What does that lab really mean?

Introduction: Ovarian masses in the pre-pubertal population are concerning for neoplasm. Tumor markers such as lactate dehydrogenase, alpha fetoprotein, beta-HCG, and CA-125 can be utilized in the diagnostic work-up to assess for possible malignancy but the sensitivity and specificity of these markers for malignancy vary. Case: This is a case of a 10-year old, pre-pubertal female with a past medical history of recurrent urinary tract infections (UTIs) and constipation presenting with abdominal pain, vomiting, and decreased oral intake. She had four days of cramping, intermittent abdominal pain, similar to her previous UTIs. Two days prior to admission, she developed low back pain and vomiting, which was not consistent with her previous infections. She was adopted, though per her birth mother, there was no significant family history of major medical illness. Her examination revealed a palpable mass in the periumbilical region. In the Emergency Department, her urinalysis showed moderate leukocyte esterase and 13 WBC/hpf. A renal ultrasound was obtained to assess for hydronephrosis given concern for pyelonephritis. No hydronephrosis was seen, but a complex pelvic mass was seen. An MRI was done to further visualize the mass, which was a 11.6 x 11.4 x 5.8 cm complex, septated cystic lesion in the mid-pelvis consistent with a benign or malignant neoplasm of the left ovary. OB/GYN was consulted given the concern for neoplasm; her lactate dehydrogenase was 181U/L, alpha fetoprotein was <1.5ug/L, and beta-HCG was <3IU/L, all within normal limits. Her CA-125, however, was 90 U/mL (reference range: 0-30 U/mL). She underwent a laparoscopic left salpingo-oophorectomy. In the operating room, she was found to have a left ovarian mass under torsion. There was moderate inflammation within the pelvis, but otherwise without any acute findings. Pathology demonstrated an ovary and fallopian tube with stromal hemorrhage and marked congestion, consistent with torsion, with no evidence of neoplasia. Our patient was found to have a complex pelvic mass during work-up of a presumed recurrent UTI. The appearance of the mass was concerning for neoplasm and while her germline tumor markers were normal, her CA-125 was elevated. There is at least one other case report in the literature of a pediatric patient with an elevated CA-125, found to have a benign ovarian torsion1. In adults, elevated CA-125 is associated with ovarian cancer along with other intra-abdominal pathology including infectious etiologies. A retrospective study of pediatric ovarian neoplasms found that elevated alpha-fetoprotein and CA-125 were associated with malignant tumors2. The association of elevated CA-125 and benign intra-abdominal pathologies in the pediatrics populations demonstrates the limited utility of tumor markers the work-up of a potential ovarian neoplasm.

2  
Bryan Jepson  
Stevens Johnson syndrome in a patient with IgA deficiency; a unique clinical presentation
Stevens Johnson syndrome, SJS, is a severe mucocutaneous reaction featuring necrosis and epidermal detachment that is often triggered by medications and some infections. This case report describes a 14-year-old female with IgA deficiency who presented with oral ulcerations and dysuria. Her symptoms began 2 weeks prior with fever, headache, and cough with productive blood-streaked sputum. Oseltamivir was prescribed given her recent exposure to a confirmed case of influenza. Despite initial symptom improvement, her fever returned and she developed throat pain. Her primary physician then prescribed amoxicillin given her IgA deficiency and history of developing pneumonia following illness. During admission she developed additional crops of oral mucosa ulcerations, ocular pruritus with conjunctival injection, vaginal and perirectal mucosal ulcerations, and polyarticular joint pain. This case details a rare trigger (oseltamivir) of SJS and provides an opportunity to consider SJS in the setting of IgA deficiency. A review of the approach to patients suspected of SJS including diagnosis, most common etiologies, and management considerations will be discussed.

3  
Kathryn Howell  
Dr. Jennifer Pratt  
A Complicated Case of Methicillin-Sensitive Staphylococcus aureus Pneumonia in a 5-week-old Term Infant.
The risk of hospitalization for community-acquired pneumonia (CAP) is highest in children less than two years old. The most common causes of CAP in children aged 3 weeks to 3 months are Streptococcus pneumoniae and Chlamydia trachomatis. Staphylococcus aureus is less commonly pathogenic. Presentation: Our patient was a previously healthy, 5-week-old term male who presented with a one day history of increased work of breathing, tactile fevers and decreased oral intake. Clinical Course: On admission, vital signs were significant for fever of 39.6, slightly elevated respiratory rate, subcostal and intercostal retractions, nasal flaring, air movement equal bilaterally with coarse crackles auscultated at the bases, right greater than left. He underwent a full sepsis evaluation, however initial blood culture was unable to be obtained after multiple attempts. Labs were as follows: WBC 30.4 k/uL, CRP 12.80mg/dL (normal 0-0.3), WBC-CSF 163/uL, RBC-CSF 14750/uL, CSF-Gram smear: 3 WBC’s, no organisms seen. Chest x-ray was obtained, which showed mild patchy airspace disease in the right lower lobe with concern for pneumonic process. The patient was placed on high flow supplemental oxygen support and started on broad-spectrum antibiotic coverage with ampicillin and cefotaxime due to concern for sepsis. On hospital day (HD) 2, vancomycin was added due to interval elevation of inflammatory markers, ongoing fever and respiratory distress. He was also noted to have intermittent clonus and abdominal distention. On HD 3 and 4 the patient was improving clinically and had downtrending inflammatory markers. Blood and spinal fluid cultures showed no growth, urine was growing 1000 col/ml methicillin sensitive staph aureus. On HD 5 he clinically deteriorated with increased work of breathing, decreased oral intake, and an increased WBC. Chest x-ray showed moderate pleural effusion, volume loss and infiltrate throughout the right lung. The patient
was transferred to the PICU where chest tube placement was unsuccessful due to complex fluid collection demonstrated on ultrasound. A mini thoracotomy with decortication and chest tube placement was performed. Pleural fluid grew methicillin sensitive staph aureus. Subsequent complications included: medial pneumothorax, acute pulmonary hemorrhage and tracheobronchitis. After this complicated hospital course the patient recovered and was discharged home.

Conclusion: Our patient is an example of a complicated pneumonia that developed in spite of appropriate antibiotic treatment. Recent studies have shown the rate of pneumonia hospitalizations complicated by empyema began to increase in the 1990’s and has continued to increase since the introduction of the 7-valent pneumococcal vaccine. Particularly the rate of empyema from staphylococcal pneumonia has increased four fold in children under two years of age, while the rate of pneumococcal and streptococcal empyema has remained stable.

### Ondansetron Promotes Expression of Sudden Cardiac Arrest in a Child with Long QT Syndrome

#### Introduction

Ondansetron use for control of gastrointestinal symptoms in the pediatric population has drastically increased in the last decade (Ann Emerg Med. 2014). Prolongation of the QT interval is a well-known side effect of ondansetron therapy. Expression of Torsades de Pointes in association with ondansetron induced prolongation of the QTc has previously not been reported in a pediatric patients with the clinical LQT syndrome.

#### Case Report

An 8 year old boy had a history of neonatal intermittent complete atrioventricular block and underwent dual chamber epicardial pacemaker implantation for a clinical diagnosis of long QT syndrome in the neonatal period. He presented to the hospital after cardiac arrest with pulseless electrical alternans eight years later, while being treated with ondansetron for gastroenteritis associated vomiting. His most recent ECG prior to the arrest in April 2014 showed a QTc of 520 msec and abnormal T waves throughout the precordial leads while being atrially paced. Emergency Medical Services had arrived within five minutes of the witnessed cardiac arrest and he was resuscitated with continued CPR, intubation and multiple rounds of resuscitative medications and fluids, after which he was admitted to the ICU for further resuscitation with GCS of 3. A 12 lead ECG revealed ventricular pacing and capture at 90 beats/minute. Despite maximal resuscitative efforts, the patient was pronounced dead due to anoxic brain injury leading to brain death one day later.

#### Discussion

To the best of our knowledge this is the first case report of a cardiac arrest and death in a child with LQT syndrome in association with ondansetron therapy. We recommend that providers should maintain a high level of suspicion and respect for QTc prolonging medications, such as ondansetron, given the associated risk of Torsades de Pointes and sudden death.

### Length of Stay of Pediatric Head Injuries in a General Emergency Department: To Scan or Not to Scan?

**BACKGROUND**

Decreasing Length of Stay (LOS) in the Emergency Department (ED) has shown to increase patient satisfaction. Prior to recent knowledge of radiation exposure and risk of malignancy, the ED commonly performed head CT (HCT) on children with a head injury versus observing them in order for a rapid and safe discharge. Clinical observation of neurological status has been considered an alternative to HCT. While studies exist comparing the efficacy of HCT versus clinical observation, there are
few studies that compare the LOS of either modality. OBJECTIVE: The purpose was to determine the LOS for pediatric patients who presented with a head injury. We hypothesized that children undergoing a HCT would have shorter LOS as compared to those who did not receive a HCT. We also applied the PECARN Head Injury guidelines to classify children into high, intermediate, and low risk groups. METHODS: This retrospective study included 666 patients between the ages of 0 to 18 years old who were evaluated at a community ED between January 2012 to June 2014. From the EMR, we determined the patient’s ED LOS (time of triage to time of discharge), pertinent time intervals, HCT results, disposition, and clinically important traumatic brain injury (CiTBI) status. RESULTS: Out of 666 patients, 237 received a HCT and 429 patients did not receive a HCT. The mean LOS of patients with a HCT was 156.16 minutes compared to 88.36 minutes for patients without a HCT. For all patients discharged to home, neither group returned to the ED with a CiTBI nor were there any deaths. DISCUSSION: Our data demonstrates that children who do not undergo a HCT have a shorter LOS by almost 70 minutes. Several factors played a role in increasing the LOS for the HCT group: Time to order a HCT; Time to HCT completion; Time to Radiology read; and Time to discharge. Our data also demonstrated that children managed without a HCT in the intermediate and low risk groups did not return to the ED for CiTBI. LIMITATIONS As a retrospective study, we could not ascertain selection bias. In addition, children may have been lost to follow-up. REFLECTIONS Children who did not undergo a HCT had a LOS that was 1.77 shorter compared to the HCT group. Increase LOS in patients receiving HCT may further justify decreasing the use of HCT. Finally, children observed or discharged home after HCT did not return to the ED nor were they later found to have a CiTBI. Therefore, observation may be a safe and time effective alternative to HCT for certain head injuries.

6 MS R/QI M Earth Hasassri Croix Fossum, Kiri Sunde, Amie Jones, MD Student-Initiated, Specialty-Specific Selective as a Tool for Preclinical Medical Student Career Exploration

Background: Medical students have acknowledged and advocated for opportunities to explore various specialties earlier in their medical education. However, few studies have reported the best approach to introduce medical students to different fields during their preclinical years. Aim: In an effort to offer early exposure to Pediatrics as well as to equip students with basic clinical skills that will enhance their clinical clerkship experience, we developed a preclinical specialty-specific selective in Pediatrics. Methods: At Mayo Medical School, for five consecutive years the Pediatric Interest Group student leadership team has created a peer-designed, student-led, weeklong group elective (“selective”) experience consisting of clinical skills workshops, faculty and resident mentoring sessions, and clinical shadowing experiences based on a student needs assessment. Students were surveyed to determine whether the specialty-specific selective changed their level of interest in this specialty. Students were asked to rate each component of the selective using a 10-point Likert scale. Analyses were conducted to evaluate the impact of this experience on student interest in Pediatrics. Results: Each year, more than 25% of first- and second-year medical students participate in the selective. A total of 121 medical students have participated in the selective from 2010 to 2014. During the last session, there was a 74% survey response rate from the 27 participating students. The self-reported interest in Pediatrics increased significantly after the selective (mean difference: 1.35, p < 0.0014).
Experiences where medical students had a chance to interact with faculty or patients were rated more positively than lecture-based components of the selective (mean difference: 1.14, p < 0.0001). The majority of students who completed the selective agreed that this experience heightened their interests and expanded their knowledge about Pediatrics. Conclusions: Our preclinical Pediatrics Selective serves as a model of an effective modality providing early exposure to a specific specialty. Active engagement was shown to be superior to the more passive learning methods. Future selectives should be designed with opportunities for active interaction in mind. Students found the group selective beneficial to their learning experience and recommend continuing to offer it in the future.

| 7 | M. Earth Hasassri  
Eric Jackson,  
Husam Ghawi,  
Chung-Il Wi, Mark Bartlett, Gerald Volcheck,  
Christopher Moir,  
Young J. Juhn | Active asthma is associated with increased risk of appendicitis in children: A population-based case-control study  
Background: Asthma increases the risk of respiratory tract infections and we recently reported non-respiratory infections such as E. coli bacteremia from genitourinary tract infections. While there are anatomic parallels in the mucosal barriers present in the gastrointestinal, genitourinary, and respiratory tracts, little is known about whether asthma is associated with an increased risk of appendicitis. Objective: To determine whether asthma is associated with an increased risk of appendicitis in children. Design/Methods: This study was designed as a population-based case-control study. We identified all children (age ≤ 18 years) with appendicitis in Olmsted County, MN between 2006 and 2012. Controls were 1:1 matched with identified cases for age, gender, registration year, and case index date from the same population. Asthma status prior to index date was ascertained using predefined criteria. Active asthma was defined by the presence of asthma symptoms, asthma-related medication use, clinic visits, ED, or hospitalization within one year prior to index date. Inactive asthma was defined as those without such asthma-related episodes within one year prior to index date. A conditional logistic regression model was used to calculate odds ratios (OR) with 95% confidence intervals (CI). Results: A total of 310 children with a diagnosis of appendicitis were identified. Among the 310 cases, 76 (24.5%) had a history of asthma compared to 69 (22.3%) of controls (OR=1.15; 95%CI 0.78-1.69; p=0.49). Active asthma was associated with a higher risk of appendicitis than inactive asthma (OR=2.34; 95%CI 1.19-4.60; p=0.013) and no asthma (OR=1.88; 95%CI 1.07-3.27; p=0.027). Tobacco smoke exposure at index date was independently associated with an increased risk of appendicitis (OR=1.57; 95%CI 0.98-2.52; p=0.06). However, when we controlled for this independent variable, children who had active asthma were still much more likely to have appendicitis compared to those without asthma (aOR=1.83; 95%CI 1.04-3.23; p=0.037). Conclusions: Children with active asthma are at an increased risk of appendicitis. Physicians should consider this possibility when evaluating children with abdominal pain. The impact of asthma on the risk of infection may go beyond the airways. Further studies of this preliminary finding and possible mechanisms for this association warrant further investigation. |
|   | Ashish Shah, MD | Phytophotodermatitis  
An otherwise healthy 15-year-old girl presented to the emergency department with a rash on her lower extremities and back after returning from a trip from Mexico. Physical exam revealed a 6cm long linear scratch in the medial aspect of the left thigh. Tan colored markings were also observed on the postero-lateral aspect of her legs. Similar landmarks were also seen on her back, which stopped at the belt-line. Hyper pigmentation was also observed on the dorsal surface of her hands. History revealed that the patient had attempted to lighten her hair using lemon juice while on her spring break trip. A diagnosis of phytophotodermatitis was made. |
|   | Manu Madhok MD |   |

|   | Heather Phillips, MD | Vitamin K Refusal: Another Dangerous Trend  
A 4-week-old girl presented from clinic with bradycardia and seizure. She was the product of an uncomplicated pregnancy and delivery. Her parents had declined immunization and vitamin K. Over the 3-4 days prior to presentation, she had been lethargic, with poor feeding and frequent emesis. At a midwife visit for routine care, she was obtunded, bradycardic, and seizing, and she was transferred to our ED. Her initial exam was significant for tense, bulging fontanelle and hypertonic extremities. She was hyponatremic and coagulopathic. A head CT demonstrated a large left-sided intracranial hemorrhage with midline shift and uncal herniation. She underwent emergent hemicraniotomy, evacuation of the ICH and a large subgaleal hematoma, and a left temporal lobectomy. She required large amounts of blood products and pressors, but she eventually stabilized and was ultimately discharged home pending planned cranioplasty. Further evaluation confirmed that ICH was due to vitamin K deficiency. At discharge, her parents were still considering whether they would immunize her. Vitamin K deficiency bleeding (VKDB) is divided into early (first 24 hours of life), classical (days 2-7 of life), and late (2-12 weeks) forms. Early VKDB is seen primarily in infants whose mothers were taking drugs that inhibit vitamin K; classical and late forms are due to inadequate vitamin K intake and are seen almost exclusively in infants who are breastfed and whose parents refused vitamin K at birth (breast milk does not contain adequate amounts of vitamin K). Late VKDB is the rarest and most severe form; ICH occurs in 50% of cases, with a 20% mortality rate.  
The AAP recommends that all infants receive a single dose (0.5-1 mg) of intramuscular vitamin K at birth, which has been shown to prevent all forms of VKDB and has virtually eliminated the late form. Oral vitamin K provides some benefit but not as much as parenteral. Recently there has been a rise in reports of parents declining this intervention that seems to parallel the rise in nonimmunization. Parents offer many reasons for refusal, including concern about causing pain, desire to only provide “natural” interventions, belief that it is unnecessary, and belief that vitamin K is associated with increased incidence of childhood leukemia (which has been found to be false). Unfortunately, increased refusal rates have been followed by increasing rates of VKDB, especially the late form. VKDB is almost entirely preventable with a single, virtually risk-free intervention at birth. Pediatricians need to be aware of the dangers of vitamin K refusal and the reasons parents give for this decision. Additionally, vitamin K refusal is associated with later vaccine refusal and may provide an early opportunity to discuss the benefits of other childhood preventive services. |
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<th>10 TRV</th>
<th>Junaid Niazi, MD</th>
<th>Early disseminated Lyme disease in a neonate</th>
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<td>Lyme disease is most commonly reported in boys aged 5 to 9 years as they are most likely to engage in activities with high risk of tick exposure. Neonates are considered not to be at risk as they are not ambulatory. There are rare case reports of congenital borreliosis noted in the neonatal period; even rarer are reports of neonatal Lyme disease. CASE: A six-week old, previously healthy term girl presented with five days of migratory rash and fevers. The rash began on the abdomen and spread to the trunk and extremities. On admission, her vital signs were normal. She had numerous erythematous patches with central clearing ranging in size from 1 to 7 cm covering her trunk and extremities. She otherwise appeared well without lymphadenopathy, joint involvement, or organomegaly. Admission labs were remarkable for thrombocytosis of 658,000/µL, elevated C-reactive protein of 10.1 mg/dL, and elevated direct bilirubin of 1.5 mg/dL. Her white blood cell count, hemoglobin, alanine aminotransferase, albumin, urinalysis, ferritin, cerebrospinal fluid studies were normal and blood, urine, and cerebrospinal fluid cultures were negative. Mycoplasma serology was negative. B. burgdorferi IgM was positive at 1.29 with 3 out 3 positive B. burgdorferi IgM bands on western blot testing confirming the diagnosis of Lyme disease. EKG revealed normal sinus rhythm without evidence of heart block. Prior to the diagnosis, the patient had been started empirically on intravenous cefotaxime with subsequent improvement of her labs. She had a fever to 38.2 degrees Celsius on hospital day 2 but no further fevers. The rash resolved by hospital day 3. After diagnosis, she was transitioned to oral amoxicillin and discharged to complete a 21-day course of antibiotics. She recovered completely. The patient presented during the summer but never had any outdoor exposure. She and her parents had remained mostly indoors since her birth. They lived in a suburb of the Twin Cities and denied activities associated with tick exposure; however, they did have an outdoor pet dog that was in direct contact with the patient. We hypothesize that the dog carried a tick into the home. DISCUSSION: This case demonstrates that neonates, thought not to be at risk for Lyme disease, can develop early disseminated Lyme disease. B. burgdorferi serology was not initially sent despite suspicion of erythema migrans because Lyme disease was considered highly improbable given her age. Fortunately, the empiric therapy on which she was placed covered Lyme disease and thus treatment was not delayed. Lyme disease should be considered in patients of all ages, including neonates, presenting with migratory rash and fever.</td>
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<td>11 TRV</td>
<td>Patricia Hickey, MD</td>
<td>Streptococcus pyogenes pharyngitis and pyomyositis</td>
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<td>Pyomyositis, purulent infection of the skeletal muscle, is usually considered a tropical disease. In temperate climates, it is most commonly recognized in immunocompromised individuals but is increasingly described in immunocompetent individuals. Staphylococcus aureus is the most common organism cultured in both settings and hematogenous spread is the proposed mechanism of infection. Symptoms in the early stage of the disease consist of muscle pain and swelling which are nonspecific especially in the setting of known trauma. MRI allows for most accurate diagnosis. Most cases are not recognized until later stages of the disease when higher fever occurs and at this stage often an abscess has formed and drainage is required. The patient is a 14 year old girl with no significant medical history who was referred from primary care clinic to our emergency department with two weeks of worsening leg pain following blunt trauma during lacrosse practice. The day following her injury she had difficulty bearing weight because of pain and was evaluated in an outside emergency department where she had normal x-rays and ultrasound. She was sent home with</td>
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crutches and followed up with orthopedics one week later. At that time she had significant swelling and was given an elastic bandage for compression. Pain subsequently worsened and by the time of presentation she was unable to sleep. At the time of admission she was febrile. Exam revealed swelling of the right thigh with induration with no visible erythema or bruising over the majority of the anterior thigh. The leg was extremely tender to palpation and she could not flex at the knee. X-ray of her right femur was normal. White blood count and CRP were significantly elevated. Differential diagnosis included infectious, oncologic, and rheumatologic causes. She was not started on antibiotics but throat swab was obtained as her sister had been treated for streptococcal pharyngitis the previous week. Rapid group A streptococcal antigen testing was positive. The day after admission, MRI showed extensive myositis of the quadriceps muscle group with deep fluid collection and adjacent cellulitis. Ultrasound-guided drainage was performed and IV clindamycin was initiated. Abscess culture grew group A streptococcus. IV penicillin was added at the recommendation of infectious disease consultants. After significant improvement she was discharged on cefazolin and ultimately completed two weeks of IV antibiotics and one week of oral antibiotics with resolution of symptoms. This case demonstrates that pyomyositis should be considered in the differential diagnosis of acute pain especially in the setting of fever and elevated inflammatory markers. History of trauma or other focus of infection should not rule out the diagnosis of pyomyositis and in fact may increase the likelihood of this disease.

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<th>12 TRV</th>
<th>Beth Thilen, MD</th>
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| **Pneumococcus gets a leg up on unvaccinated children** | Immunization has reduced the burden of many childhood diseases, but pneumococcal disease often receives less attention in discussions of vaccine-preventable illnesses. Pneumococcus remains a common pathogen and has the potential to cause numerous clinical syndromes, particularly in unvaccinated or incompletely vaccinated hosts. An 8-month-old previously healthy but incompletely immunized male infant was brought to the emergency department by his mother with a painful, swollen left leg. Three weeks prior to this presentation, he had a self-limited upper respiratory infection. Two weeks prior to presentation, he began favoring his left leg and refusing to bear weight. He had a history of a minor twisting injury to the leg, but this was not thought to be severe enough to account for the presenting symptoms. Radiographs of the entire leg were obtained and normal. He continued to limp, and on the day prior to presentation developed progressive swelling of the ankle, which prompted family to seek further evaluation. At this time, he was afebrile and clinically well appearing. Initial labs were notable for a neutrophil-predominant leukocytosis, thrombocytosis and elevated inflammatory markers. Repeat radiographs at this time revealed areas of lucency and sclerosis in the distal tibia with periosteal reaction; MRI confirmed an extensive inflammatory process in the distal tibia likely extending into the ankle joint. Surgical debridement was performed to determine the etiology of the lesion. Operative exam confirmed diagnosis of osteomyelitis with adjacent soft tissue abscess and septic arthritis of the ankle. Cultures grew pan-sensitive Streptococcus pneumoniae serotype 19F, a serotype included in both the PCV7 and PCV13 vaccines. The patient was started on intravenous antibiotics and exhibited rapid recovery. Streptococcus pneumoniae is the causative agent of a spectrum of clinical disease ranging from mild upper respiratory tract infections, such as acute otitis media and sinusitis, to pneumonia and invasive pneumococcal disease (IPD). Invasive
Pneumococcal disease encompasses multiple clinical syndromes, the most common of which are bacteremia and meningitis but which can include osteoarticular infections, endocarditis, peritonitis and hemolytic uremic syndrome. While the incidence of IPD has declined significantly in the U.S. following the introduction of PCV7 in 2000 and PCV13 in 2010, cases do still occur, most commonly in unimmunized individuals or due to serotypes not included in the current vaccines. Although the causative organism in this case did not exhibit significant antibiotic resistance, surveillance data reveal increasing resistance among pneumococci to multiple classes of antibiotics, including the commonly used beta-lactams and macrolides. Therefore, treating these infections when they do occur may become increasingly difficult.

**Petrous Apicitis: Acute Otitis Media—The Tip of an Iceberg**

This case discusses petrous apicitis with internal carotid arteritis, a rare, but serious, complication of acute otitis media. While the rates of acute otitis media have declined following the introduction of Streptococcus pneumoniae and Hemophilus influenzae b immunizations, acute otitis media remains one of the leading causes of primary care visits for infants under age two years in the United States. In fact, although rates of acute otitis media have decreased, it is still unclear if the rates of acute mastoiditis have subsequently decreased. Therefore, pediatricians must remain vigilant for intracranial and extracranial complications of acute otitis media, particularly in children aged younger than two years. Case: A 22-month-old fully immunized, previously healthy boy was admitted to the hospital with 10 days of fevers, otorrhea, decreased oral intake, and fatigue. One week prior to admission, he presented to his outpatient provider with fever and left ear pain. His provider diagnosed left acute otitis media and started treatment with oral antibiotics. Then, one day prior to admission, he presented again to his primary provider due to persisting fevers, decreased oral intake, and new otorrhea. His primary provider transitioned to a different oral antibiotic. His clinical condition continued to worsen, so his mother brought him to the emergency department where he was admitted for intravenous antibiotics and fluid resuscitation. His admission exam was significant for a temperature of 38.9 degrees Celsius, left otorrhea, mild periorbital edema, subtle left ptosis, and moderate dehydration. He did not have any facial or mastoid tenderness. Laboratory data showed leukocytosis and markedly elevated inflammatory markers. CT of the head was obtained which was concerning for petrous apicitis, internal carotid artery narrowing, cavernous sinus inflammation, middle ear effusions, mastoiditis, and pansinusitis. MRI confirmed these findings in addition to a left intracranal orbital abscess and acute left pontine cerebrovascular accident. His antibiotics were broadened, and he was started on anticoagulation. He had tympanostomy tubes placed. Cultures of the middle ear fluid grew a Corynebacterium subspecies. He clinically improved without any further intervention. Follow-up MRI results showed interval improvement in the inflammation surrounding the internal carotid artery and the left orbital abscess.

Discussion: Sequelae of acute otitis media can be severe and life threatening. This case illustrates an example of extensive underlying intracranial infection in a child diagnosed with acute otitis media within 10 days of symptom onset. All pediatricians must maintain an index of suspicion for serious complications when a patient is not improving with oral antibiotics or has other concerning findings on exam warranting further imaging investigation.
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<th>Refusal of Intramuscular Vitamin K and Complications Related to Alpha-1 Antitrypsin Deficiency</th>
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<td>Infants not given intramuscular (IM) vitamin K at birth are 81 times more likely to develop late vitamin K deficiency and bleeding from two weeks to six months of age. Compounding risk factors include: breastfeeding, celiac disease, cystic fibrosis, and liver diseases, such as biliary atresia and alpha-1 antitrypsin deficiency. This report demonstrates the consequence of not providing appropriate vitamin K supplementation in the perinatal period. Case: A three-week old female presented for outpatient care with bloody emesis and dark stools for one day. She was a full-term infant born via uncomplicated vaginal delivery at a local birthing center, staffed by midwives, and was discharged home at four hours of age. She had two siblings with alpha-1 antitrypsin deficiency, an autosomal recessive single gene mutation that meant she had a ¼ chance of also being affected by the same inheritance. Still, her parents refused hepatitis B vaccination, erythromycin eye ointment, and vitamin K injection. Alternatively, she was given 500 mcg of oral vitamin K at birth, at two days, one week, and three weeks of age. At presentation, a heel stick complete blood count (CBC) was obtained and was normal. The following day, she returned because of continuous bleeding from the puncture site despite pressure and bandages. She was transferred to the emergency department and labs were significant for International normalized ratio (INR) of greater than 10 and Partial thromboplastin time (PTT) of 123. She was given intravenous vitamin K replacement and sealant gauze was applied to successfully stop the bleeding. She was admitted for close monitoring of laboratory levels and bleeding. Her INR and PTT levels normalized the day after admission, but additional labs were significant for a total bilirubin of 6.7 and a direct bilirubin of 3.8. The pediatric gastroenterology service was consulted and recommended an abdominal ultrasound, which was normal, and oral ursodiol replacement twice daily. At five weeks of age, she was seen in follow-up and continued to have elevated bilirubin, alkaline phosphatase, and liver transaminase levels. Further testing revealed a zz phenotype for alpha-1 antitrypsin deficiency, which is the form associated with liver dysfunction. Discussion: There is a substantial responsibility as neonatal care providers to take the time to explain the risks and complications of not receiving appropriate vitamin K at birth. Alternative formulations to the IM injection, such as oral supplementation, have not been proven to prevent hemorrhagic diseases of the newborn. Because liver diseases further increase one’s risk of having late bleeding from vitamin K deficiency, and these conditions are often unknown at birth, it is necessary for parents to be well informed of the importance of this simple intervention.</td>
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<th>Multiple polymicrobial brain abscesses in a child with a recent dental procedure</th>
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<td>The clinical presentation of brain abscess in infants and children may be non-specific, with the classic triad of fever, headache, and focal neurological deficits seen in only 20-30% of patients. (1, 2) Streptococci species are the predominating organisms in brain abscesses, causing up to 50-70% of cases in children (1, 2), with the Streptococcus milleri group the most common. (2, 3) Case: A 2 year old female presented with decreased energy, refusal to walk, and vomiting. Two days prior, she had fever and twitching movements. Additional history revealed dental extractions one month prior. Vital signs were normal. Physical exam was significant for mild drowsiness, but no neurologic deficits. Labs demonstrated WBC count 17.4 10^9 cells/L with 72% neutrophils and elevated CRP at 30.5 mg/L (range 0.0- 8.0 mg/L).</td>
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CXR and UA were unremarkable. To evaluate for retropharyngeal abscess, CT Neck was obtained, which unexpectedly showed left temporal and right frontal lobe ring-enhancing lesions. Subsequent MRI confirmed ring-enhancing lesions in the right frontal, left temporal, and left parietal lobes, compatible with abscesses, and significant associated edema resulting in mass effect, midline shift, and left-sided uncal herniation. The patient was started on Vancomycin, Ceftriaxone, and Metronidazole, and Levetiracetam for seizure prophylaxis. Neurosurgery promptly performed stealth-guided needle evacuation of the abscesses, with purulent, foul-smelling fluid sent for aerobic and anaerobic cultures. Abscess cultures isolated Streptococcus intermedius, Aggregatibacter aphrophilus, Eikenella corrodens, Fusobacterium nucleatum, and Prevotella species, all susceptible to Ceftriaxone. Blood cultures remained negative. After 15 days of hospitalization, the patient was discharged with IV Metronidazole and Ceftriaxone via PICC, as well as Levetiracetam, all for six weeks. She completed her antibiotic therapy and clinically improved, and repeat Head CT and MRI showed complete resolution of all three fluid collections.

Discussion: This case illustrates the high index of suspicion required for diagnosis of pediatric brain abscess. A predisposing condition is identified in 70-86% of children. (1, 2) The most common conditions are congenital heart disease (1, 3) and contiguous source of infection, such as otic, sinus, or odontogenic. (1, 2, 4) The latter was suspected to be the source in our patient. The most commonly isolated organisms from brain abscesses in children are of the Streptococcus milleri group, which includes S. anginosus, S. constellatus, and S. intermedius. (2, 5) Of these, S. intermedius is the most likely to form abscesses. (5, 6) Aggregatibacter (Haemophilus) aphrophilus is a fastidious, Gram-negative facultative anaerobe found in dental plaque. It is known to cause HACEK endocarditis, and has more recently been recognized as a cause of osteomyelitis and abscesses of the brain and liver. (7) As was seen in our patient, many abscesses are polymicrobial, with more than one pathogen isolated in 23-39% of cases. (1, 2, 4)

The Unimmunized Child: Re-emergence of Vaccine Preventable Diseases
Immunization has been one of the most effective interventions against illnesses in the history of medicine. With increasing number of parents refusing vaccines on personal and religious grounds, there is a threat for the re-emergence of vaccine preventable diseases. Among other isolated cases of pertussis and diphtheria in the community, the recent measles outbreak in California was a huge reminder of this concern. Streptococcal pneumoniae infections were known to be the most common cause of vaccine preventable deaths in children < 5 years of age, until the introduction of the PCV7 and later the PCV13 vaccine. It typically causes mucosal infections like otitis media and sinusitis or invasive infections like bacteremia and pneumonia. We present here, a case of a previously healthy unimmunized child with streptococcal osteomyelitis and septic arthritis.

An Unusual Case of Suspected Head Injury
A previously healthy 2 year old female presented to the Emergency Department with lethargy and recurrent episodes of non bilious non projectile emesis after sustaining a fall while playing at the recreation center. On exam, she was drowsy though easily arousable with GCS of 15. Her abdominal exam revealed a left quadrant mass. Initial labs were remarkable
for a low hemoglobin. In the setting of trauma, given the low hemoglobin and abdominal mass there was a concern for splenic injury and hemorrhage. A CT of the abdomen and pelvis revealed a large mass arising from the left kidney suggestive of Wilms tumor. Wilms tumor is the most common primary renal malignancy in children and constitutes about 5% of all Pediatric cancers. It is typically described as an asymptomatic abdominal mass noted by a caregiver, however may have vague and atypical presentations. Pediatric ER physicians are often the first point of medical contact for children with malignancy and play an important role in early diagnosis of pediatric cancers.

**Pediatric Trauma Experience after Transition to a Free Standing Children's Hospital**

In 2011, the University of Minnesota Masonic Children’s Hospital (UMMCH), previously located within the University Medical Center on the East Bank of the Mississippi River, transitioned to a freestanding children’s hospital on the West Bank campus 1.7 miles across the river. The new location previously lacked dedicated pediatrics services. The pediatric emergency department also downgraded from a level II adult and pediatric trauma center to a level III pediatric trauma center. To our knowledge, no studies have been published on the impact of emergency department relocation on trauma volume and severity. Given the importance of trauma census, severity, and trauma center designation at major University teaching hospitals, the purpose of this study is to determine the impact of a new geographic location and lower trauma designation on trauma visits and severity of trauma acuity presenting at the University of Minnesota Masonic Children’s Emergency Department. Methods: A retrospective analysis of the volume of pediatric trauma visits (age <15 years old) and the index of severity score (ISS) presenting to the emergency department from 2007-2014 was performed. Pre-move years were defined as 2007-April 2011 and post-move years defined as May 2011-2014. Pre- and post-move trauma census and ISS scores by year were compared to evaluate the change in total average volume and severity of trauma in pediatrics visits after transitioning to a freestanding children’s hospital. Results: Pediatric trauma volume: 2007-2011 mean per year: 73.75; 2011-2014 mean per year: 188.33. Index of severity score: Mean ISS score 2007-11: 5.51 (n=295); 2011-14: 5.78 (n=565). Analysis of ordinal measures: Mean 2007-11: 3.98 (SE 0.140, CI [3.78-4.18]); 2011-14: 3.97 (SE 0.077, CI [3.82-4.12]), p=0.9292. Conclusion: Our study demonstrates that transitioning to a freestanding children’s hospital and downgrading to a level III trauma center did not significantly affect the severity of trauma presenting to the UMMCH emergency department. In addition, trauma census nearly doubled within two years post-move. Factors that may have contributed to increased volume of pediatric trauma include parental preference for facilities with specialized pediatric care and ease of accessibility of ED location.

**Quality Improvement of the Admission Process at the University of Minnesota Masonic Children’s Hospital**

Background: The University of Minnesota Masonic Children’s Hospital serves a large population of patients within the Upper Midwest and averages 6,700 inpatient stays per year. As a teaching hospital, creating an efficient and streamlined admission process incorporating outpatient clinics, inpatient procedures, and resident physicians (housestaff) can be challenging.
Description of Work: In order to improve the admission process at Masonic Children’s Hospital we initiated a quality improvement protocol in order to isolate “problem admissions”. Problem admissions were considered to be any admission in which the housestaff was unaware of the admission prior to the patient arriving on the hospital floor. Our team collected baseline data regarding the admissions to medical-surgical floor, information regarding the admission process, and a survey of key players’ understanding of the admission process. Our initial evaluation found that in up to 11% of admissions to The University of Minnesota Masonic Children’s Hospital housestaff had no prior knowledge of the patient prior to the patient's arrival to the floor. As well, it was found that there was poor understanding among outpatient physicians regarding the admission process. Changes were then implemented with the intent to decrease and better track problem admissions, including direct paging of the housestaff by patient placement following any bed request, tracking all of patient placement pages in a database, and educating department chairs and housestaff on the appropriate admission process. The absolute number of problem admissions decreased by 20% following these changes. Quality improvement regarding this issue is ongoing. Reflections: Our research has demonstrated the difficulty in maintaining a clear, cohesive process within a hospital treating a diverse number of patients and conditions. The changes we found following modification of the existing admission system demonstrated the importance of a teaching hospital implementing a consistent admission process in order to best serve patients while also fully utilizing and incorporating housestaff.

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Jennifer Berger, MD
Karen Sheehan, MD; Michael B. Pitt, MD

Compliance of Advertisement for Children in Leading Parenting Magazines with American Academy of Pediatrics Recommendations over Five Years

Frequent exposure to health-related messages in advertisements can impact an individual’s health decisions. The American Academy of Pediatrics (AAP) issues consensus statements on many issues facing children, several of which speak against products or actions often advertised in the media (i.e. infant walkers, unsafe sleep practices). Purpose: Determine the frequency of advertisements for children’s products which violate AAP recommendations in the top two parenting magazines, and compare these offenses over 5 years. Methods: All advertisements from the top two parenting magazines based on circulation were reviewed for 2009 and 2014. Ads for products intended for use by children were included. Any ad with images or products which went against an AAP recommendation (from AAP Policy Statements, Clinical Practice Guidelines, Where We Stand Statements and their textbook Injury Prevention and Control for Children and Youth were reviewed) was deemed a violation, and was categorized according to the statement it violated. Violation totals and types for each year were compared using Fischer’s exact tests. Results: 3,218 advertisements were reviewed (1,845 in 2009; 1,373 in 2014) of which 2,047 (63.6%) were for products for children. Of these, 337 (16.5%) contained one or more violations of AAP recommendations. Recommendation violation categories ranked by percent share of violations from most to least: non-FDA approved medical treatments, age-defined choking hazards, vitamins/supplements (excluding vitamin D), cold medicine, infant formula, nutrition (based on juice volume per serving), oral care, screen time, sleep safety, fall risk, unsafe toys, and water safety. There was no significant difference in the total percentage of violations between 2009 and 2014 (215 [17.7%] vs. 122 [14.6%]; p= 0.069), however several violation categories showed significant (P<0.05) decreases over the five years including nutrition, oral care, screen time, and sleep.
safety. Conclusion: Nearly 1 in 6 advertisements for children’s products in the top two parenting magazines contain images or products which violate AAP recommendations. Despite a difference in the share of several violation types, there was no significant change in the overall total number of violations over the 5 years. The significant decrease in the violation categories nutrition and oral care are likely due to liberalization of the AAP recommendations regarding juice intake and fluoride toothpaste use. However, the significant decrease in safe sleep violation and screen time categories is may reflect improved awareness of the importance of these topics via recent advocacy campaigns.

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<th>21 TR R/QI</th>
<th>Abby Montague, MD</th>
<th>WeCare: Engaging Pediatric Trainees in Patient Safety and Event Reporting</th>
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<td>Sameer Gupta, MD</td>
<td>Knowledge regarding the frequency and nature of medical errors is necessary to improve patient safety within a hospital. The University of Minnesota Masonic Children’s Hospital (UMMCH) uses “iCare”, an anonymous event reporting system to document and respond to errors. Graduate medical trainees are are the primary physicians interacting with patients at our institution but rarely utilize the iCare event reporting system. Objectives: We aim to increase the monthly incidence of iCare event reports by pediatric trainees at UMMCH by 100% from baseline after 7 months of WeCare intervention. Our secondary aims regarding trainee experience and education are threefold: 1) increase the percent agree (% agree) scores for Safety Climate on UMMCH Safety Attitudes Questionnaire (SAQ) in 7 months; 2) increase our baseline Culture of Safety program rating to above the national average of 4.5 for the fellow and resident ACGME surveys from 2014 to 2015; and 3) increase mean trainee knowledge score on patient safety topics by a measure of 1 on the post-intervention survey.</td>
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<td>Abraham Jacob, MD</td>
<td>Methods: The Safety Attitudes Questionnaire was administered to all trainees to assess baseline safety climate prior to intervention. In September 2014, we included iCare in our hospital orientations. In October 2014, we began the WeCare educational intervention. This includes a monthly electronic flyer on core patient safety concepts followed by a discussion applying these concepts to error reporting and management. At the conclusion of this intervention, the SAQ will be re-administered and annual ACGME survey completed. Results: Baseline data included six event reports by trainees in a six-month period and SAQ score below previously published benchmark goals. In the first five months of our intervention period, thirty-seven events have been reported by our trainees. Discussion: We have observed a statistically significant (p=0.0232) increase in trainee event reporting within five months of WeCare implementation. More data is needed to determine if the increase in reporting is due to our intervention. Impact of the WeCare project will be assessed at the end of the study period and the curriculum will be revised for the 2014-2015 academic year.</td>
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