerging fields to petition the ABP for recognition. The options are the formal 3-year training program designed to produce academic practitioners or a 1-2 year training program that satisfies the additional training needs to be a hospitalist.

It is important to understand that attaining recognition would not preclude anyone from working in the inpatient setting much as lack of Pediatric Emergency Medicine training does not prevent pediatricians from working in emergency rooms. Also, all newly recognized fields have a period where current practitioners can “grandfather” in to the certifying exam so most of you reading this will be able to sit for the exam. The challenge is to consider what the field will look like in 10-15 years and whether or not this is the next step. We will be talking about this in Minneapolis and the months/years to come. This is also another opportunity to get involved because there will be a call for participants to help think this through in depth. Because, of course, major steps forward such as the ones I just listed do not happen without the hard work of many people.

I thank both Tim Hartzog and Lee LaRussa for their leadership and participation on the SOHM Executive Committee.

Tim Hartzog has recently rotated off the SOHM EC after many years of dedicated service. Tim has been the go-to tech guy for the Section. I know many of you believe we are behind the times in terms of new technology utilization, and I won’t argue that point, but I can tell you that the Section would still be mired in the 1990’s if not for the efforts of Tim. He has been instrumental in shaping the listserv®, creating the library and the archive, and many other behind-the-scenes efforts to attempt to keep pace with new developments. He did this while changing jobs and, literally, through sickness and health with a selfless dedication that should be recognized with our heartfelt appreciation.

Also moving off the SOHM EC is Lee LaRussa. His is a name you have seen many times a day over the last several years as our webmaster, a role he admirably performs and will continue. Lee stepped into a vacancy to serve out a term, managed to get to San Francisco for an EC meeting, reviewed abstracts for the NCE all in the name of good citizenship. We are lucky to have a committed member such as Lee who simply does what is needed. I thank both Tim and Lee for their leadership and participation.

I hope you read the recent article in the New York Times about hospitalists. It seems as though hospitalists are a good idea and may be part of the solution to the health care crisis. I find it reassuring that my home town paper has noticed what I do for a living and has given my profession a stamp of approval. What I think is the take-home message is that Hospital Medicine has arrived. It is up to us to decide what to do now that we are “here.”

SOHM Executive Committee 2009-2010

Daniel A. Rauch, MD, FAAP
Chairperson
darauch@aap.net

Jennifer Daru, MD, FAAP
jadaru@gmail.com

Matthew Garber, MD, FAAP
matthew.garber@palmettohealth.org

Liborio LaRussa, MD, FAAP
lee@larussafamily.com

Anuj S. Narang, MD, FAAP
snarang@pccoabr.com

Erin R. Stucky, MD, FAAP
thartzog@mac.com

Laura Mirkinson, MD, FAAP
Immediate Past Chairperson
laura.mirkinson@gmail.com

D. Corey Lachman, MD, Liaison,
Section on Medical Students, Residents, and Fellowship Trainees
clach@gmail.com

Committee On Hospital Care 2009-2010

Jerrold Eichner, MD, FAAP
Chairperson
jerrold.eichner@gfclinic.com

Members
James M. Betts, MD, FAAP
Maribeth Chitkara, MD, FAAP
Jennifer A. Jewell, MD, FAAP
Patricia Lye MD, FAAP

Section Member
Laura Mirkinson, MD, FAAP
Section on Hospital Medicine

Consultants
Kurt Heiss, MD, FAAP
Section on Surgery

Jack Percelay, MD, FAAP
The Joint Committee Hospital Professional and Technical Advisory Committee

Liaisons
Chris Brown, MS, CCLS
Child Life Council (CLC)

Lynne Lostocco, RN, MSN
National Association of Children’s Hospitals and Related Institutions (NACHRI)

Barbara Meeks, RN, MSN, MBA
American Hospital Association (AHA)
LEtter from the editor

hospital pediatrics is becoming a journal!

(Can you see me leaping up and down?)

Jennifer Daru, MD, FAAP, FHM
jadaru@gmail.com

Over the next six months, this news journal will be going through a number of changes as the Section on Hospital Medicine and a newly elected editorial board work with AAP leadership to create what will evolve into a peer-reviewed journal, Hospital Pediatrics: A Journal of the American Academy of Pediatrics. Our goal is to create a similar editorial structure and rigor as that of Pediatrics but maintain a down-home feel with peer-reviewed articles, review articles, commentaries, Section updates, and a few figures/illustrations. Ultimately, the journal will be indexed as well.

How did we get here?

I would be remiss not to supply a brief history of Hospital Pediatrics as I say my thank yous to its supporters. First, there was the vision of Dr Jack Perceley who started the initial newsletter in the Summer of 2000 for the then provisional Section on Hospital Care. That edition had a summary of a program in San Diego by Dr Erin Stucky (now a SOHM EC member) and advertised a program at the National Conference and Exhibition that year called: “Tag Team Pediatrics – The General Pediatrician and the General Pediatric Hospitalist-Collaborative Care of the Pediatric Inpatient.”

When Jack asked me to try and fill the shoes of Dr Paul Bellet, a retiring member of the EC, he handed me the newsletter as my task. In June, 2003, the first edition I edited, I said I was overwhelmed by the participation of all of you–we had filled 11 pages! Well, we grew much bigger than that (our last few editions have been 32 pages)! In 2006, Ruth Podjasek joined, assisting Nicole Alexander (the wonderful manager of our section for the AAP); she improved our formatting so that when we received funding in 2007 from Mead Johnson ($10,000 per year!) we were able to bring on a publisher and call ourselves a news journal. In fact, thanks to Dr Lisa Zaoutis, editor of You are the Hospitalist, we called ourselves Hospital Pediatrics.

In the meantime, the field was evolving; our group became the Section on Hospital Medicine. The Ambulatory Pediatric Association (APA) took the risk of hosting the first Pediatric Hospital Medicine conference; now a yearly tri-sponsored event with the AAP, APA and Society of Hospital Medicine. As a group we increased our contribution to the literature and care of kids; we established organizations such as PRIS and the VIP network. Just in the past year, leaders came together as the Pediatric Hospital Medicine Roundtable helping give the field direction and, importantly for all of us, the Core Competencies were published on-line in the Journal of Hospital Medicine.

Where do we go now?

It is the right moment for Hospital Pediatrics to become a journal. The journal will remain dedicated to the health of all children in the hospital setting through advocacy, education and service—incorporating the core principles of safety, effectiveness, timeliness, efficiency, and equity in family-centered health care. It’s a long mission, but I think we can do it. Thank you to the AAP, the Section on Hospital Medicine Executive Committee past and present, editors, writers and readers.

There’s plenty more to say, and now we will have a journal to say it in …
It is an exciting time for complex care, with many new offshoots blossoming across this spring. In this edition we are pleased to highlight the work of our sister organization, the Academic Pediatric Association (APA) which has recently successfully launched the Complex Care Special Interest Group (CC-SIG). Since its formation in 2009, the CC-SIG has graduated from provisional to full SIG status and is growing fast in numbers and initiatives.

The purpose of the CC-SIG is to bring together practitioners from varied settings (inpatient, outpatient, community and academic) to foster collaboration in caring for children with medical complexity (CMC). About 50 practitioners with a wide range of backgrounds, including generalists and specialists, trainees and experienced pediatricians attended the second annual SIG meeting at the Pediatric Academic Societies (PAS) Meeting in Vancouver, BC in early May 2010. Although a rigorous definition remains elusive, the majority of participants agreed that CMC are a subset of children and youth with special health care needs (CYSHCN) who require more intensive care coordination and who are high utilizers of medical services.

At the May meeting the CC-SIG attendees divided into three working groups (research, reimbursement, and education) to develop an agenda for the upcoming year. The Research group plans to take an in-depth look at the National Survey for Children with Special Health Care Needs, Epidemiology, General Pediatrics, and Hospitalist Medicine as well as one workshop titled, “Building Innovative Clinical Programs for Children with Complex Health Care Needs,” led by Dennis Kuo.

Any practitioners with an interest in CMC are invited to join members of the AAP SOHM Subcommittee on Complex Care led by chair Allison Ballantine (ballantine@email.chop.edu) at the Pediatric Hospital Medicine Annual Meeting in Minneapolis, MN, July 22-25, 2010. At this same meeting a two-part workshop titled, “Technical Trouble-Shooting: The Role of the Hospitalist in Managing Technical Devices,” led by Eyal Cohen will be of particular interest to the complex care community. Those interested in complex care will also have an opportunity to meet on September 22, 2010 at the 64th Annual Meeting of the American Academy of Cerebral Palsy and Developmental Medicine (AACPDM) in Washington, DC. A number of complex care themed posters and platforms will also be presented at this meeting.

The AAP and the APA have a strong history of successful collaboration and look forward to supporting the growth of the exciting field of complex care.
Case: 4-month old with rapidly spreading rash

Alicia Genisca, MD, Carmen Briones, MD, Lisa Arkin, MD, and James Treat, MD
The Children’s Hospital of Philadelphia, Philadelphia, PA
Contact: Alicia Genisca MD, GeniscaA@email.chop.edu

You are the pediatric hospitalist seeing a full term 4-month-old girl with a history of eczema who presents with a one-day history of rash. On the morning of admission, while changing the infant's diaper, the mother noted red spots that encompassed the patient's legs, diaper area, back, abdomen and upper torso. This rash was not present the prior evening when the patient was put to bed. The infant was also fussy.

The patient was brought to her pediatrician’s office where a diagnosis of impetigo was made and amoxicillin was prescribed. Despite receiving the first dose of amoxicillin, the rash continued to spread to her neck, cheeks and scalp. The mother was concerned so she brought the patient to the Emergency Department. There was no report of fever, vomiting, diarrhea, cough or rhinorrhea. The rash never appeared vesicular to the mother. The infant's oral intake was good with the normal numbers of wet diapers. There had been no changes in soaps, shampoos, emollients or laundry detergent. Mom stated that the family had recently changed brands of dryer sheets.

The patient's past medical history is notable only for atopic dermatitis managed with emollients and the recent addition of fluocinolone cream. She has no allergies and takes no other medications except the single dose of amoxicillin on the day of admission. Her immunizations were up to date through 2 months. Her family history is notable for her mother who is also atopic. The patient lives at home with her parents and 19-month-old brother. There were no pet or animal exposures. There was contact with an aunt who had an orolabial “cold sore” 3 days prior to admission. There was no known exposure to anyone who had recently received smallpox vaccine.

On your examination, you note her vital signs: temperature 37.4° C, heart rate 144 beats per minute, respiratory rate 30 breaths per minute and blood pressure 96/62 mmHg. She is crying but consolable, seems uncomfortable when rash is touched, but is in no acute distress and appears well hydrated. There is no lymphadenopathy. Skin examination reveals many 1-4 mm coalescing yellow crusts on an erythematous base which surround circular erosions on her trunk, extremities (see Figure 1), diaper area, neck, and scalp. She also has a few 2-3 mm red macules on the palms and soles. The forehead and periorbital areas are spared. There are no intact or ruptured vesicles, and the lesions all appear to be of similar age. The areas of skin without lesions appear normal as are the conjunctivae, lips and oropharynx. The remainder of the examination is normal. Initial laboratory testing includes a complete metabolic panel, which is normal. Complete blood count shows white blood cell count 8.2 K/µL (24% neutrophils, 66% lymphocytes, 3% atypical lymphocytes), hemoglobin 10.0g/dL and slightly elevated platelet count of 499 K/µL. A blood culture was sent.

You consider the following diagnostic and treatment options:

A. Start acyclovir intravenously, and send swabs for herpes simplex virus (HSV) and varicella zoster virus (VZV) from the affected skin.

B. Start antibacterial antibiotics intravenously to cover Staphylococcus aureus and Group A Streptococcus (specific antibiotics guided by local prevalence and susceptibilities of S. aureus), and send swabs for bacterial Gram stain and culture from the affected skin.

C. Send swabs from the affected skin for HSV, VZV, and bacterial Gram stain and culture, and withhold treatment until infection is confirmed.

D. A and B and send viral studies for Enterovirus.

Congratulations to our newly elected SOHM Executive Committee Members!

Drs Hain and Quiñonez were elected to the Executive Committee during the spring election and will begin their terms of service on November 1, 2010.

Paul Hain, MD, FAAP
Ricardo Quiñonez

Continued on page 8
The Clinical Characteristics of Methicillin Resistant Staphylococcus Aureus (MRSA) Infections in Complicated Pediatric Patients.
Jeffery Bergman, DO, Nicole M. Willis, DO, Natalie A. Dick, DO, Kayse Shrum, DO, Rhonda L. Casey, DO, Stanley Grogg, DO Oklahoma State University Medical Center, Tulsa, OK.

Comparison of the Incidence, Etiology and Treatment of Anaphylaxis Over Time.
Julia K. Fuzak, MD1, Jennifer Traynor, MD2 1The Children’s Hospital, University of Colorado Denver, Aurora, CO, 2Children’s Memorial Hospital, Fermegn School of Medicine, Northwestern University, Chicago, IL.

Creation of a Standardized Rigorous Training and Credentialing Program for Pediatric Hospitalists to Deliver IV Sedation and Total Intravenous Anesthesia in A Children’s Hospital.
Dudley Hammon, MD, Samuel Ajizian, MD, FAAP Wake Forest University Health Sciences, Winston Salem, NC.

Critically Ill and Hospitalized Children with Novel H1N1 Influenza A (nH1N1) Infection.
Haidee Custodio, MD1, Michael Gayle, MD2, Christine Bailey, RN2, Jose Zayas, DO1, Peter Whadyka, PhD1, Moseen Rathiore, MD1 1University of Florida, Jacksonville, FL, 2Wolfson Children’s Hospital, Jacksonville, FL.

Development of a Pediatric Hospitalist Sedation Program.
Michael P. Turmelle, MD, Lisa Moscoso, MD, Kim Handlin, MD, Yasmeen Daud, MD, Douglas Carlson, MD Washington University/St. Louis Children’s Hospital, St. Louis, MO.

Effect of Implementation of a Clinical Pathway On Outcome Variables for Patients with Osteomyelitis.
Jessica Nicholson, MD1, Tamara Baer2, Caroline Russbach, MD1 1Children’s National Medical Center, Washington, DC, 2George Washington University School of Medicine, Washington, DC.

The Importance of Communication as a Component of Service in Pediatrics.
Chris Collura, Chris Colby, MD, William A. Carey, MD, Gretchon A. Matheux, MD Mayo Clinic, Rochester, MN.

Improved Referral Pattern with Child Life Specialists’ Involvement in Family-Centered Rounds.
Shelley W. Collins, MD, Nicole M. Paradise Black, MD, Amy Wagnor, BS, CCLS, CTRS, Erik Black, PhD, Naomi Martinez, BS, CCLS, CTRS, Marilyn Close-Batteo, BS, CCLS Shands Children’s Hospital at the University of Florida, Gainesville, FL.

Modalities of Cardiorespiratory Monitoring in Apparent Life Threatening Event Patients.
Arti Lal, MD, Supriya Jambhekar, Dennis Z Ruo Arkansas Children’s Hospital, Little Rock, AR.

Portal Hypertension in Children without Hepatic Dysfunction: a Descriptive Study of 32 Cases.
Nhan T. Ho, MD1, Phuc L. Hoang, MD2, Chi H. Nguyen, MD2, Tam T. Tran, MD2 1Ho Chi Minh City University of Medicine and Pharmacy, Ho Chi Minh City, Vietnam, 2Children’s Hospital No 1, Ho Chi Minh City, Vietnam.

Prevalence and Epidemiology of Pain in Hospitalized Pediatric Patients.
Paul B. Mick, Vicki L. Montgomery, MD, FAAP, FCCM, Jan Sullican, MD, FAAP, John W. Berkenbosch, MD, FAAP, FCCM, FRCPCH University of Louisville, Louisville, KY.

The Quality of Root Cause Analyses Performed in a Children’s Hospital.
Rustin B. Morse, MD, Murvoy M. Pollack, MD Phoenix Children’s Hospital, Phoenix, AZ.

Reducing Catheter-Associated Blood Stream Infections in a Pediatric Inpatient Unit: Proven Strategies in a Novel Setting - Pediatric Hospital Medicine Research Award Recipient.
Anand K. Sekaran, MD, FAAP, Stephen Neff, Robert Englander, MD, MPH Connecticut Children’s Medical Center, Hartford, CT.

Research Needs of Pediatric Hospitalists.
Arpi Bekmezian, MD1, Ronald Teyfel, MD2, Karen Wilson, MD2 1University of California San Francisco, San Francisco, CA, 2MUSC, Charleston, SC, 3University of Rochester, Rochester, NY.

Restructuring the Morbidity and Mortality Conference to Address Core Competencies and Improve Resident Awareness of Patient Safety Issues.
Vasudha L. Bhavaraju, MD1, Paul Bakerman, MD2, Richard Engel, MD2 1 Maricopa Medical Center, Phoenix, AZ, 2 Phoenix Children’s Hospital, Phoenix, AZ.

Successful Model for Integrated Hospitalist Care of Medically Complex Children.
Arti Lal, MD, Carrie M. Brown, MD, Alme Tanios, MD, Patrick H. Casey, MD Arkansas Children’s Hospital, Little Rock, AR.

Transition of Care: What Is the Hospitalists Role?
Shelley W. Collins, MD, John Reiss, PhD, Arzoo Saiti, MIBCh Shands Children’s Hospital at the University of Florida, Gainesville, FL.

Alka Goyal, MD, Upasana Tewari, MD Children’s Hospital of Pittsburgh, University of Pittsburgh School of Medicine, Pittsburgh, PA.

Utility of Post-UTI Imaging in Children with Normal Prenatal Renal Anatomy.
Jan Sasaki, MD1, Mayia Nanda, MD2, Rina Shah, MD1, Preeti Sharma, MD1, Nirmala Parajuli, MD1, Saumil Trivedi, MD1, Daniel A. Rauch, MD, FAAP3 1Elmhurst Hospital Center, Elmhurst, NY, 2Bellevue Hospital Center, New York, NY, 3Mt. Sinai School of Medicine, Scarsdale, NY.

Posters for Presentation at the NCE during the SOHM Program October, 2010

Research past issues of Hospital Pediatrics by visiting the news journal’s Keyword List at http://www.aap.org/sections/hospcare/Keyword%20Search.xls
Answer: D

This patient was started on intravenous acyclovir and clindamycin to cover for possible bacterial and/or herpetic superinfection of her atopic dermatitis. Swabs of open lesions were sent for herpes simplex virus (HSV), varicella zoster virus (VZV), and Enterovirus polymerase chain reaction (PCR) assay; bacterial Gram stain and culture. Entero viral and IHSV PCR assays from the blood were also sent as well as bacterial blood culture. The PCR assays from both the skin swab and blood were positive for Enterovirus, and all other infectious studies were negative. This patient was diagnosed with Kaposi’s varicelliform eruption (KVE) secondary to enterovirus infection. After receiving these results, further questioning of the mother revealed that the 19-month-old brother had been sent home from daycare with fever and small bumps on his hands and feet 3 days prior to the initiation of his sister’s eruption.

Background
Kaposi varicelliform eruption (KVE) is the term used to describe a distinct cutaneous viral eruption in patients with pre-existing dermatoses. Most commonly, it is caused by HSV in the setting of atopic dermatitis (where it is called eczema herpeticum), but it has also been reported where the infecting agent is coxsackie, vaccinia and variola viruses. Patients with a host of other skin conditions that compromise the epidermal barrier, including severe burns and genodermatoses (inherited skin disorders), may also become infected with one of these viruses.

The pathophysiology of the condition is speculated to involve a host of factors that impair the skin’s antiviral defenses. These include a thick but dysfunctional, penetrant epidermal layer that predisposes to superinfection, decreased numbers of antimicrobial peptides, and a skewed TH2 response that inhibits T-cell activation and natural killer cell function. These derangements have been widely reported in patients with atopic dermatitis. Reported risk factors include an earlier onset of atopic dermatitis and a high total serum IgE level. Topical corticosteroid use has also been suggested as a risk factor, but this remains unproven. In fact, a recent study of 100 patients with eczema herpeticum found that 75% of patients had not received any corticosteroid therapy in the months prior to presentation, arguing against a causal relationship between pharmacologic immunosuppression and disseminated viral infection. If more severe atopic dermatitis were itself a risk factor for the development of KVE, then better eczema control, through the appropriate use of topical corticosteroids, might actually be protective.

Enteroviruses are a genus of the family of picornaviruses. There are many serotypes of Enteroviruses that cause human disease and they are arranged into subgroups: polioviruses, group A coxsackieviruses, group B coxsackieviruses, echoviruses and enteroviruses. There is a high degree of cross reactivity and genomic similarity among Enteroviruses, which makes detection of any strains of the Enterovirus genus identifiable by PCR testing. Human enteroviral infections are acquired by ingestion of virus that is shed in the feces or the upper respiratory tract of direct and indirect contacts. Enteroviruses are common causes of a broad array of cutaneous eruptions and mucous membrane lesions, including hand-foot-and-mouth disease and herpangina.

Presentation
KVE typically initiates with eruptions of new lesions in regions of prior dermatitis. Depending on the actual infectious agent, the character of the lesions may range from umbilicated vesiculopustules that progress to hemorrhagic erosions, to macules and papules with varying degrees of weeping or crust ing. Patients with KVE secondary to Enterovirus may have lesions that resemble those of hand-foot-and-mouth disease, with tender erythematous macules or papules that evolve into elliptical vesicles and ulcers. However, as demonstrated by our patient, the distribution of the rash may be quite different than hand-foot-and-mouth disease. She lacked oral findings, and had concentration of lesions in the areas of her underlying atopic dermatitis.

Evaluation
Since concern for herpetic infection remains high when a diagnosis of KVE is being considered, testing for this pathogen is essential. Direct fluorescent antibody (DFA) stain for HSV widely available and highly sensitive. It should be sent from scrapings of infected epithelial cells at the base of recently unroofed ulcerative lesions. If available, PCR for HSV, VZV, and Enterovirus from the skin lesions are useful for identification of the pathogen, and PCR from the blood may detect virus if the patient is viremic. Surface cultures from crusted or eroded areas are useful to detect bacterial co-infection, most commonly caused by S. aureus or Group A Streptococcus. Due to the further impairment of the skin barrier by viral infection of the eczematous skin, the risk of bacterial infection is increased so obtaining blood cultures is also prudent.

Differential Diagnosis
Herpes simplex virus (HSV) is the most common cause of KVE, and the lesions typically erupt in clusters of nonmorphic vesicles or pustules, which eventually erode and ulcerate, and may appear “punched out” with some crusting. Patients often have associated fever and lymphadenopathy.

Bacterial superinfection of atopic dermatitis with widespread pustules, crusting and erosions can look similar to KVE. In addition, bacterial co-infection can complicate KVE, so awareness of bacterial involvement remains an important consideration.

Widespread primary varicella (chickenpox) could also look similar to KVE. The lesions are typically vesicular on an erythematous base. The vesicles eventually become flaccid or rupture, and then crust over. New vesicles tend to erupt in crops, which results in the presence of lesions at various stages present at the same time. The distribution of lesions may involve skin affected and unaffected by underlying atopic dermatitis.

Molluscum contagiosum can also become widespread in children with atopic dermatitis, and is usually diagnosed clinically. Small, umbilicated flesh-colored papules are pathognomonic, and may be widespread. Patients typically appear well without systemic symptoms.

Rarely, KVE may result from vaccinia virus, the virus used to inoculate against smallpox infection, with a reported prevalence of about 100 cases per million. The condition, called eczema vaccinatum, has primarily been documented in patients with accidental
exposure to vaccinated individuals, since a history of atopic dermatitis is a contraindication to vaccination. The eruption appears as large, tense bullae, which appear in the same stage of development and synchronously transform to necrotic erosions. Patients have associated fever and systemic symptoms. PCR for vaccinia virus is the diagnostic test of choice.

**Treatment**
The treatment of choice for KVE due to HSV is acyclovir. For infants or children with a toxic appearance, treatment is often initiated intravenously at a dose of 15-30 mg/kg/day divided TID. Oral therapy can be considered if the patient is well appearing or when the lesions show signs of healing, but increased doses may be warranted due to decreased enteral bioavailability compared to the intravenous route. KVE due to HSV carries a significant risk of viremia, which can lead to multi-system organ involvement with potential associated complications that include keratitis, meningitis and encephalitis. Prior to effective antiviral therapy, the mortality was reportedly 75%, therefore patients should be presumptively covered for HSV infection until proven otherwise. Since the differential diagnosis also includes impetiginized atopic dermatitis and both HSV and bacteria can co-infect, antimicrobial coverage is often added to cover for bacterial superinfection with Group A Streptococcus and S. aureus until these pathogens have been excluded.

**Patient Outcome**
This patient was febrile the first night of her hospitalization, but was afebrile and increasingly comfortable on day 2 of hospitalization. No new lesions appeared, and the overall appearance improved over the second 24 hours of her hospital stay. When the bacterial cultures, HSV and VZV results came back negative, and with the positive enteroviral studies, the antibiotics and acyclovir were discontinued and the patient was discharged to home (day 3 of hospitalization). Interestingly, when the patient was seen in follow-up the day after discharge the mother had developed red vesicles on the hands, feet (see Figure 2) and face. The pattern of infection of the brother, the patient, and the mother are strongly suggestive of a clinical diagnosis of hand-foot-and-mouth disease, most commonly caused by coxsackie virus A16.

---

**References:**
Bronchiolitis Protocol: The Impact of Multidisciplinary Education on Pulse Oximetry and Oxygen Utilization and Ultimately Length of Stay, Phoenix Children’s Hospital, Phoenix, AZ

Ryan Bode, MD, Robert Wilson, RT, Deborah Geise, RT, Chris Tenaglia, RT, Rustin Morse, MD

Phoenix Children’s Hospital, Phoenix, AZ

Aim
A previous bronchiolitis protocol at this institution had failed to result in a significant decrease in length of stay (LOS). A multidisciplinary, educational approach, focusing on nursing (RN) and respiratory therapists (RT), and the utilization of pulse oximetry and oxygen, was instituted in an effort to make a more significant impact on LOS.

Interventions
A bronchiolitis protocol had been in place at this institution for 2007 and 2008 without a significant impact on LOS. A revised protocol was instituted in 2009 with a major emphasis on education regarding the use of pulse oximetry and oxygen. The two protocols were similar in regards to: inclusion and exclusion criteria, scoring system, use of suctioning and scoring dependent trial of bronchodilators. The cutoff for oxygen utilization was consistent in both protocols calling for oxygen for SpO2 <90%. The revised 2009 protocol had added language regarding the use of spot pulse oximetry and oxygen:

- Scheduled spot check pulse oximetry Q4 and prn. Consider continuous pulse oximetry in acute cases (first 24-48 hours of illness), high risk infants <1 month of age, history of prematurity, or significant distress.
- Supplemental oxygen provided if SpO2 consistently <90%. If SpO2 falls below 90% and patient remains comfortable, assess and provide oral or nasopharyngeal suctioning prior to starting oxygen.

The utilization of pulse oximetry, supplemental oxygen, weaning of oxygen and subsequent meeting of discharge criteria is driven by RN/RT care at the bedside. Prior to initiating the revised 2009 protocol, multiple educational and compliance tools were utilized targeting this specific area:

- RN/RT required on-line learning module with competency testing on appropriate use of oxygen including weaning and utilization of spot pulse oximetry.
- Protocol Implementation Assessment Tool to track and emphasize protocol compliance.
- Hospitalist section and RN/RT grand rounds.

Measures and Sampling Methods
- 2008 and 2009 Length of Stay (LOS) for Bronchiolitis (DRG 138)
- 2008 and 2009 RN/RT compliance rate for on-line learning module
- 2008 and 2009 chart audit utilizing Bronchiolitis Protocol Implementation Assessment Tool to document weaning of oxygen and utilization of pulse oximetry in accordance with protocol. Audit included 22 patients and 65 assessments.

Results:
- The 2009 bronchiolitis LOS was 3.39 days compared to 2008 LOS of 4.31 days showing a decrease in LOS by 21% resulting in nearly a full day shorter LOS.
- 100% compliance with required on-line learning module.
- Chart audit utilizing Bronchiolitis Protocol Implementation Assessment Tool revealed:
  1. Audit included 22 patients and 65 assessments
  2. Weaning of oxygen in accordance with protocol in 22/22 patients (100%)
  3. Spot pulse oximetry use in 5/22 patients (23%) increasing to 12/22 patients (65%) by end of auditing period.
- 13/22 audited patients (59%) were less than 1 month of age. This supported the initial high use of continuous pulse oximetry (17/22 patients) in accordance with the protocol suggesting the use of continuous pulse oximetry in these higher risk infants.

Lessons Learned
Oxygen and pulse oximetry use significantly impact bronchiolitis LOS. Protocol development must include a concentrated multidisciplinary educational component to optimize its success and improve patient outcomes.

Please contact Dr Ryan Bode (rbode@phoenixchildrens.com) for questions or additional information regarding the bronchiolitis protocol or the educational interventions utilized.
Adherence to an Oxygen Monitoring Protocol Reduces Use of Continuous Pulse Oximetry and Decreases Costs

Mark Shen, MD, Becky Toth, RN-BC, MSN, CNS, Patty Cervenka, RN, BSN, CPS, Adam Carey, RRT
Dell Children’s Medical Center of Central Texas, Austin, TX

Aim
This project aimed to decrease the use of continuous pulse oximetry in normoxic patients with respiratory diseases (asthma, bronchiolitis, pneumonia) on one medical unit by 50% during the period from January 1, 2010 to May 31, 2010.

Outcome Measures
1. Proportion of patients with respiratory diseases on room air for > 4 hrs who remain on continuous pulse oximetry.
2. Pulse oximeter probes ordered per patient day.

Sampling Method
Convenience sampling of patients on the respiratory general medical unit, once weekly between 11 am and 1 pm.

Intervention
Multimodal (email, fliers, individual reinforcement) and multidisciplinary (RN, MD) education reinforcing a pre-existing oxygen monitoring protocol. This protocol order is pre-checked in the asthma, bronchiolitis and pneumonia order sets and authorizes cessation of continuous pulse oximetry (with as needed spot checks) after a patient has oxygen saturations > 92% for at least 4 hours.

Results
1. Decreased use of continuous pulse oximetry by 69%.
2. Decreased pulse oximeter probes ordered by 38% at a cost savings of approximately $1000 per month.
3. No patients required transfer to a higher level of care due to undetected hypoxemia and clinical deterioration.

Lessons Learned
1. A multidisciplinary quality improvement project effectively modified “ingrained” culture related to continuous pulse oximeter monitoring.
2. Return on investment financial data may be leveraged to support ongoing quality improvement efforts.

Please contact Mark Shen, MD (mshen@seton.org) for questions or additional information regarding the oxygen monitoring protocol or the interventions utilized.

Section On Hospital Medicine Resources

Review current pediatric hospitalist resources.
Find out what other programs are doing.
Visit the SOHM Web site.
http://www.aaphospmed.org

Clinical Documents • Lectures • Protocols • Guidelines • listserv® Archive
Visit the SOHM eLibrary for Pediatric Hospitalists
www.sohmlibrary.org

And join the SOHM listserv®
E-mail Nicole Alexander at nalexander@aap.org
Pediatric hospitalists have unique professional responsibilities, which vary significantly based upon institution. In addition to managing patients on the inpatient wards, clinical responsibilities may include providing patient care in the emergency department, neonatal intensive care unit, or newborn nursery, and performing inter-facility transport and procedural sedation or care in the pediatric intensive care unit. The variety of clinical responsibilities of pediatric hospitalists was a foundational concept upon which the pediatric hospitalist sub-internship at The Children’s Mercy Hospital (CMH) in Kansas City, Missouri was created. The goals of the sub-internship are 1) to gain experience managing general pediatric inpatients and 2) exposure to the diverse field of pediatric hospital medicine. The specific objectives are based upon the six core competencies outlined by the American College of Graduate Medical Education (ACGME) which are as follows: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice. The sub-internship is offered to medical students who have successfully completed their core pediatric rotation. Only one student per month may participate in the sub-internship. Individualized learning plans, development of medical knowledge, hands-on experience, scheduled didactics, and direct learner feedback are essential to the rotation. At the beginning of the four-week rotation, the student identifies personal goals, which are specific, measurable, attainable, realistic, and bound in time. The students’ goals generally focus on acquisition of medical knowledge and attaining procedural skills pertinent to pediatric patients (see Table 1 for examples). The elective co-coordinator reviews and refines these goals if necessary and works with the student during the rotation month to ensure successful completion. The student also provides the elective co-coordinator a list of their strengths and weaknesses at the beginning of the month. Past examples of strengths include: “I have a friendly personality and work well with children”; “I am effective at literature searches.” Examples of weaknesses identified by the students are as follows: “I am not organized with my oral presentations”; “I do not know what information to include with transition of care.” This information allows the educator to build upon the student’s strengths while directing focus on areas for improvement. By developing an individualized educational plan based on the learner’s needs, the elective provides students an opportunity for personalized professional development.

### Example of Student Goals for Rotation

1. Learn the steps involved with performing a lumbar puncture and successfully perform one lumbar puncture during the month.
2. Understand the thought process for selecting antibiotics when treating illnesses and understand how to determine the length of therapy. (Note: This goal was further refined to apply to specific medical conditions.)
3. Learn how the economics of medicine and its relationship to evidence based practice affect the quality of care for patients.

The primary clinical responsibility of the hospitalists at CMH is management of hospitalized general pediatric patients. The hospitalist inpatient team at CMH is staffed only by attending hospitalists with an average daily census of twenty patients. This staffing model allows the student to have individualized teaching directly from an attending physician. The students have multiple clinical responsibilities, which expose them not only to the hospitalists’ roles at CMH, but also to the field of pediatric hospital medicine. The students work approximately fifteen clinical shifts with an attending hospitalist. The shifts are twelve hours in duration. The students work with the sedation team, transport team, and the wound care team. While working with the wound care team, they learn about ostomy care, packing supplies, wound dressings, management of decubitus ulcers, and wound debridement. The students also spend half of a day in the simulation lab with the elective co-coordinator learning about airway management, venipuncture, intraosseous access, and basic life support skills. Figure 1 is a sample student schedule.

An essential component of the CMH sub-internship curriculum is didactic education to complement the breadth of clinical experience. Examples of clinical topics taught by the hospitalists include community acquired pneumonia, urinary tract infections, febrile illness, and pediatric seizures. A radiology CD and a dermatology CD are also available for students to enhance their knowledge about the subject matter while promoting self-directed learning. Practice-based educational topics are included in the curriculum. For instance, documenting and submitting charges for reimbursement are integral parts of a physician’s responsibilities yet rarely taught in medical school. At
Sample Schedule

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Patient Care (6:30am – 6:30pm)</td>
<td>5 OFF</td>
<td>6 Transport (7am-7pm)</td>
<td>7 Wound Care (9am-5pm)</td>
<td>8 Transport (7am-7pm)</td>
<td>9 Patient Care - PM (6:30pm – 6:30am)</td>
</tr>
<tr>
<td>13 OFF</td>
<td>12 Sedation (9am-12pm) Simulation Lab (1pm-4pm)</td>
<td>13 Patient Care (6:30am – 6:30pm)</td>
<td>12pm - Lecture</td>
<td>14 Patient Care (6:30am – 6:30pm)</td>
<td>12pm - Lecture 2:30pm – EBM</td>
<td>15 Patient Care (6:30am – 6:30pm)</td>
</tr>
<tr>
<td>16 OFF</td>
<td>19 Patient Care (6:30am – 6:30pm)</td>
<td>20 Patient Care (6:30am – 6:30pm)</td>
<td>12pm - U/TI Lecture</td>
<td>21 OFF</td>
<td>22 Patient Care (6:30am – 6:30pm)</td>
<td>23 Patient Care (6:30am – 6:30pm)</td>
</tr>
<tr>
<td>25 OFF</td>
<td>26 Patient Care (6:30am – 6:30pm)</td>
<td>27 Patient Care (6:30am – 6:30pm)</td>
<td>2:30pm – EBM</td>
<td>28 Patient Care (6:30am – 6:30pm)</td>
<td>End of Rotation</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1

the beginning of the sub-internship, the student participates in a billing and coding training session presented by a coding and billing specialist. The student then has the opportunity to apply the information learned by submitting practice billings. The specialist provides feedback to the student on billing accuracy and level of documentation. In addition to the above didactics, the students are also expected to participate in an evidence-based medicine lecture series, which is presented by a hospitalist. At the end of the month, the student reviews and presents a medical article to the director of evidence-based medicine within the section.

Evaluating and providing constructive feedback to learners is an essential component of the educational process. To ensure the student receives timely and specific feedback, a daily evaluation form was developed for this rotation (Figure 2). Each day that the student provides direct patient care on the hospitalist team, the supervising attending completes a feedback form. The form serves as a tool to facilitate discussions about the student’s strengths, weaknesses, and medical knowledge. This is a unique opportunity for students to receive focused daily feedback from an attending physician, which has been favorably viewed by the students. In addition to daily feedback, the elective co-coordinator provides mid-rotation formative and summative feedback along with an end of rotation summative evaluation. Input from families and nursing staff is solicited with a focus on professionalism to be integrated into the final evaluation.

The students are given an opportunity to evaluate the elective as well and provide suggestions for improvement. The elective has been in existence for the past three years and the evaluations have been positive. The students routinely rate the individualized attending teaching and the transport team experience as highlights of the month.

The pediatric hospitalist sub-internship has been a great success at CMH. The number of students wanting to participate in the elective has tripled. Furthermore, there is a slight increase in the number of students outside of the metropolitan area applying for the rotation. The success of the elective will hopefully generate an increased interest in pediatric hospital medicine. The overwhelming majority of students who participate in the rotation enter residency programs in Pediatrics. The unique attributes of an attending only service with a breadth of exposure to clinical and non-clinical opportunities has contributed to the success of the elective. For those who are interested in implementing a sub-internship, the foundation for success lies with a supportive administration. The success is sustained by continued administrative support, hospitalists’ commitment to student education, and by providing an unparalleled diverse clinical and educational experience.

Daily Performance Evaluation by Attendings

Instructions: Each day when you provide direct clinical patient care, please complete the following information. It is your responsibility to speak with the attending physician and ask for feedback.

- Student’s name:
- Today’s date:
- Patient’s medical record number:
- Attending name:
- Student’s Strength:
- Student’s recommended area of improvement:
- Teaching point:
- Attending signature:

Figure 2
Critically Appraised Topic:

Does the use of systemic corticosteroids improve acute outcomes in infants with recurrent wheezing under 2 years of age?

Mark Shen, mshen@seton.org
Medical Director, Hospital Pediatrics, Dell Children’s Medical Center, Austin, TX

Reviewers:
Michael Lang, MD, MPH, FAAP, Children’s Hospital & Research Center Oakland, Oakland, CA
Stacy Pierson, MD, FAAP, All Children’s Hospital, St Petersburg, FL

Summary of Search, “Best Evidence” appraised, and Key Findings:
Infants and young children with recurrent wheezing are often prescribed systemic corticosteroids, particularly if they are given a label of reactive airways disease or asthma. Asthma guidelines recommend oral corticosteroids for moderate to severe exacerbations in infants and children < 5 years of age. Evidence for the efficacy of systemic corticosteroids in the management of asthma exacerbations has typically come from studies in school-aged children and adults. Furthermore, systemic corticosteroids are not recommended for acute bronchiolitis in infants younger than two years of age.

Only two trials have assessed the efficacy of systemic corticosteroids on acute exacerbations of recurrent wheezing in infants less than two years of age. Both studies utilized parental symptom diaries to record primary outcome measures in mild exacerbations of wheezing. Neither study demonstrated a beneficial effect of systemic corticosteroids.

Clinical Bottom Line:
There is insufficient evidence to support the routine use of systemic corticosteroids in infants less than two years of age with mild exacerbations of recurrent wheezing or asthma.

1. Search Strategy:
• Terms used to guide Search Strategy: Wheeze or Wheezing, child and infant, bronchiolitis, asthma, steroid
• The bibliographies of all articles, guidelines and reviews were also searched for relevant articles.

2. Inclusion and Exclusion Criteria
• Inclusion: Any study that examined the effects of systemic corticosteroids on acute exacerbations of recurrent wheezing, or asthma, in infants less than two years of age.
• Exclusion: First episode of wheeze, inhaled corticosteroids, inclusion of children less than two years of age.

3. Summary of Studies Evaluated

Included Studies:
Webb et al. Randomized, placebo-controlled partial crossover trial, 1986. Webb studied thirty eight children less than 18 months of age who had at least two prior episodes of wheezing in the current episode lasted at least 48 hrs and was of sufficient severity by standardized criteria. Asthma was the primary diagnosis in these children, and thirty (79%) of them had a prior hospitalization for asthma. For enrollment, children currently hospitalized were excluded, as this was an outpatient study. Patients were randomly assigned to receive either placebo or prednisolone (1 mg/kg twice daily for five days) and then entered a crossover phase if there had been no improvement eight days from the start of therapy. If the general practitioners prescribed bronchodilators or antibiotics, they were continued. Parents used symptom diaries to record outcomes. There were no significant differences found between treatment groups for 1-7 days after the beginning of each treatment. This was a small study utilizing symptom diaries to record outcome measure. Thus, it measured parental perception of benefit. Although symptom diaries are not objective measures of respiratory status and (with multiple caretakers) are subject to both inter-rater reliability and validity concerns, in the outpatient setting, symptom diaries may be the most feasible way to document frequent assessments.

In the 12-18 month subgroup analysis there was a trend towards benefit in the prednisolone group. This study was adequately powered to demonstrate a clinically relevant effect of prednisolone in 75% of patients, yet it still failed to show significant benefits of the drug. The authors acknowledge that this was not powered to detect small benefits of corticosteroid treatment over the perceived 37% efficacy rate of placebo, although smaller benefits would be unlikely to have clinical relevance.

This study suggests that systemic corticosteroids do not offer a benefit in infants with recurrent wheezing or asthma.

Fox et al. Randomized, double-blind, placebo-controlled trial, 1996. Fox randomized 62 episodes of recurrent wheezing in 59 infants aged 3 to 15 months to four combinations of oral salbutamol, oral prednisolone and placebo: salbutamol-placebo, prednisolone-salbutamol and placebo-placebo. Prior to enrolment, infants that responded (by improvement in clinical score) to either a dose of nebulised salbutamol or nebulised ipatropium bromide were excluded to prevent withholding of beneficial treatment. The dose of prednisolone was 2 mg/kg once daily for five days, initiated upon admission at enrolment and continued at home if the patient was discharged. Parents recorded symptom scores on a diary card twice daily for 14 days. Despite a trend towards beneficial effect in infants given oral salbutamol, there was no statistically significant difference in scores between the 4 groups.
A primary limitation of this study is the lack of a prednisolone-placebo arm. The authors calculated that the relative risk of treatment failure (readmission or wheezing by day 14) was 2.51 for the placebo-placebo group, leading them to suggest a possible positive effect of oral salbutamol; however this was not a primary outcome of the study and the p value was not significant. With regards to systemic corticosteroids, there was no difference in outcomes between the salbutamol-placebo and salbutamol-prednisolone groups. This study shares the same limitations as that of Webb et al. in that parental symptom diaries were used to measure outcomes. Notably, scores were very similar in all treatment groups. Although days in the hospital was also measured and showed a trend towards benefit in both the salbutamol-placebo group as well as the salbutamol-prednisolone group, the outcome was recorded in increments of whole days and average stays were only 1 or 2 hospital days, which suggests these infants had relatively mild disease. This study concluded that systemic corticosteroids offer no benefit to infants with recurrent wheezing.

**Excluded Studies:**
- Tal et al. Randomized, double-blind, placebo-controlled trial, 1983. Tal randomized 32 infants from 1 to 12 months of age with acute wheezing to four combinations of intramuscular dexamethasone, inhaled salbutamol and placebo. The combined dexamethasone-salbutamol-placebo group had a statistically significant improvement in clinical scores over dexamethasone alone, salbutamol alone or placebo. This trial was excluded, however, as it studied infants with bronchiolitis (first wheezing attack with upper respiratory symptoms and no atopic symptoms), asthma (recurrent wheezing with evidence of atopy), and wheezing-associated respiratory illness (acute wheezing not classified as asthma or bronchiolitis).
- Daugbjerg et al. Randomized, double-blind, placebo-controlled trial, 1993. Daugbjerg randomized 123 children between 1.5 and 18 months of age with wheezing to four combinations of oral prednisolone, inhaled terbutaline, inhaled budesonide and oral and inhaled placebo. They found that children that received either inhaled or oral steroids were discharged earlier than children that did not. This study was excluded as it included children with both first and recurrent attacks of wheezing.

**Other studies by phenotype**

**First Episode of Wheeze**
In addition to the two studies above that looked at mixed populations (first episode and recurrent wheeze), numerous infants with a first episode of wheeze have been studied in the literature on bronchiolitis. While a review of that body of work is beyond the scope of this discussion, it should be noted that national guidelines on bronchiolitis recommends against the routine use of corticosteroid medication, based on a lack of sufficient evidence to date. Older Age
Several studies have looked at populations including an older age group. Tal looked at infants 6 to 60 months of age with asthma (at least 3 episodes of wheezing) in an ED and found that methylprednisolone (with salbutamol) reduced admission rates. Of note, statistically significant reductions were found in secondary analysis in the 6-24 month age group, but not the older (24-60 months) age group. Oomen and Panickar looked at mixed populations of preschool children with acute viral wheezing and found no effect of systemic corticosteroids, but did not focus solely on patients with recurrent wheezing less than two years of age. Finally, the literature on the positive effect of systemic corticosteroids in acute exacerbations of asthma is based largely on data in school-aged children and adults.

**4. Implications for Practice, Education and Future Research**
An accumulating body of evidence suggests that systemic corticosteroids may not be effective in preschool children with mild exacerbations of recurrent wheezing or asthma. However, in many instances, both the data and study populations have been heterogeneous. To date, no studies have specifically examined the role of systemic corticosteroids in infants less than two years of age with moderate to severe exacerbations of recurrent wheezing. Future research should also seek to better define the relationship between wheezing in infancy and the later development of asthma.

**References**
Physicians at Risk: Addressing the needs of clinicians in the wake of adverse events

Chrissy Bourland, MD, FAAP, christina.bourland@childrens.com
Assistant Professor of Pediatrics, University of Texas Southwestern Medical School, Children’s Medical Center, Dallas, Texas

Editor’s Note: In this issue’s Quality and Safety section, we are excited to bring you something old, something new, and some ideas for you to borrow without worry of your patients turning blue. QI Brief Reports are a new feature where we aim to provide you brief snapshots of quality improvement in action. These quick, easy-to-read reports are designed to highlight key steps in quality improvement, with a focus on visual data and lessons learned. Reducing continuous pulse oximetry use is a theme for this issue as we offer up two projects that achieved strong returns on investment through the use standardized monitor weaning strategies. And we revisit an old format in our Safety M&M, where a failed intubation prompts exploration of the second and often silent victims of adverse events. Enjoy! M.S.

While on call at a community hospital, a 7 month old infant with bronchiolitis develops worsening respiratory distress progressing to failure. While awaiting transport to the closest PICU, Jeremy, the hospitalist, attempts intubation. On his second attempt, he visualizes the vocal cords, inserts the endotracheal tube (ETT), and continues providing positive pressure ventilation. While initially high, the infant’s oxygen saturation begins to steadily fall over the next several minutes. Jeremy re-evaluates his equipment, repeats “I saw the tube pass through the vocal cords,” and applies increased oxygen to the patient. The transport team arrives as a CXR is obtained. Oxygen levels continue to fall, and when the transport team verifies placement of the ETT with a laryngoscope, the ETT is noted to be in the esophagus.

Jeremy watches the clock as his patient is re-intubated, cognizant of the 5-10 minutes that have passed in which the infant was hypoxic and ineffectively ventilated. He is horrified by his mistake and is trembling as transport loads his patient into an ambulance. Over the next several days he replays the events in his mind. He feels responsible for the child’s now worsened and more complicated clinical condition, questions his competence, and shaken, wonders if he has chosen the right profession.

In 2000, Albert Wu commented on the emotions clinicians feel after involvement in medical errors. He stated that although patients are obviously the first victims of medical error, physicians can become victims as well, as they attempt to handle feelings of guilt and their own fears of being isolated and judged by their colleagues. These feelings may be exacerbated if a medical error, a mistake in action or judgment, results in an adverse event, defined as an injury due to medical mismanagement rather than the underlying condition of the patient. Not all medical errors result in adverse events, but when they do, the consequences often have greater impact on both patient and clinician. Imagine feeling the burden of fault in an adverse event, but being unable and in fact discouraged by your peers to discuss it. However, the culture of medicine is changing, and as it evolves institutions are developing innovative ways to promote provider healing following adverse events.

... it is important for physicians to mentally prepare themselves for a disclosure conversation. ... physicians must alter their thinking, and shift from the analytical perspective the clinician would use to evaluate his own error, to a more compassionate family-centered perspective.

The First Victim
As has been the case since each of us chose medicine as a profession, the needs of our patients come first. Regardless of what the provider may be personally feeling, his duty dictates his initial first steps. Consistent with this, hospital policy typically instructs clinicians to disclose medical errors to families as soon as a mistake resulting in an unanticipated outcome is realized. Although each hospital has its own specific policy, disclosure should include a description of exactly what happened and how that event will affect the patient. In addition, some expression of regret for the error is reasonable, and families often want to know how their negative experience will be used to prevent another family from experiencing a similar event. Typically a nurse, social worker, or someone else intimately involved in the patient’s care accompanies the physician to act as a witness and to assist the family as they move forward.

Just as with any other part of medicine, the art of disclosure must be practiced and learned. Beth Peters, Director of Risk Management at Children’s Medical Center in Dallas, Texas, states that it is important for physicians to mentally prepare themselves for a disclosure conversation. She suggests that physicians must alter their thinking, and shift from the analytical perspective the clinician would use to evaluate his own error, to a more compassionate family-centered perspective. Mrs. Peters stresses that with the initial disclosure, physicians have the opportunity to set families on a “healing path” versus a “scarring path,” and therefore frame how families reflect on the situation for years to come. Similar to the way we emulate clinicians whose methods we respect, she proposes that we identify mentors who handle difficult conversations well, and borrow from them the techniques we find effective.
An emotionally healthy clinician who is able to acknowledge his own feelings about the adverse event will likely be more effective at delivering information to parents with sincerity and compassion. According to Delbanco and Bell, all parties to an error have somewhat similar needs. Disclosure has the capability to set the physician on the “healing path” as well, and these conversations can be productive for everyone involved. This benefit extends to the institution in which the error occurred, as improved and timely communication may decrease the number of lawsuits filed. It seems to be in the institution’s best interest to support the physician through the disclosure process.

The Second Victim

Initial Response

So how does the clinician make sense of an adverse event after the immediate needs and concerns of the patient are addressed? Christensen et al conducted open-ended interviews with clinicians, questioning them about their emotional reactions following a mistake resulting in injury. For many, feelings of agony, pain and panic dominated the realization of their error. One physician stated, “I was just appalled and devastated that I had done this to somebody.” Another related, “I was really shaken. My whole feelings of self-worth and abilities were basically profoundly shaken.”

The duration and evolution of emotions can vary from clinician to clinician. In the interviews conducted by Christensen et al, some physicians report that their feelings of guilt, embarrassment and fear last for days to weeks, others months to years. The investigators inquired further about the personal belief systems of the individual physicians, and suggest that the severity of emotional response may be affected by the provider’s beliefs regarding the degree of control a clinician has over physiologic events. According to Christensen et al, physicians who feel that medicine and its associated technologies should be able to significantly alter patient outcomes hold themselves to more stringent standards, and were less accepting of their mistakes. In contrast, some physicians interviewed believe that we have limited control over the evolution of illness, and that only in some circumstances do we alter disease course. These physicians tended to view poor outcomes as failures of medical technology rather than personal failures. As one medical doctor stated, “It’s a waste of time to anguish about things that you don’t have control over.”

Christensen et al suggest that other deeply held beliefs may affect how a clinician views an adverse event. Physicians who feel that mistakes are an inevitable part of the practice of medicine approach the experience differently than those who do not accept that premise. A provider who has the belief, perhaps instilled and reinforced in training, that he will be exposed to ridicule and reprimand if his mistake is made public, is anecdotally less likely to disclose the error and/or seek help in dealing with his emotional response. In addition, a physician who closely relates his self-esteem to his competence as a clinician may be more likely to generalize the mistake and question his competence to provide care. This is in contrast to a provider whose self-identity is less tied to his medical performance and may view an error as an isolated event.

...physicians are at risk to enter a cycle in which medical errors lead to personal distress, future errors and ultimately worsened patient care.

Coping Strategies and Peer Interventions

Several studies suggest that peers play a vital role in healing for all physicians. Resident surveys performed by Engel emphasize that talking with colleagues (both residents and attending level), listening to others’ experiences, and receiving reassurance are crucial to generating constructive changes and emotional healing following an adverse event. In a series of interviews conducted with family physicians (n=30), Newman reports that 63% needed someone to talk to about the mistake, 48% needed validation of their decision-making process, 59% needed professional reaffirmation, and 30% needed reassurance of personal self-worth. Although peers were an important source of this support, and may seem to be the best suited to provide it, 67% of those interviewed reported receiving significant support from a spouse or other family member who was able to provide unconditional acceptance.

Consistent with the above observation, it is interesting to note that although attending physicians describe peer communication as helpful, they struggle to find a compassionate colleague and a supportive institution. Newman notes that in questions referring to a hypothetical situation, although all the physicians he interviewed recognized a colleague’s need for support, only 32% of them would unconditionally offer it. The other providers interviewed stated that they would only offer support if the affected physician was a close friend or partner, and only if their support was solicited. These perceived limitations of support extend to the organizational level. In 2007, Waterman et al reported that 90% of surveyed physicians disagreed that health care organizations provided adequate support after medical errors. It seems physicians desire more opportunities for help. In fact, 82% of physicians surveyed by Waterman were either somewhat or very interested in counseling after serious medical errors, despite their concerns about the time costs, potential lack of benefit of counseling, confidentiality of counseling, and judgment by peers.

While maintaining a physician’s mental health must be a priority following an adverse event, supporting the clinician to make constructive changes in response to an error should be of equal importance. In a survey of 114 internal medicine residents, Wu notes that 98% of those surveyed reported some constructive change in practice in response to their mistakes, while 18% reported one or more defensive changes. Interestingly, in multivariate analysis, accepting responsibility for the mistake and engaging in significant discussion about the case were significantly associated with developing constructive changes. In contrast, residents who reported that an error was caused by job overload were less likely to report constructive changes. Defensive changes to practice were made in situations where the resident felt the institution was judgmental in dealing with the case. Thus, institutions that encourage physicians to be honest in acknowledging their mistakes and then support them as they engage in sincere discussion of their errors may promote greater practice improvement.

In general, the literature shows that health care organizations and peer groups are not effectively supporting providers when they are dealing with the aftermath of an adverse event. So why does it matter? In addition to the

Continued on page 18
obvious personal costs to the physician experiencing sleep deprivation, isolation and loss of professional confidence, West describes a reciprocal cycle of error that an emotionally distraught physician may repeat. In surveys completed by internal medicine residents, West collected longitudinal data, attempting to correlate frequency of self-perceived error with various aspects of mental and emotional health. He reports a loose association between frequency of self-perceived error and decline in quality of life, including a decline in empathy, as well as increases in burnout and the symptoms of depression. He reports a stronger association between increased burnout, decreased empathy and increased odds of self-perceived error in the following three months. He concludes that physicians are at risk to enter a cycle in which medical errors lead to personal distress, future errors and ultimately worsened patient care. He argues that the physician who is unable to constructively recover from an error may repeat the cycle to the detriment of his patients.  

Conventional Interventions and Mechanisms for Support

Morbidity and mortality conferences (MMC) have traditionally been the framework through which physicians have been encouraged to explore their medical errors resulting in adverse events. While MMCs are a great opportunity to discuss the medical details of a particular case, they are typically not forums for discussion of the personal feelings surrounding an event. In contrast, an MMC is a facts-based approach to evaluate the systems and medical decision-making that contributed to the error. This process is essential, but does not help the practitioner reconcile his guilt, fear and self-doubt. In addition, in many institutions, MMCs occur weeks to months following an event, while the physician is experiencing distress in real time.

Employee Assistance Programs (EAPs) exist at almost every institution as a standard benefit to employees. Although institutions may vary somewhat in the services offered, they typically provide counseling to any provider (MD or otherwise) experiencing emotional distress that may be effecting their work. Patrick Tiner, Director of EAP services at the University of Texas Southwestern Medical Center at Dallas stresses that it is important for clinicians to understand that they are feeling a “normal grief reaction to an event.” Clinicians who feel their response is atypical or exceptional, may have a more difficult time healing. Barriers to the utilization of EAPs, particularly for physicians, include fear of admitting failure or weakness to colleagues, and fears of the legal implications of talking about the event.

At a recent forum addressing the need for an increased emphasis on physician support programs, Paul McTague, Esq., of a Boston law firm, reviewed the legal ramifications of discussions surrounding adverse events. He states that a provider may talk to anyone about their feelings following an event or during a lawsuit. He advises, however, that discussion of the specific medical details of the case should be avoided unless the conversation is protected or privileged, and will not be “discoverable.” Protected conversations include those between a clinician and members of the clergy or licensed mental health professionals. Peer review, MMCs, and conversations between a physician and his attorney are privileged. State laws regarding the degree of protection afforded to discussions with risk management staff vary. Typically conversations with a spouse are “disqualified” (not as protected as the others mentioned above), and in his experience these are not “discoverable,” nor has their discoverability been challenged in court.

Isn’t it time we all acknowledge the burden of our experiences, shed any false airs of perfection, and learn to support our peers?

Innovations in Physician Support Programs

Over the last several years, multiple institutions have developed more formal programs for physician support following an adverse event, often growing out of the personal experience of a faculty member or patient. Different institutions’ programs have grown out of differing established departments within those organizations. While accomplishing similar goals, the physician support group in one institution may be under the umbrella of the chaplain’s office, while in another institution it is directly within the quality and safety departments.

Medically Induced Trauma Support Services (MITSS) in Boston sponsored a forum in 2009 highlighting the need for more programs to benefit physicians experiencing emotional distress in the aftermath of an error. The forum staff highlighted two existing programs as models for future innovation. In the Kaiser Permanente model, a Situation Management Team leads all aspects of the response to an adverse event and contacts the EAP directly. The EAP leads what is then described by Jerry O’Keefe, national director of Kaiser’s EAP, as a reconciliation of the “art and science” of event response. Clinicians are educated about the discoverability of conversations and are guided towards safe and appropriate outlets for discussion of the facts surrounding an event. Then EAP professionals help clinicians evaluate their personal reactions and identify those who may need more follow-up assistance or counseling. Kaiser’s EAP is a physician specific program employing peer support, which may be important in minimizing physician barriers to utilization.

The MITSS sponsored forum also highlighted the Office of Clinician Support (OCS) at Children’s Hospital Boston. The OCS evolved initially from the Office of Physician Support led by and through the Department of Psychiatry, which was already providing support services to groups of clinicians. The current OCS works closely with the EAP, peer support groups, and quality, legal and patient safety departments. The OCS emphasizes the benefits of peer support and recognizes a process Dr David DeMaso, Chairman of Psychiatry at Children’s, calls “modeling surprise.” This powerful experience involves a colleague sharing his own personal story of error with a clinician who has recently experienced an adverse event. Both clinicians benefit from telling their stories and examining the factors contributing to their errors. Outside of the acute event, OCS has also focused on proactively working with clinicians to develop knowledge about what to expect following an adverse
event, often employing role playing exercises and peer coach training. This work helps physicians anticipate the depth of their response to medical error with the goal of improving resilience when an event does occur.

For clinicians and health care organizations looking to implement improved support services for their staff, leaders at the MITSS forum stress the importance of developing local solutions attentive to the local culture. This may involve being particularly sensitive to the department in which a program is housed, how it is publicized to clinicians, and obtaining buy-in from medical and non-medical staff in positions of perceived authority. The MITSS emphasizes the need to make a case for return on investment and promotes administrative support at a high level as essential to the long term sustainability of the intervention and to physician acceptance of the program. In addition, each facility has its own current procedural response to adverse events, and the initiation of a support service should complement this structure rather than work against it.

It has been said that “Every experienced clinician carries an invisible knapsack filled with the weighty burden of his or her errors.” Isn’t it time we all acknowledge the burden of our experiences, shed any false airs of perfection, and learn to support our peers? We are on the frontlines of resident education and are role models for our colleagues and trainees at all levels. Only physicians can change a culture surrounding adverse events that encourages silence and isolation. Our young field of hospital medicine, with its emphasis on communication, team-building, and evidence based inpatient care, is uniquely positioned to do just that.

References
Hospitalist Program at Arkansas Children’s Hospital

Christopher E. Smith, MD, FAAP, Professor, Director of Hospitalist Services
Arti Lal, MD, MBBS, FAAP, Assistant Professor, Hospitalist (ALTE Clinic)
Supriya Jambhekar, MD, FAAP, Assistant Professor, Pulmonologist (ALTE Clinic)

University of Arkansas School of Medicine, Arkansas Children’s Hospital, Little Rock, AR
Contact: Arti Lal, MD, FAAP, LalArti@uams.edu

Arkansas Children’s Hospital is a freestanding children’s hospital affiliated with the University of Arkansas. It is the only pediatric medical center in the state, with 316 beds, and more than 14,000 discharges per year.

Staffing
The inpatient medicine service includes eight physicians, each with different background and job descriptions. Each FTE includes 14 weeks of inpatient service, which is broken up into 14-day blocks (including weekends). In addition to the hospitalists, there are a number of general pediatric outpatient physicians and other non-hospitalist physicians who provide a few weeks of ward attending coverage per year. There is one hospitalist per team during the daytime, and an evening hospitalist who admits new patients from 3-11 pm. Residents cover the patients at night and hospitalists provide support via call from home.

There are three teams with general pediatric inpatients, which are staffed by the hospitalist group: Team 1 (infant care), Team 2 (neurology, medically complex patients), and Team 3 (endocrine, toxicology, adolescents). There are other teams comprised of subspecialty patients only, which are not staffed by hospitalists. All teams are covered by the house-staff. Each of the teams includes approximately 15-18 general pediatric patients.

Clinical Services and Programs
The hospitalists provide consultation for subspecialists based upon geographic location of the patient. The group does not provide emergency department consultation, nursery coverage, or sedation coverage. However, one of the hospitalists serves as an attending on the palliative care service. Some hospitalists spend clinical time in the general pediatrics clinic, emergency room, or infectious disease service. Many of the physicians who staff the medical complex patient team also staff the complex patient service in the general pediatrics clinic. In addition, three hospitalists work in the Medical Home clinic. The Medical Home clinic was founded three years ago by a developmental pediatrician and neonatologist, and originally designed to follow-up neonatal intensive care unit graduates. It has grown to include other complex patients, and to date cares for more than 400 patients. The clinic includes a social worker, nutritionist, speech therapist, developmental/behavioral specialist, nurse, and case manager.
The Apparent Life Threatening Event (ALTE) ALTE Clinic at Arkansas Children's Hospital opened in September 2008, in response to a need for coordinated transition to ambulatory care after an admission for an ALTE. Parents often expressed discomfort with going home after an ALTE, and physicians likewise sometimes felt apprehensive about discharging these patients. Reassurance and education on SIDS and CPR frequently exacerbates the anxiety. The goal of the clinic is to facilitate safe discharge from the hospital, and provide comprehensive follow-up.

To improve quality of care for patients with an ALTE, we approached care from both the inpatient and outpatient settings. We developed clinical practice guidelines, history and physical forms, and order-sets to streamline care. Standardization of care is difficult in this population as there are no formal national guidelines due to the diagnostic heterogeneity of these patients, and the order-set is used in only approximately one third of ALTE admissions. We also modified the monitoring system, using SMART home-type apnea monitors during the inpatient stay. The same type of monitor (except without integrated pulse oximetry) is used for home monitoring when patients are discharged. Some of our hospitalists have received informal training from the pulmonologists on reading apnea monitor downloads, and currently review these downloads with the pulmonologist. This interdisciplinary approach has improved turnaround time for apnea download readings and improved access to pulmonary consultation. This has resulted in shorter length of stay and improved patient satisfaction.

Before the inception of the ALTE clinic, patients were asked to follow up with their PCP within a week to a month depending on the clinical situation. However, that approach was problematic, as PCP's may not have received the discharge summary prior to the follow-up, apnea monitor downloads may not be available, and access to subspecialists may be difficult. Therefore, the ALTE clinic was established to facilitate care for both Arkansas Children's Hospital patients as well as patients of community providers. In addition, we are able to collect a database of ALTE patients and analyze the future needs and usefulness of such a clinic as part of a QI project.

The clinic is integrated into the General Pediatrics outpatient clinic. Drs Arti Lal and Supriya Jambhekar staff the ALTE clinic, along with nursing support and case management. Before the visit, a request for authorization is sent to the PCP, which is successful in the vast majority of cases. During the visit, the physician reviews the history and physical, and obtains the home apnea monitor download. The physician then reviews the apnea monitor download with the pulmonologist (if applicable), and makes the results available to the family within 3-7 working days. The date of the next download is determined. The physician also provides education, including apnea monitor training, and discusses safe sleep and feeding practices, and reflux precautions. The clinic expedites consultation with subspecialists such as pulmonary and neurology, makes referrals, and schedules recommended tests. Most patients are only seen once; however, some patients require two or more visits depending upon symptoms and ongoing evaluations. The patient's PCP is contacted with the results of any tests, and with any concerns for follow-up. Patients who don't have a PCP, or those for whom Arkansas Children's Hospital is the PCP, receive routine health supervision at the same visit.

Diagnoses encountered thus far include gastroesophageal reflux, RSV, pertussis, laryngomalacia, tracheomalacia, seizures, prolonged QT interval, breathholding spells, central apnea, obstructive apnea, dysphagia, and apnea of prematurity. Future plans include expanding the program to take referrals directly from the emergency department for patients who are not hospitalized, and providing phone consultation for other hospitals. With the new ICD-9 code for ALTE, better tracking of ALTE patients is possible, allowing us to apply for IRB approval and formally analyze the ALTE clinic database.

We think the ALTE clinic is an excellent model for integrating inpatient and outpatient care and has potential for future growth. It may provide a vital database to answer key clinical issues related to admitted ALTE patients, as well as provide a resource for pediatricians in the community.

**RESOURCES FOR MEMBERS**

**Pediatric Hospitalist Programs of North America**

The Pediatric Hospitalist Programs of North America resource can be used by individuals and programs to network as well as by members to seek out contacts and job opportunities in a location of interest. Visit the SOHM web site at www.aaphospmed.org for more information.

**Neonatal/Pediatric Transport Team Database**

The Neonatal/Pediatric Transport Team Database is a resource for professionals who are interested in reviewing transport programs across the country. Visit the Section on Transport Medicine web site at www.aap.org/sections/transmed for additional information.
Establishment of an Inpatient Unit for Adults with Special Needs: Building Partnerships and Trust

Garey Noritz, MD, gnoritz@metrohealth.org
Division of Comprehensive Care, MetroHealth Medical Center/Case Western Reserve University, Cleveland OH

The vast majority of children with special health care needs (CSHCN) will live to adulthood. These children use health care services, particularly inpatient services, more often than their typically developing peers. Many children's hospitals have programs and mechanisms in place to care for CSHCN, but similar programs for adults with special health care needs do not exist. The need to admit an adult who has survived a serious chronic childhood illness typically strains hospital systems and personnel, and is fraught with ambivalence by both the family and medical caregivers.

What is the appropriate setting to care for such patients? Who are the appropriate physicians and caregivers? The impasse usually occurs because pediatricians are uncomfortable caring for adults, and may not have admitting privileges to a hospital that cares for adults. Some children's hospitals will allow older patients to be admitted; others may have a strict age cut-offs beyond which patients may not be admitted. Similarly, internists may be uncomfortable caring for patients with childhood illnesses with which they are unfamiliar. Patients and families are often caught in the middle and find themselves in the unfortunate situation where no physician is available to care for them.

Other Models
The transition from pediatric to adult providers for individuals with chronic childhood illnesses is an important aspect of patient care, particularly in the outpatient setting. Several care models have evolved to support this transition, usually around specific diseases. Many include a hybrid program that involves both pediatric and adult providers. Adults with cystic fibrosis benefit from the work of The Cystic Fibrosis Foundation, a forward-thinking and centralized organization that includes adult providers within their care centers. In contrast, although there is a burgeoning interest in developing programs for adults with congenital heart disease at adult centers, these individuals often receive their care at pediatric centers, regardless of age. Internists and adult subspecialists frequently care for adults with childhood-onset diabetes, asthma, and inflammatory bowel disease, as the medical aspects of these conditions are familiar enough to these providers to make the patient's transition relatively easy.

Our Program and Setting
MetroHealth Medical Center is a 731-bed tertiary care hospital, affiliated with Case Western Reserve University School of Medicine in Cleveland, Ohio. The Children’s Hospital at MetroHealth encompasses 67 of these beds and is located within the main building. The Children’s Hospital and the rest of the medical center share most services, including radiology, nutrition, social work, and case management. However, the Children’s Hospital has a dedicated nursing staff; the nurses do not “float” or cross-train between the adult and pediatric units. MetroHealth has about 300 residents and fellows, including 80 in Internal Medicine, 24 in Pediatrics, and 24 in Internal Medicine-Pediatrics. All hospitalized patients are covered by residents.

The Division of Comprehensive Care at MetroHealth Medical Center has provided a medical home to chronically ill and medically fragile patients for about fifty years, including both outpatient and inpatient care. Currently, we have more than 1300 patients, one-third of whom are over age 18. Our patients have a variety of developmental disabilities, neurologic and genetic disorders, and are often dependent on technology. Common diagnoses include spina bifida, cerebral palsy, autism, Down syndrome, hydrocephalus, and respiratory or nutritional insufficiency. Initially, all physicians in our division were pediatricians interested in CSHCN. There was no age limit on the practice, either inpatient or outpatient, and each admission of an adult caused strife among the physicians, family, residents, and nurses. The first physician dually trained in Internal Medicine and Pediatrics was hired in 2001; we currently have four Med-Peds physicians, two pediatricians, and a pediatric nurse practitioner.

Despite the participation of Med-Peds physicians in our inpatient program, we continued to have problems when adults required admission: should they go to the Medicine Floor or Pediatrics? Who should care for them? If they were critically ill, should they go to an Adult or Pediatric ICU? If they needed a consult or surgery, should it be performed by adult or pediatric specialists?

Expansion of Services
In 2006, we opened a 4-bed unit for Adult Comprehensive Care on 8B, a general medical-surgical unit. In preparation, the Comprehensive Care attendings and the pediatric nurses engaged the 8B nursing staff in an educational program focused on the details of the Comprehensive Care program, the common diagnoses and conditions of our patients, the principles of family-centered care, and the care of nonverbal patients. Some members of the 8B nursing staff visited the pediatric floor, and vice-versa.
A Comprehensive Care attending and a team of pediatric residents provided physician services. The Comprehensive Care social worker worked in tandem with the 8B social worker, providing vital continuity. Depending on their availability, Child Life specialists provided services to the adult patients on 8B; when unavailable, the 8B nurses had a supply of developmentally-appropriate activities for the patients.

Changes to the hospital’s facilities and policies were made to ensure the safety and comfort of the patients in the unit. Since many of the patients had limited communication skills, respiratory monitors were installed so that caregivers and staff could be easily and promptly alerted to the development of respiratory compromise. Also, an exception was made to the visitation policy in the main hospital, allowing for family members to remain in the hospital overnight.

In the first three years, we averaged 78 admissions with an average daily census of 1.04 patients. The mean age of the patients was 33.8 years. The mean length of stay was 4.9 days. Gastrointestinal and nutritional problems, such as feeding intolerance, vomiting, and diarrhea, were the most common admitting diagnoses. Other common diagnoses were pneumonia, asthma exacerbation, and cellulitis. Most of the patients had intellectual disability, cerebral palsy, epilepsy, and were tube fed.

Current Arrangements
Despite the success of the initial model, there was concern among the pediatric providers that “adult” problems such as cardiac ischemia or pulmonary embolism might occur and might not be optimally managed by a pediatrician. In response to these concerns, the physician model changed in January 2009. The adult patients are still admitted to the designated unit on 8B, but to one of the six Internal Medicine (IM) teams. The physician of record is an internist – sometimes a hospitalist, sometimes a generalist, sometimes a subspecialist – and an IM resident team. In all cases, a Comprehensive Care attending (a pediatric-trained physician) and the Comprehensive Care social worker consult on the patient.

The involvement of the Comprehensive Care team has many benefits. Because of our continuing involvement and knowledge of family dynamics, we are able to provide a helpful perspective to the medical team and to advocate for the family as the best expert on the patient. We can assist in the workup and management of problems that may be unfamiliar to an internist, such as behavioral change in a patient with intellectual disability, intrarenal hemorrhage in a patient with tuberous sclerosis, or failure of a cerebrospinal fluid shunt. Our presence is key during transitions of care, both during the hospitalization when the primary team changes and at the time of admission and discharge.

Challenges
Our current policy is that patients 21 years and younger go the Children’s Hospital and those 22 years and older to go to the designated unit on 8B. However, ensuring appropriate placement can be difficult, particularly when the hospital is very busy. Additionally, patients and families might express some anxiety about transitioning to the adult unit once the patient is older. We continue to look for ways to make the transition between venues easier for the patient and families, including inviting older adolescent patients who are frequently admitted to tour 8B and meet the nursing staff. We discuss the inpatient transition as part of the overall transition discussions during outpatient visits.

Since so many internists rotate as attendings on the inpatient services, we often have to update new attendings about the role of the Comprehensive Care consultant. There may be differences of opinion when it comes to the management of a particular patient and we must work with the primary team to find common ground. This is a core existential struggle for the hospitalist who cares for chronically ill patients at the intersection of two models of care – the chronic care model, where the physician and patient have the strength of continuity, and the hospitalist model in which a new set of eyes can be beneficial.

Strengths
This model works well for several reasons. It helps to have Med-Peds faculty members as part of our group and a large, well-established Med-Peds residency program. All of the Med-Peds physicians hold joint appointments and are actively engaged in all three training programs. Our Children’s Hospital, as a hospital within a hospital, allows for a smoother and less stressful transition from pediatric to adult providers, since no facility change is necessary. Also, MetroHealth Medical Center has had an advanced and comprehensive electronic medical records system since 1999, allowing providers to review old records with ease.

One of our greatest strengths is that the nurses on 8B have embraced and enjoy the care of adults with special needs. Many of the patients are admitted for long periods of time and the nurses have a chance to get to know them, their families, and their idiosyncrasies. They can often detect subtle changes in behavior or vital signs that warn the physicians of impending crises. It is that kind of long-term relationship with a patient, family, and medical team that has made Comprehensive Care a successful program for the care of patients with special needs.

References
A 15 year old girl with no prior history of seizures or neurologic deficit presented with a 3 month history of bloody diarrhea and cramping abdominal pain and fatigue. She was admitted to the general care unit for inflammatory bowel disease (IBD)-with pancolitis of indeterminate type. She was treated initially with sulfasalazin 15mg/kg every 6 hours and allowed to eat ad lib. Her IBD was resistant to treatment and hydrocortisone enemas were added. Two days prior to onset of neurologic symptoms Asacol (an oral form of mesalamine, a 5-aminosalicylate derivative) was added. She also started on parenteral nutrition for continuing weight loss.

Thirteen days into her hospital course she had 3 tonic clonic seizures. Her blood pressure at the time of the first seizure was 158/92 and at the 2nd seizure it was 175/100. In retrospect her BP had been elevated to 150/90 for much of the 3 days prior to the first seizure. A stat head CT showed bifrontal and biparietal cortical low attenuation. She was transferred to the PICU where she was confused and sleepy, pulling at her monitoring leads and vascular tubing. Her Glasgow coma scale score was 8-14. Aggressive control of her blood pressure was instituted and titrated to a blood pressure of 130/80. Keppra was started for seizure therapy and steroids, considered essential to the treatment of her colitis, were continued.

Hypertension was managed initially with a labetalol infusion. Lisinopril, isradipine and metoprolol, and amiodipine were eventually added as the labelolol infusion was tapered and discontinued. An MRI was obtained and showed scattered linear areas of hyperintense FLAIR signal within subcortical white matter in both frontal and both parietal lobes. There were no further seizures after blood pressure control was achieved, and mental status improved steadily over the first 24 hours in the PICU to her baseline normal state. She did not have follow-up imaging.

Blood pressure was managed with oral agents when the patient returned to the general care unit after 3 days. Her refractory colitis eventually responded to a course of remicaid, and steroids were tapered. Antihypertensive medications could easily be discontinued following steroid taper.

Her PICU diagnosis was PRES, posterior reversible encephalopathy syndrome.

Introduction

Posterior reversible encephalopathy syndrome, PRES, is a recently described entity of neurotoxicity, vasogenic edema, mental status changes, often including seizures and visual changes, usually in association with hypertension. The first description of this syndrome was in 1996 by Hinchey, et al, who named it reversible posterior leukoencephalopathy syndrome, or RPLS.² The name was changed to PRES in 2000 by Casey, et al when it was realized through improved imaging techniques that both white and grey matter could be involved.² Since then it has been suggested that the acronym be preserved but the name changed to “potentially reversible encephalopathy syndrome,” on the basis that posterior regions of the brain are not solely affected and that the syndrome is only reversible if properly treated.³ The older term hypertensive encephalopathy can be considered a subset of PRES as can the cerebral edema seen in preclampsia/ eclampsia.² ⁴

Etiology

A wide variety of causes or risk factors have been associated with PRES, but the common thread among them is endothelial damage in cerebral vessels leading to vasogenic edema.² ⁴ ⁶ Hypertension is the most common cause of PRES and it is documented in approximately 75% of cases.² ⁶ It is usually in the moderate to severe range. It may be the sole cause or it may be one of multiple factors. Blood pressure does not usually exceed the upper limit of the ability the brain to autoregulate- mean arterial pressure of 150-160 in adults.⁶ Blood pressure may be normal in patients with another inciting factor. Eclampsia/ preclampsia is another common cause of PRES.⁵ ⁶ Cyclosporin A is the drug most commonly associated with PRES, but tacrolimus, sirolimus, dexamethasone, and a variety of chemotherapeutic agents have been implicated.⁵ ⁷ ⁸ Bone marrow and solid organ transplantation-independent of the immunosuppressant drugs can also cause PRES through mechanisms including or resembling graft versus host disease, and rejection.¹ ² ⁶ Sepsis or septic shock, particularly when caused by gram positive bacteria, can trigger PRES.⁶ One case report attributed PRES to influenza A.⁹

Other conditions associated with PRES include autoimmune diseases, notably, systemic lupus erythematosus, Wegener’s granulocytosis, scleroderma, and polyarteritis nodosa.⁵ ⁶ Thrombotic thrombocytopenic purpura, Henoch-Schonlein purpura and hemolytic uremic syndrome are also associated with PRES.⁵ ⁶ Anaphylaxis, alcohol withdrawal, hypercalcemia, and hypomagnesemia are rare causes.⁵ Renal impairment is a common comorbidity.¹

Mechanism

There is controversy about the pathophysiology mechanism underlying PRES.² ⁵ ¹⁰ One theory holds that the primary mechanism is hypertension (or toxicity) exceeding the brain vasculature’s ability to autoregulate thus causing direct injury to the capillary beds and subsequent extrusion of fluids. This so-called “hypertension/hyperperfusion theory” is supported mainly by the observation that blood pressure is usually high at the time of diagnosis and treating hypertension leads to resolution of symptoms. The competing theory argues that hyperperfusion caused by vasoconstriction and vasoconstriction causes edema via hypoxia and endothelial cell activation, possibly inducing VEGF (vascular endothelial growth factor) in the process. This is supported by the watershed distribution of lesions, the observation that hypertension is not always present, and that the most severe hypertension is not always associated with the most edema. The controversy has recently been reviewed by Bartynski in 2008.¹⁰

Presentation

Symptoms arise acutely or over several days. Patients may present with seizures, altered levels of consciousness, aphasia, headache, nausea, vomiting, or visual disturbances, including cortical blindness. These symptoms occur in the setting of hypertension and/or one of the systemic illnesses or toxicities described above. Seizure was the presenting symptom in 58 of 76 cases in one large series of PRES cases.¹ Status epilepticus was studied as the presenting manifestation of PRES in another series. Some of those patients had focal onset of tonic/clonic status but the majority had nonconvulsive status epilepticus. Motor manifestations of these episodes of nonconvulsive status were
subtle—such as lip smacking, impaired consciousness, or altered behavior.\textsuperscript{11}

**Imaging**

PRES can be diagnosed with CT or MRI scans. MRI is more sensitive and can diagnose many lesions missed on CT. FLAIR sequences (fluid attenuated inversion recovery sequences) are especially helpful as these lesions are often superficial and FLAIR suppresses the adjacent CSF signal. DWI (diffusion weighted imaging) is also utilized. Hyperintense signal on FLAIR sequences in cortical and subcortical white matter is the most typical finding, representing vasogenic edema.\textsuperscript{2,3}

PRES lesions, focal or patchy areas of vasogenic edema, are more commonly seen in the posterior cerebrum as the acronym implies but lesions can occur in all areas of the brain and brain stem, and even rarely in the spinal cord.\textsuperscript{4,5} Lesions in frontal lobes that were once characterized as “atypical” are now known to occur commonly in PRES. The distribution favors watershed areas of the brain.\textsuperscript{6} Focal areas of vessel dilation and constriction, resembling “strings of beads” have been demonstrated in some cases suggesting vasculopathy.\textsuperscript{6}

**Treatment**

The majority of patients recover fully if promptly treated. However, roughly 17% of patients in one large series had CNS infarction and 17% had CNS hemorrhage, emphasizing the need for prompt recognition of the syndrome and early aggressive treatment.\textsuperscript{5,6}

When hypertension is present it should be corrected aggressively.\textsuperscript{1} Ideally, this is initiated with infusions of titratable agents in the ICU. Once blood pressure is normalized, therapy can be transitioned to intermittent agents. Many different agents have been successfully used. There is some evidence from the eclampsia studies that magnesium is helpful in the CNS toxicity, so there may be some reason to believe that Ca channel blockers have a theoretical advantage.\textsuperscript{10} Nicardipine is the titratable continuous infusion in the Ca channel blocker class and it can be transitioned to nifedipine following clinical improvement. Labetalol, esmolol, and sodium nitroprusside (nitride) are also effective titratable antihypertensive agents, but any agent that controls blood pressure is acceptable.

The second major avenue of therapy is withdrawal or decreased dosing of the offending toxic agent whenever clinically possible.\textsuperscript{7,8} These agents are most often immunosuppressive drugs or chemotherapeutic agents. It is important to note that the levels of these agents are frequently in the therapeutic ranges when PRES occurs, so one should not discount their role based on normal levels.

In cases where PRES is caused by sepsis/septic shock or influenza, treatment of the primary etiology is key. In preeclampsia/eclampsia delivery of the fetus may be curative.

Seizures should be treated with standard antiepileptic agents. Neurological consultation may be warranted as multiple seizures and even status epilepticus are commonly seen. Moreover, given the frequent occurrence of subtle neurologic findings in non-convulsive status, an EEG may be useful. Because the seizures are believed to be secondary to the PRES, in most cases the antiepileptic agents are continued for only a short course, although the duration of treatment is controversial.

In Hinchey’s original case series she noted that all 15 patients recovered in two weeks and ten recovered in one week or less.\textsuperscript{1} In many case reports and case series patients recover within hours to a few days of normalization of blood pressure or removal of the toxic agent.\textsuperscript{1,2}

Clinical judgment should be used in determining the need for repeat imaging. Delayed or incomplete recovery might prompt imaging if there is concern for accompanying infarction or hemorrhage.

**Summary**

PRES should be considered in any patient with hypertension or systemic disease who develops seizures, mental status changes, visual changes, or headache. Because the syndrome can be reversed with prompt therapy, but can be complicated by infarct and/or hemorrhage, timely recognition and treatment of the syndrome is paramount. MRI with FLAIR and DWI sequences usually provide the diagnosis. CT can diagnose the more severe cases, and can rule out other acute causes of mental status change such as hemorrhage. Therapy involves blood pressure normalization, removal or tapering of toxic agents, treatment of seizures if present, and treatment of the underlying disease state (e.g. sepsis) if present.

The author wishes to thank Dr. Mahesh Jayaraman for providing the radiologic images.

---

**Figure 1.** Three axial FLAIR images in our patient demonstrate areas of subcortical white matter hyperintensity with relative sparing of the cortex. Involvement is bilateral, and in both anterior and posterior circulation territories.
NOTE: Some details of this case have been altered to protect patient confidentiality.

The patient is a ten-month-old boy with a past medical history significant for complex congenital heart disease with a severe AV canal defect and pulmonary stenosis. He ultimately required a Glenn procedure. Shortly after the procedure, the patient developed signs of worsening heart failure and pulmonary hypertension. Previous evaluations and hospitalizations revealed clots in many of his major vessels, including his bilateral subclavian veins, axillary veins, one internal jugular vein, and several of his pulmonary venous collateral veins.

Over the following weeks, Doppler ultrasonography showed further clotting of both femoral veins to near total occlusion, despite being on anticoagulation therapy. Due to his extensive venous occlusions and pulmonary hypertension, the cardiology team determined that the patient was not a candidate for a Fontan procedure.

The patient’s condition required daily lab draws, which was further complicated by his clotting dysfunction. The nursing staff was very hesitant to attempt venipuncture on the patient due to the difficulty in obtaining a successful draw and the feeling of causing the patient a significant amount of pain with repeated attempts.

The parents were adamant that their son remain in “full code” status and have everything possible done for him, despite multiple discussions regarding the child’s terminal condition. The parents believed that if something was said it would come true. This concern stemmed out of their belief in mystical physics. This belief-system has become more popular in recent years and is the subject of various books and movies, including the movie “What the Bleep Do We Know?” Its basic tenet is that matter and energy are inseparably connected, so that a negative thought stems from negative energy and has a negative impact on the matter associated with that negative energy. Thus, the parents felt that if they agreed to anything less than full code status for their son, they would be inducing his death.

They refused to have any discussion of hospice or palliative care due to this belief and prior “bad experiences” with hospice care of another family member. Attempts were made to clarify these experiences in hopes of finding a solution; however, the father was not willing to elaborate further.

The medical team felt that the patient was at risk for further thrombotic events that could lead to a cardiac arrest, and that performing a full resuscitation with intubation, compressions, and drugs was not in the patient’s best interest, as it would inflict further pain with little chance for success. The team also felt that a successful resuscitation would further decrease his quality of life, and have the potential for indefinite life support, and further arrests. In addition, the team believed that, based on the parent’s wishes, blood draws were necessary to ensure that anticoagulation and cardiac drug therapies were safe and appropriate, but that continued attempts to draw labs were cruel given the significant number of punctures required for a successful draw.

The ethics committee was asked to review the case. The committee agreed that continued attempts at venipuncture were inflicting excessive pain and constituted cruel treatment. In addition, the committee agreed that the treating team was under no obligation to follow the parents’ desire to keep the patient on full code status. They felt that the treating team could not be forced to provide care that they considered harmful to the patient or not in the patient’s best interest. The committee required that the team make their position and the rationale behind it clear to the family and to offer the transfer of the patient to another team if the family desired so.

The treating team met with the parents and explained that the team would no longer be drawing labs on the patient, which, in effect, meant that treatment could not be monitored and would be based on clinical situations rather than laboratory data. The family agreed, saying this was their son’s way of indicating he did not want to be poked anymore. The team also explained their belief that putting the patient through a full resuscitation would be inappropriate. The team offered to transfer the patient to another facility or to request a second opinion from another physician regarding the treating team’s position. The parents understood the team’s decision and, while they disagreed with it, they felt comfortable with the current team continuing to care for their son. They decided to take the patient home rather than having him die in the hospital and expressed their gratitude and relief about this decision. Arrangements were made over the next few days for home care (though the family refused hospice care) and the patient ultimately died at home a few weeks later.

Discussion
This patient’s family chose to have a full resuscitation status for their son, believing that to do otherwise would induce their son’s death. The treating team felt that to perform a full resuscitation would not be in the patient’s best interest. This begs the question: are physicians required to carry out the wishes of our patients’ families in situations where the care is felt to be harmful to the patient? Physicians have a deeply ingrained moral obligation to “first, do no harm.” Occasionally, this position is at odds with the desires of patients and their
families. Pediatricians are in a unique position in that our patients generally cannot make decisions on their own and may not be able to express their desires on the issue. When these situations occur, every effort should be made to reconcile the conflicting positions so that the physician and the family are united in the care of the patient. When possible, support staff including social workers and clergy members (if desired by the family) may help the family in their decision-making process.

A meeting where all parties can be present at the same time (including consultants, social work, and desired family members) may be necessary so that everyone can be made aware of the various opinions and come to a unified decision. If the physician or team members still feel that the family’s wishes run contrary to what is felt to be ethically appropriate (e.g. the treatment option is crossing the “do no harm” line without likely benefit) then the ethics committee should be consulted. Ethics committees can be a valuable resource by providing a perspective removed from direct patient care and providing with options for both the treating team and the family. In addition, it may be helpful to discuss the case with the risk management department if legal counsel is not part of the committee.

Physicians face many ethical dilemmas trying to balance between beneficence (i.e. promoting good) and nonmaleficence (i.e. avoiding harm). In this case, the treating team felt that they would be violating the principle of nonmaleficence by putting the child through painful procedures that offered little to no benefit if they were to carry out the family’s desires. This principle provides the physician with the grounds to object to such treatments. It is important to remember that nonmaleficence does not operate in isolation of other ethical principles and that the ethical dilemma must be viewed in the context of nonmaleficence, beneficence, and parental rights to decide the treatment course for their child. Situations exist where it may be appropriate to follow the parents’ desired treatment even in the face of little evidence of benefit, as long as the risk does not outweigh the benefit. In fact, physicians face these types of situations frequently. As an example, chemotherapy carries significant health risks but the benefits of a possible cancer cure allow for such treatment to proceed. When the physician feels that potential harm does not justify the benefit, he or she should not feel ethically obligated to proceed with a treatment course that is not in the patient’s best interest. When the physician determines it is inappropriate to proceed, and this conflicts with parental desire, it is not sufficient to simply inform the parents of the decision. Every effort should be made to come to an agreement on a treatment plan (including investigation of the rationale used by the family to make their decision). If an agreement cannot be made between the family and the physician, it is incumbent upon the physician to offer a second opinion or to arrange for the patient to be transferred to another physician for further care, as long as the family agrees. Allowing for such a transfer can facilitate a process where the physician’s ethical position is not compromised, while continuing to respect the parents’ right to decision making. If such a transfer is not possible, the requested treatment need not be conducted.

In balancing beneficence and nonmaleficence, it is important to consider the entire team’s perspective, including nursing and ancillary staff. In this case the nurses, rather than the physicians, performed the painful procedures that were part of the controversy. The entire care team’s assessments are important when determining the risks and benefits of any procedure.

It may not be possible to reach consensus with the family members. Attempts to understand the rationale behind their decisions can provide valuable insight into possible solutions to the dilemma. In this case, due to their belief in mystical physics, the family was absolutely against changing the patient’s resuscitation status, in fear that they would induce their son’s death. This made it clear to the team that they needed a different mechanism to resolve the dilemma, including the involvement of the ethics committee.

The decision not to comply with the family’s request was based on the principle of nonmaleficence. In this case, a decision to override the parent’s request for ongoing full resuscitation status and further laboratory evaluation of their child allowed the treating team to feel that they were acting in the best interests of their patient. At the same time, not forcing the parents to make this decision allowed them not to feel as if they had induced their son’s death. Ultimately all parties involved respected the outcome.

Keywords: Nonmaleficence, Ethics, Do Not Resuscitate, Terminally Ill, Pediatrics

References
1. What the Bleep Do We Know? [DVD]
Thrombocytopenia in the Neonate

Brittany Weldon, MD, bweldon@stanford.edu
Clinical Instructor, Division of Neonatology, Department of Pediatrics
Stanford University, Stanford, California

Thrombocytopenia is a common finding in the newborn, occurring in approximately 0.7-2% of neonates. The number is even higher, approximately 20-30%, in preterm and full-term babies admitted to neonatal intensive care units. The source of the thrombocytopenia is often elusive, with up to 60% of babies having an idiopathic diagnosis. However, for some of the babies, thrombocytopenia is the presenting sign of a more serious illness.

The definition of thrombocytopenia is a platelet count of < 150 x 10^9/L irrespective of gestational age. During development, the mean fetal platelet count reaches 150 x 10^9/L by the end of the first trimester, so any baby of viable gestation can be evaluated using the same normative values.

The main concern with a low platelet count is bleeding, specifically intracranial hemorrhage. The majority of affected babies will have mild to moderate thrombocytopenia with a platelet count between 50 and 150 x 10^9/L. Fortunately, severe thrombocytopenia, defined as a platelet count <50 x 10^9/L, is relatively rare, occurring in only about 0.24-0.32% of births. This translates to few significant hemorrhagic events as a direct result of low platelet counts as such events are unlikely unless the count is <50 x 10^9/L, and spontaneous bleeding is unusual with a count >10 x 10^9/L. However, identifying babies at risk is crucial since timely diagnosis and treatment can be life saving.

When approaching the diagnosis and management of newborns with thrombocytopenia, it is useful to have a way to categorize the patient. The pathogenesis of thrombocytopenia can be divided into three groups: increased destruction, decreased production, and sequestration. They can further be distinguished by the timing of the presentation, though with significant overlap. Fortunately, for many of the rarer causes, there are other signs present to lead the clinician toward the diagnosis.

---

... the first step is to evaluate the smear or simply repeat the level with a separate specimen.

---

When considering how to proceed with an unexpected instance of thrombocytopenia, the first step is to evaluate the smear or simply repeat the level with a separate specimen. This will help to correct for “artifactual” thrombocytopenia, when a normal platelet count is incorrectly counted as low, or pseudothrombocytopenia, when platelets clump in an ethylenediaminetetraacetic acid (EDTA) preserved tube. Counts are also most accurate when performed within two hours of collection.

If the platelet count is accurate, or if the patient is symptomatic, then sepsis must be at the top of the clinician’s list, irrespective of the patient’s age. If the neonate develops thrombocytopenia after the first three days of life, then sepsis and necrotizing enterocolitis are responsible in >80% of cases. Multiple mechanisms can cause a low platelet count in the setting of acute infection. Disseminated intravascular coagulation (DIC) is a major contributor, causing a low count by consuming the platelets in circulation. Additional platelets are consumed through binding to bacteria or viruses and immune complexes, subsequently being cleared by the reticuloendothelial system. Furthermore, there is impaired megakaryopoiesis in the setting of hypoxia and stress from infection thus reducing marrow response to thrombopoietin and platelet production.

Of course, additional symptoms in a septic neonate may include respiratory distress, but the combination of respiratory symptoms with thrombocytopenia is not specific to infection. Given the susceptibility of neonatal megakaryocytes to hypoxic stress, it is not surprising that respiratory distress syndrome (formerly known as hyaline membrane disease) is also a cause of thrombocytopenia. This susceptibility is multi-factorial. Fetal and neonatal megakaryocytes are smaller and of lower ploidy than those of adults, so it has been postulated that they release fewer platelets. In addition, thrombopoietin levels in thrombocytopenic newborns are lower than anticipated for the platelet count, possibly indicating a decreased ability to up-regulate platelet production.

---

... placental insufficiency, ... birth asphyxia, maternal pregnancy-induced hypertension, or diabetes mellitus, ... are the most common causes of early-onset thrombocytopenia.

---

These same mechanisms are thought to be at play when low platelet counts are seen in babies born to mothers with placental insufficiency, such as those with intrauterine growth restriction, birth asphyxia, maternal pregnancy-induced hypertension, or diabetes mellitus, which are the most common causes of early-onset thrombocytopenia. Relative chronic hypoxia leads to a decrease in platelet production during fetal life that presents with mild to moderate thrombocytopenia in the first 72 hours, and usually corrects within seven to ten days.

Although bacterial sepsis and NEC are common infectious causes of thrombocytopenia, viral infections must also be considered. The TORCH organisms are classically implicated in early-onset neonatal thrombocytopenia. The platelet count is often < 50 x 10^9/L, especially in cases of congenital CMV infection. The baby often appears sick, and may present with the textbook...
“blueberry muffin” rash, in which the “blueberries” are sites of extramedullary hematopoiesis, though they may resemble purpura.

Approximately 1 in 900-1500 births, is complicated by neonatal alloimmune thrombocytopenia (NAIT), a relatively rare but potentially lethal disease. NAIT is considered to be the platelet equivalent of hemolytic disease of the newborn in that the mother is negative for platelet antigens (HPAs) found on the fetus’s platelets and she produces antibodies against them. These antibodies, in the form of IgG, cross the placenta and attack the fetal platelets, often resulting in a profound thrombocytopenia in utero or within the first few days of life. One key difference is that, unlike in hemolytic disease of the newborn, sensitization to fetal platelet antigen can occur during the first pregnancy, and first-born babies can be affected.\(^1,6,9\)

Diagnosis of NAIT is usually suspected in a term healthy-appearing baby with good APGARs who develops petechiae. When the platelet count is checked, it is often < 50 x 10\(^9\)/L. Maternal and neonatal platelets are then HPA-typed and the serum is checked for antiplatelet antibodies. However, NAIT is the most common cause of severe thrombocytopenia and negative serologic testing does not completely rule out the diagnosis because not all antigens have been identified and not all reference laboratories test for all antigens.\(^9\)

The concern with NAIT is the likelihood of severe thrombocytopenia and the risk for intracranial hemorrhage, which occurs in 10-20% of cases.\(^1,9\) When a hemorrhage occurs, it is frequently intraparenchymal, rather than intraventricular,\(^3\) and approximately two-thirds of patients with NAIT-associated ICH later are identified as having neurodevelopmental problems.\(^9\)

Therefore, preventing ICH in NAIT is a high priority, though this is complicated by approximately half occurring in utero.\(^6\) The criteria for transfusion are somewhat variable, but there seems to be agreement that babies with known NAIT and platelet counts < 30-50 x 10\(^9\)/L should be transfused, as should any infant with thrombocytopenia and...
active bleeding. In general, matched HPA-1a and -5b negative platelets should be used, though random platelets can be given with IVIG 1mg/kg/day for one to two days if no antigen-negative platelets are available. In addition, any newborn with NAIT and a platelet count < 50 x 10^9/L should undergo neuroimaging to evaluate for intracranial hemorrhage.

A pathogenically similar disease to NAIT is autoimmune thrombocytopenia, though the antibodies are directed against both maternal and fetal platelets. These babies often look remarkably healthy after an uncomplicated delivery, but may be anticipated because of a maternal diagnosis of idiopathic thrombocytopenic purpura (ITP), hypothyroidism or other autoimmune disease. Thrombocytopenia is usually mild to moderate with a nadir at approximately 2-3 days and recovery within 3 weeks. The incidence of ICH is approximately 1-3%. Treatment is IVIG with or without methylprednisolone, and is generally done for platelet counts < 30 x 10^9/L or bleeding episodes. Platelet transfusions have limited utility since the antigens involved are common to all platelets.

Inherited thrombocytopenias, those accompanying chromosomal and metabolic abnormalities are listed in table 1. Infants with these problems are often recognized based on physical exam. Hemorrhage is rare in trisomy patients with counts remaining > 50 x 10^9/L. Thrombocytopenia is severe in disorders such as Fanconi’s anemia and Thrombocytopenia with absent radii (TAR) syndrome, with gastrointestinal and intracranial hemorrhage occurring frequently in untreated patients. If the child survives the first year, often with the appropriate use of single-donor platelets, the thrombocytopenia generally improves over time.

Wiskott-Aldrich syndrome presents with characteristic small platelets and moderate to severe thrombocytopenia. However, patients tend to have bleeding problems out of proportion to the degree of thrombocytopenia secondary to abnormal function. Patients also suffer from eczema, recurrent infections secondary to abnormal T-cell function, and an increased risk for autoimmune disorders. X-linked thrombocytopenia presents with a milder thrombocytopenia and without the eczema, infections and autoimmune disorders of Wiskott-Aldrich.

Thrombocytopenia may also develop in the newborn due to rare conditions causing bone marrow failure or infarction. Congenital amegakaryocytic thrombocytopenia is an isolated failure of the megakaryocytic line in the bone marrow, though many patients may go on to develop aplastic anemia, as well. It is often confused initially with NAIT or TAR because of the severely low platelet count, but the thrombocytopenia does not resolve. Congenital leukemia, neuroblastoma and hemophagocytic lymphohistiocytosis are rare causes of thrombocytopenia, as is osteopetrosis, in which the hyperostosis leads to an obliteration of the narrow cavity and pancytopenia. Many of these disorders will also present with hepatosplenomegaly.

Though most cases of thrombocytopenia are due either to increased destruction or decreased production, sequestration also can occur in the neonatal period. An example of this is Kasabach-Merritt syndrome in which platelets are trapped on the endothelium of a hemangioma. The low platelet count can be exacerbated by DIC. Often, the diagnosis is obvious since the hemangioma is on the skin, however, up to 20% may have visceral involvement without cutaneous manifestations. In any infant with signs and symptoms of DIC and severe thrombocytopenia, Kasabach-Merritt syndrome must be considered because the mortality is between 20-30%. In patients with renal failure and thrombocytopenia, renal vein thrombosis must also be considered.

Thrombocytopenia is a common finding in the newborn period and is frequently identified incidentally. In the majority of healthy-appearing neonates, hypoxia in utero from conditions such as PH, GDM, placental insufficiency and low birth weight will be the cause, and the thrombocytopenia will be mild to moderate and likely resolve without sequelae. However, the clinician must remain vigilant to the risk of hemorrhage in severely thrombocytopenic newborns, and to thrombocytopenia from other causes, such as infection, NEC, NAIT, autoimmune thrombocytopenia, and more rare genetic etiologies.

References
SUBCOMMITTEE UPDATES

Subcommittee on Evidence Based Medicine

The EBM Subcommittee is excited about the launch of their new website at: https://sites.google.com/site/sohmevidencebasedmedicine where you can search our small, but ever-growing library of EBM resources for pediatric hospitalists. Or, if you don’t want to type that much, just link to it from the section website. We are eagerly soliciting volunteers to write or review CATs or bibliographies and will be having a brief planning meeting at this year’s PHM meeting in July in Minneapolis.

Early Careerists and Pediatric Residents

Each year the AAP SOHM sponsors 3 resident travel grants to the summer pediatric hospital medicine meeting. With more than 20 outstanding applicants applying for the 3 grants, the selection again was difficult. The recipients will be listed in an upcoming issue of the Hospital Pediatrics as well as an article describing their conference experience. Almost half of the applicants heard about the grant from a hospital medicine physician so we thank you for your support for the program.

We are almost finished developing a program to pair trainees or pediatricians new to hospital medicine with experienced physicians. This mentorship program will have online applications as well as specific details posted in the upcoming Early Careerists and Pediatric Residents Subcommittee page of the AAP SOHM website. This will be a great resource to those new to the field as well as trainees so keep your eyes on the website and listserv® if you are interested in being a mentor or mentee.

The Early Careerists and Pediatric Residents Subcommittee addition to the website will soon be posted. It will provide a location to host the details on great programs like those mentioned above. It will also include some resources about the profession for residents interested in pediatric hospital medicine and pediatric hospital medicine fellowships, such as a tell-all Q&A section from the Executive Committee. I greatly appreciate the effort and time of those who contributed to this material.

Subcommittee on Family-Centered Care

We’re gathering data, year by year, on who’s doing family-centered care & rounding and who isn’t. We have almost 90 institutions in our dataset, and we need yours. We will use the information for research and planning. This is important because no one else is gathering this information.

Even if someone has completed a survey from your hospital in a prior year, we need your update. If you aren’t doing FCR, we need information on your perceptions and barriers to doing FCR. The estimated completion time is 5-10 minutes with a total of 8 questions.

Here’s the link: http://www.surveymonkey.com/s/N3YCFXX

We will send a copy of this year’s results to all who complete the survey. In addition, we will present the results at the Pediatric Hospital Medicine Conference in Minneapolis on July 23rd at the FCC/FCR Subcommittee Meeting at 12:30 on Friday, July 23rd. You are invited!

Thanks for your help.

Section on Hospital Medicine Subcommittee Chairpersons

Billing & Coding
James O’Callaghan, MD, FAAP
James.ocallaghan@seattlechildrens.org

Community Hospitalists
Beth Robbins, MD, FAAP
erobbins@aahs.org

Complex Care
Allison Ballantine, MD, FAAP
ballantine@email.chop.edu

Early Careerists & Pediatric Residents
D. Corey Lachman, MD
cach79@gmail.com

Evidence Based Medicine
Shawn Ralston, MD, FAAP
shawnralston@msn.com

Family-Centered Care
Geeta Singhal, MD, FAAP
gsinghal@bcm.edu

Ted Sigrest, MD, FAAP
tsigrest@pol.net

Research
Karen Wilson, MD, FAAP
karen_wilson@urmc.rochester.edu

Ronald Teufel, MD, FAAP
tteufelr@musc.edu

Web Master
Liborio LaRussa, MD, FAAP
lee@larussafamily.com

LISTSERV® Moderator
Kevin Powell, MD, PhD, FAAP
kpowell@pol.net

If you are a member of the Section and interested in joining one of these groups, please visit the SOHM website at www.aaphospmed.org for more information.
Moderator: Steve Narang, MD, FAAP
Education and Program Chairperson

8:30 am  Poster Session and Presentation of the 2010 Pediatric Hospital Medicine Abstract Research Award

9:30 am  Update on DKA
Faculty: Nicole Glaser, MD

10:30 am  Break

10:45 am  Update on Advocacy and Policy
Faculty: AAP Federal Affairs Staff

11:45 am  Break

12:00 pm  Section Business Meeting – Grab Lunch and Talk
Chairperson: Daniel Rauch, MD, FAAP

1:00 pm  Family Centered Rounds
Faculty: Geeta Singhal, MD, FAAP

2:00 pm  Break

2:15 pm  Nutrition update from FTT to TPN, including Pre-op and Post-op Feeding
Faculty: Jatinder Bhatia, MD, FAAP

3:15 pm  Adjourn

For a list of accepted posters for presentation at the Section Program, please refer to page 7.