

Distraction osteogenesis

In a typical week, **Bonnie Padwa, MD, DMD**, chief of the Oral and Maxillofacial Surgery Program at Children's Hospital Boston, performs 15 to 20 wisdom teeth extractions. While this comprises a significant part of her practice, the program isn't all about extracting teeth. On any given day, Dr. Padwa might resect an oral tumor, repair a facial fracture, perform jaw surgery to correct an underbite or treat a child who has a temporomandibular joint (TMJ) disorder. In short, her team provides a full range of services, from the routine to the complex.

One of the more involved reconstructive procedures that the team offers is distraction osteogenesis (DO) for facial skeleton deformities, which is performed on patients from infancy through young adulthood. During this procedure, a bone is separated into two segments (osteotomy) and lengthened gradually under tension using a distraction device. The movement of the two pieces of bone results in a gap, where new bone forms.

Originally used in orthopedic surgery to repair limb length discrepancies, DO for treatment of facial skeleton deformities has gradually gained acceptance, and according to Dr. Padwa, it has revolutionized the field of oral and maxillofacial surgery. "Before distraction, surgeons had to lengthen bones by taking bone grafts from the patient's hip, rib or cranium," she says. "This required a long operation and another operative site with the associated risks and complications. In infants, there's a relatively small amount



Bonnie Padwa, MD, DMD

of bone that's available to harvest for grafts." Distraction avoids many of these problems and significantly reduces healing time.

The department often uses DO to correct severe micrognathia seen in patients with Robin Sequence, Treacher Collins and Nager Syndromes. Enlargement of the lower jaw brings the tongue forward, preventing it from obstructing the upper airway. Children with midface deformities, such as cleft lip and palate or more severe syndromes, such as Apert, Crouzon or Pfeiffer syndrome, also routinely benefit from DO.

The process of DO begins with preoperative assessment. Doctors use three dimensional imaging to identify the parts of the patient's facial skeleton that need repositioning and determine the magnitude and direction of distraction. They then select the most appropriate distraction device and sometimes have custom devices fabricated. When


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Tools you can use for assessing children's mental health

Recent research has indicated that clinicians under-identify patients who are in need of mental health services when they rely solely on their impressions during a routine visit. One large study found that pediatricians identified only one of five children with behavioral health problems, and another found that the identification of potential behavioral health problems increases when standardized developmental, mental health and substance abuse screening tools are used. In young children, behavior and development are intrinsically linked, as developmental difficulties correlate with behavioral problems.

The new Rosie D. state mandate, which is the result of a lawsuit filed in October 2001 by nine plaintiffs ages 5 to 16 who had been hospitalized or were at risk of hospitalization due to the lack of intensive home-based mental health services, stipulates that providers are now required to offer Mass Health patients the use of a standardized behavioral health screening tool at every Early and Periodic Screening, Diagnosis and Treatment (EPSDT) and Preventive Pediatric Health Care Screening and Diagnosis (PPHSD) visit. Fortunately, the tools that help identify children at risk for developmental delays and behavioral health problems are now available and enable early identification and intervention.

To further help children receive mental health services, Children's Hospital Boston has collaborated with the Boston Bar Association to produce a free guide for parents on how to navigate Massachusetts mental health services, called *The Parents' How-to Guide to Children's Mental Health Services in Massachusetts*. The book and accompanying Web site can help families find resources and learn about how to pay for specific services.

 [Online developmental screening tool kit: developmentalscreening.org/index.htm](http://developmentalscreening.org/index.htm)

 [Rosie D. update: mass.gov/masshealth/childbehavioralhealth](http://mass.gov/masshealth/childbehavioralhealth)



What's inside

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New Web site for young men's health



Children's Hospital Boston has an award-winning Web site dedicated to young women's health (youngwomenshealth.org), and is now launching a similar site for young men. Produced by members of Children's Adolescent and Young Adult Medicine departments and a teen advisory committee, the Web site provides health information for teenage boys, encouraging them to take an active role in their own health care. Topics range from acne and body piercing to fast food facts, emergency contraception, sports, nutrition and stress.

Check it out: youngmenshealthsite.org

Ditch the itch

Children's Atopic Dermatitis Center welcomes children and adolescents with severe atopic dermatitis (eczema) and food allergies. The clinic is held Friday mornings on Fegan 6 at Children's Longwood campus. Patients are seen by a pediatric allergist, nurse practitioner, nutritionist and behavioral therapist to learn ways to cope with itching and scratching.

More information: childrenshospital.org/atopic or 617-355-6180

Children's expands

Within the past few months, several Children's clinical sites at the main hospital have moved. The Intermediate Care Program (ICP) moved to a new home base on 11 South in February. There are 10 designated beds for this clinical unit and service. Also, last month, 12 beds on 11 South began a phased opening in the new Medicine Intensive Care Unit (MICU).

Vascular anomalies conference

Steven Fishman, MD, Marilyn Liang, MD, and John Mulliken, MD, all of Children's Vascular Anomalies Center, will serve as course directors for the 17th workshop of the International Society for the Study of Vascular Anomalies, taking place June 21 to 24 at the Fairmont Copley Hotel in Boston. This is a CME-accredited conference.

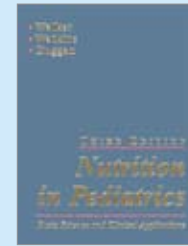
More information: childrenshospital.org/vac

Neurosurgeon takes appointments at Waltham

Neurosurgeon **Liliana Goumnerova, MD**, is increasing her availability at Children's Hospital Boston at Waltham. She will now see patients there one Friday a month.

Schedule an appointment: 617-355-6008 or childrenshospital.org/neurosurg

Nutrition in Pediatrics: Basic Science and Clinical Applications



By Children's gastroenterologists **Christopher Duggan, MD, MPH**, and **John Watkins, MD**, and **W. Allan Walker, MD**, of Massachusetts General Hospital.

The third edition of this textbook covers pediatric nutrition for pediatricians, dietitians, pediatric gastroenterologists, family practitioners and medical students. Topics cover general principles, pathophysiology, clinical conditions and definitive treatment.

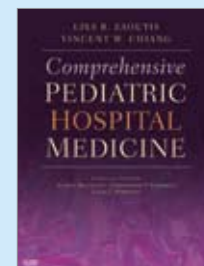
Manual of Pediatric Therapeutics



By Children's doctors **John Graef, MD, Joseph Wolfsdorf, MB, BCh**, and **David Greenes, MD**.

Updated for its seventh edition, this quick-reference manual for residents includes patient management guidelines based on the authors' clinical experience. Coverage includes normal newborn, well-child and adolescent care; acute care; disorders of each organ system; behavioral disorders; and management of the child with specialized health care needs.

Comprehensive Pediatric Hospital Medicine



By **Lisa Zaoutis, MD**, and **Vincent Chiang, MD**, chief, Children's Hospital Inpatient Service.

The authors compiled this reference that addresses the subspecialty of pediatric hospital care from infancy to adolescence. The book describes approaches to hospital-based pediatric care and issues related to staffing a unit; financial, legal and ethical topics, and how a hospitalist program interacts with referring providers and consulting staff.

Residents get hands-on training on talking to teens

When medical residents begin their rotations in Children’s Hospital Boston’s Division of Adolescent/Young Adult Medicine, they study with an unusual group of teachers: teenagers. Children’s peer-resident training program helps new residents practice patient interviews through a series of mock appointments with peer leaders Dennisse Rorie, 17, Paoli Roman, 18, and Rahiem Crawford, 17, all of whom are current or former patients themselves and now work with the Center for Young Women’s Health. Here, Rorie, Roman and the Director of Resident Training, **Sara Forman, MD**, talk about the resident training program and give their recommendations on how to talk to teens.

What is the focus of the peer-resident training sessions?

Dr. Forman: The focus of the program is to improve the interview skills of the interns with teenage patients. Up to this point in their residency, interns have had limited experience with teenage patients, especially in an adolescent clinic. Some of the topics and subject areas they will be dealing with—like sex and substance abuse—can be very awkward to talk about. These sessions are intended to make them feel more comfortable and prepared when they begin to have actual teen patient appointments.

What do you emphasize during these classes?

Dr. Forman: The peer leaders and I wanted to emphasize the more uncomfortable and serious subject areas, so we created characters for the peer leaders to play who have a history of problems with the issues we want to highlight. These include sexual activity, substance abuse, mental health, diet and violence.

How did you develop these characters?

Rorie: Our characters are a reflection of what we see among our peers almost every day. Many of our classmates have engaged in some form of alcohol abuse or dangerous sexual activity. The adolescent clinic serves the urban neighborhood that we live in, so much of what our characters convey are what the interns will probably really experience while seeing patients here.

Roman: As trained educators in young women’s health, we sometimes get approached by our classmates for advice or counseling. They are usually worried they have done something wrong or damaging to their health, but are afraid to seek professional help. This apprehension is a common trait of the characters we create, which can make it more challenging for the interns to start open conversations.

How can physicians better engage teens?

Dr. Forman: The peer leaders and I created a check-list we use to evaluate the interns during interviews. It focuses on how they relate to the patient, their use of language and whether the questions they ask are “teen-friendly.” It also addresses counseling points intended to help the doctors clearly educate the teens.

Rorie: We always encourage the doctors to be genuine and compassionate when speaking with teens. Some of the subject matter teens discuss is personal and embarrassing, so it’s important for teens to know that what they share about themselves will ultimately lead to them getting help.

Roman: We also advise them to remain non-judgmental and not talk down to teens like many authority figures do. Teens have enough authority figures in their lives; they need adults who can help them live a more healthful life.

What should physicians not do when speaking to teens?

Rorie: Bad body language, like crossing your arms or rolling your eyes in frustration, will only make us less likely to share important personal information.

Roman: How the physician reacts is important. If the patient talks about her sexual activity or alcohol consumption and the doctor jerks his head back in amazement, it can be very uncomfortable. Even questioning why she participates in these activities can come off as critical and authoritative. Maintaining a positive, welcoming demeanor will help patients be open.

What else might physicians experience with teens?

Dr. Forman: Since some of the doctors are so close in age to the patients, we address the possibility that teens might overstep their boundaries. For example, during mock appointments, the peer leaders sometimes ask interns personal questions about their lives. It can catch some of them off guard, and reinforces that physicians shouldn’t let the teens infringe upon patient-physician boundaries.

What’s most important when talking to teens?

Roman: We intentionally made the characters younger than 18 years old in order to help the interns practice outlining confidentiality agreements. Confidentiality gives teens the sense that they’re in a safe environment and that doctors are there to help.

Rorie: Many adolescents are resentful and rebellious toward adults, and aren’t going to share information about their personal lives with anyone. It’s important to generate a level of trust. If we can relate to the physician and have an open conversation without fear of their authority, we’ll be more likely to speak openly about aspects of our personal lives and health.

Dr. Forman: Getting teens to realize they have a problem is difficult to do without sounding preachy. When some of my patients are at risk, I talk about how I worry that what they are doing can lead to major health issues, and that we are always here to help.

What common errors do physicians make?

Dr. Forman: One is when physicians assure confidentiality beyond what they can provide. For instance, some say, ‘Don’t worry, I won’t tell anyone.’ In fact, doctors do have to share the information when the teen might be at risk for physical or mental harm. Another common mistake is when physicians make assumptions and phrase their questions in ways that are close-ended, like ‘You aren’t doing drugs are you?’, which doesn’t give teens the opportunity to be open. This is sometimes a result of the physicians having a pre-conceived bias or feeling rushed.

 [Check-list to evaluate residents: childrenshospital.org/views](http://childrenshospital.org/views)

A new Clinical Pharmacology Program

This spring, Children's Hospital Boston's pharmacologist/toxicologist **Michael Shannon, MD, MPH**, chief emeritus of the Division of Emergency Medicine, along with **Randy Prescilla, MD**, of Anesthesia, Perioperative and Pain Medicine, is launching a groundbreaking new Clinical Pharmacology Unit that will serve as a clinical and research resource for physicians across the country. "We want to build a unified presence as a center for drug and clinical discovery," says Dr. Shannon. The unit will ultimately include a drug development and clinical trials coordinating center and translational research program that investigates adverse drug events and their mechanisms using pharmacogenetics and pharmacogenomics as key research tools. It will be one of the only pediatric clinical pharmacology programs in the United States.

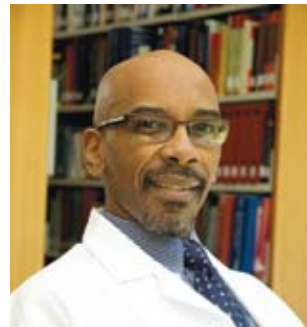
The need for pharmacology research has never been greater—a fact that's recently come into the media spotlight with the recall of children's cough and cold medicines. Because children are so sensitive to poisoning—from both the environment and medications—Dr. Shannon has spent the past 25 years at Children's working on poisoning prevention and means of protecting children from the threats of lead exposure, drug overdose, unsafe toys and other injuries.

During the past 10 years, Congress and the National Institutes of Health (NIH) have made it clear that safe drug therapy for children is a priority, passing the Best Pharmaceuticals for Children Act (BPCA) legislation in 2002 to establish a process for studying on-patent and off-patent drugs for use in pediatric populations. Dr. Shannon's program will promote BPCA efforts and respond to other demands for pediatric clinical studies, including those by the Food and Drug Administration (FDA) Modernization Act and FDA 1998 Pediatric Rule.

10 FACTS ABOUT CHILDREN AND MEDICATIONS

1. Approximately 80 percent of medications prescribed to children have never been adequately tested in the pediatric population.
2. The dose of a drug given to children, when extrapolated from the adult dose, commonly leads to either drug underdose or drug overdose.
3. There is no scientific evidence that cough and cold medications improve the cough, congestion and coryza of upper respiratory tract infections in children.
4. Pharmacogenetics research has proven that individuals have widely differing abilities to metabolize drugs.
5. Up to 15 percent of children are unable to metabolize codeine to its active analgesic form; such children will receive no pain relief from codeine-containing pain relievers.
6. Many adverse drug reactions can now be predicted and prevented by testing the child's genetic ability to metabolize the drug.
7. "Personalized medicine" in pediatric drug therapy means the right drug, in the right dose, will be given to the right child, every time.
8. Laboratory tests are now available that allow pediatricians to identify children who will not metabolize specific drugs in a typical fashion.
9. Pharmacogenetic testing is being used clinically; the FDA now recommends prior genetic testing in children receiving warfarin, since gene abnormalities (polymorphisms) can result either in warfarin underdosing or warfarin toxicity.
10. Drug-drug interactions and drug-food interactions are extremely common. Foods as common as grapefruit juice can significantly alter a child's ability to metabolize certain drugs.

In addition to its research arm, the Clinical Pharmacology Unit will have two other major components: an American Board of Clinical Pharmacology (ABCP)-accredited clinical pharmacology fellowship training program and a clinical pharmacology consult service. The two-year fellowship program—one of the nation's only pediatric clinical pharmacology training programs—will offer both clinical and research experience



Michael Shannon, MD, MPH

to physicians and PharmDs, training those who wish to remain in academic medicine, where the need for pharmacology expertise is greatest. At the end of the fellowship, graduates will be eligible for board certification in Clinical Pharmacology. Of greater importance, fellows will have all the skills necessary to meet the growing demand for experts in pediatric-focused drug discovery, development and safety.

The other major component of the program, the clinical consultation service, has been designed to assist clinicians addressing difficulties that often arise around drug therapy in children. Working in partnership with the Program in Medical Toxicology, directed by **Michele Burns Ewald, MD**, of Emergency Medicine, the consult service will have 24-hour availability to Children's clinicians, offering the following services:

Pharmacokinetic analysis: This service will be particularly targeted to patients with recurrent sub- or super-therapeutic serum drug concentrations or drug treatment failures.

Pharmacogenetic testing: This service will provide genotypic (identification of genetic polymorphisms) and phenotypic (use of probe drugs to identify aberrant metabolic pathways) testing to answer questions about drug behavior specific to the individual child.

Adverse drug reaction investigations: In collaboration with the Program in Medical Toxicology, the service will investigate adverse drug reactions in an effort to identify their mechanisms and prevent future events. Such investigations will make use of all modern tools in laboratory and translational pharmacology/toxicology, including pharmacogenetic testing, drug concentration measurement (using the appropriate biological specimen) and metabolic pathway analysis.

There will also be outpatient and inpatient services available through the consult service. Outpatient services will include pharmacokinetic and pharmacogenetic testing and adverse drug events analysis. Inpatient services will admit patients for pharmacokinetic analysis and similar testing.



Amy Fahrenkopf, MD, MPH

Depressed doctors in training make more errors

New evidence suggests that depression leads residents to make potentially dangerous medication errors. Researchers led by **Amy Fahrenkopf, MD, MPH**, a pediatric hospitalist at Children's Hospital Boston, used established diagnostic questionnaires to screen 123 pediatric residents at Children's, Lucile Packard Children's Hospital and Children's National Medical Center. Medication errors—mistakes in requesting, writing instructions for or giving medication—were tracked for one month on hospital floors.

Consistent with previous estimates, 74 percent of residents were suffering from burnout (emotional exhaustion and detachment in response to chronic occupational stress), and about 20 percent had depression, twice the rate in the general United States population. While the total medication error rate was just 0.7 percent, depressed residents made 6.2 times more errors than their colleagues. Burnout alone was not linked to higher error rates.

Most errors were minor or caught by hospital safety nets, but the potential for patient harm exists, Dr. Fahrenkopf believes. Moreover, the study didn't address other mistakes that are harder to catch and correct, such as diagnostic errors. "The majority of these residents seemed unaware they were depressed," Dr. Fahrenkopf notes. "It's expected that you'll be miserable as a resident, so it's hard to see when unhappiness has crossed the line into illness. We need to pay more attention to residents' mental health."

The study was published online February 8 in the *British Medical Journal*.

Getting the lead out

For 35 years, Children's Hospital Boston has used D-penicillamine, an oral chelator, to treat children with lead poisoning. But it's never been FDA-approved for children, and its noxious, rotten-egg smell and taste have limited its use. So **Michael Shannon, MD, MPH**, chief emeritus of the Division of Emergency Medicine, worked with a Rhode Island-based company to develop a grape-flavored version that children would actually ingest.

But sadly, no drug company was interested in mounting the clinical trials needed to get FDA approval for the new formulation. Years of lead screening and abatement efforts have made lead poisoning an "orphan" disease. But Boston-based venture capitalist **Roger Kitterman** was interested, and raised seed money from angel investors. This support has enabled Dr. Shannon to obtain a grant from the FDA and launch a small clinical trial in children with moderate blood-lead elevations.

Dr. Shannon hopes that aggressive treatment will spare children from the behavioral and cognitive consequences of even mild lead poisoning.

 **More information on the trial:**
617-355-8177

Turn to page 3 to read an article on Dr. Shannon's new Clinical Pharmacology program.

Multidisciplinary care improves survival in short bowel syndrome

In 1999, Children's Hospital Boston launched the Center for Advanced Intestinal Rehabilitation (CAIR) to provide coordinated, multidisciplinary care for children with short bowel syndrome (SBS). Now, a retrospective analysis finds that such care—integrating surgical, medical and nutritional management—is associated with significantly better survival.

Researchers led by **Biren Modi, MD**, a Rapaport Research surgical fellow in the CAIR program, compared 54 children with severe SBS, managed by CAIR from 1999 to 2006, with 30 patients treated between 1986 and 1998. Diagnoses included necrotizing enterocolitis, intestinal atresia and gastroschisis. Survival was found to be 89 percent in the CAIR group, compared with 70 percent in the historical controls. Notably, among patients who remained on parenteral nutrition, mortality was 33 percent in the CAIR group versus 90 percent historically.

Over the years, care of short bowel syndrome has improved with new measures, such as bowel lengthening procedures, transplantation and changes in parenteral nutrition solutions. But the program's multidisciplinary nature is key, say senior co-authors **Christopher Duggan, MD, MPH**, of the Division of Gastroenterology and Nutrition and **Tom Jaksic, MD, PhD**, of the Department of Surgery. CAIR's general surgeons, gastroenterologists, transplant surgeons, nutritionists, pharmacists, nurses and social workers provide critical input on each patient's care regularly, allowing the team to make more timely and effective decisions, they say.

The study was published by the *Journal of Pediatric Surgery* in January.

 **More on CAIR:**
childrenshospital.org/cair

Distraction osteogenesis

possible, intraoral devices are used.

The surgery starts with an osteotomy followed by the distraction device being placed under the skin and across the osteotomy. A few days later, the two ends of the bone are very gradually pulled apart through continual adjustments that are made to the device by the parents at home. The adjustments are made by turning a small screw that extrudes through the skin, usually at a rate of 1 mm per day. This gradual distraction leads to formation of new bone between the two ends. After the process is complete, the osteotomy is allowed to heal over a period of six to eight weeks. A small second surgery is then performed to remove the device.


“Before distraction, surgeons had to lengthen bones by taking bone grafts from the patient’s hip, rib or cranium.”

— Bonnie Padwa, MD, DMD

A wide range of conditions are diagnosed and treated by Children’s Oral and Maxillofacial Program, including:

- Malpositioned and impacted teeth, including wisdom teeth
- Missing teeth due to congenital defect or trauma (dental implants)
- Temporomandibular joint (TMJ) disorders
- Jaw cysts and tumors
- Intraoral lesions
- Dentoalveolar injuries
- Facial trauma
- Cleft lip and palate
- Hemifacial microsomia
- Severe malocclusions
- Midface hypoplasia
- Micrognathia
- Jaw asymmetry

Outpatient services, such as extractions, removal of impacted teeth and placement of dental implants, are available at Children’s Hospital Boston and Children’s Hospital Boston at Waltham.

 [More information or referrals:](#)
617-355-6259



Before



Patient’s upper jaw was brought forward 1.5cm using DO.

In June, Children’s Department of Plastic Surgery will expand its services with new clinic space at Children’s Hospital Boston at Waltham. The new space will increase appointment availability for both plastic and oral surgery consultations as well as minor surgical procedures.

The 5,000-square-foot suite will be located on the first level with free parking and will feature:

- three treatment rooms for minor plastic surgery and oral procedures, including IV sedation
- four exam rooms
- clinical photography
- dental laboratory



Henry Dorkin, MD, has been named the associate chief of the Division of Respiratory Diseases and co-director of the Cystic Fibrosis Center. Dr. Dorkin joins us from Massachusetts General Hospital for Children, where he was clinical director of the Pediatric Pulmonary Unit, director of the Joey O'Donnell Cystic Fibrosis Center, co-PI of the CFF Therapeutic Development Center and director of the Pediatric Pulmonary Function Laboratory. A past Chair of the Center Committee for the North American Cystic Fibrosis Foundation, he currently serves as CFF Chair of the Professional Education Committee and is on the Medical Advisory Council for

the Foundation. His research and publications have centered on development of new therapies for cystic fibrosis and novel diagnostic methods in pulmonary physiology.



David Ludwig, MD, PhD, director of the Optimal Weight for Life Program, won the E.V. McCollum Award from the American Society for Nutrition. The award is given to a clinical investigator currently perceived as a major creative force, actively generating new concepts in nutrition, and personally seeing to the execution of studies testing the validity of these concepts.



Athos Bousvaros, MD, MPH, associate director of the Inflammatory Bowel Disease Program, was named Humanitarian of the Year by the New England Chapter of the Crohn's and Colitis Foundation.



David Hunter, MD, PhD, ophthalmologist-in-chief, received the American Academy of Ophthalmology's Outstanding State Advocate Award for 2007. The award is given to an ophthalmologist who this year made extraordinary advocacy efforts to ensure quality eye care.

Pediatric Health Care Summit at Beverly Hospital

Wednesday, April 30, 7:30 a.m. to 12:30 p.m.

Beverly Hospital

85 Herrick St., Beverly, MA

CME credits: 4 hours category 1 credits

Topics: Developmental Screening in Your Office, Endurance Training in the Young Athlete, Current Therapies in the Treatment of Epilepsy, Managing Neonatal Emergencies

Pediatric Health Care Summit at South Shore Hospital

Thursday, May 15, 7:30 a.m. to 12:30 p.m.

55 Fogg Road (at Route 18)

South Weymouth, MA

CME credits: 4 hours category 1 credits

Topics: Elbow Injuries in the Throwing Athlete, Managing Eating Disorders in Pediatric Patients, Pediatric Sleep Disturbances, Managing Adolescent Substance Abuse

Difficult Conversations in Health Care: Pedagogy and Practice

Saturday, May 17

Boston, MA

Fee: \$452

Description: This course offers the opportunity to learn how to enhance relational capacities and communication skills. For physicians, social workers, nurses and other health care professionals at all levels.

Pediatric Health Care at Framingham Union Hospital

Wednesday, June 11, 7:30 a.m. to 12:30 p.m.

115 Lincoln St., Perini Auditorium

Framingham, MA

CME credits: 4 hours category 1 credits

Topics: ADHD, Pediatric Dermatology Updates for the PCP, Headaches: When to Treat and What are the Options?, Celiac Disease



Full agendas and registration information on the above courses: childrenshospital.org/cme

Q: What are the signs that an infant's vomiting may be caused by or lead to a serious condition?


A: There are many clinically serious causes of infant vomiting, or emesis. Identification is initially a process of elimination. Routine "spit-up," in small amounts that tends to diminish in frequency isn't a cause for alarm. However, a potential mechanism underlying spit-ups, gastroesophageal reflux (GER), can lead to serious problems if complications arise. Gastroesophageal reflux disease (GERD) can result in failure to gain weight, bleeding, respiratory problems or esophagitis. Symptoms include frequent vomiting, pain upon regurgitation and refusal to feed. Any sign of GERD warrants referral to a specialist.

But not all vomiting can be attributed to reflux. A minority of infant vomiters do need urgent, or even emergent, surgical management. For example, all neonatal bilious emesis is a surgical emergency until proven otherwise. Bilious vomit is green in color, and may indicate an acute bowel obstruction from a midgut volvulus from the congenital condition known as malrotation. Malrotation is often "silent" in newborns until a volvulus occurs. Intestinal obstruction from incarcerated hernias, meconium ileus, intussusception, Hirschsprung's disease, intestinal stenoses, and appendicitis are also possible

causes. In these rare cases, time is of the essence. Without immediate surgical intervention, the sequelae of a missed diagnosis can be fatal.

At Children's, specialists have access to imaging (KUB), as well as intestinal contrast studies (upper and/or lower GI studies), so one can obtain images to assess for intestinal blockages if time allows. For the office pediatrician, key indications for emergent surgical referral include the presence of green, bilious vomiting—a suggestion of bowel obstruction. Urgent referral for severe or persistent constipation and pathologic GERD is welcomed. Understanding the difference between the common newborn "spit-up" from severe GERD or an intestinal obstruction from malrotation can save lives.

— **Terry L. Buchmiller, MD, staff surgeon**

 [More information:
childrenshospital.org/surgery](http://childrenshospital.org/surgery)

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