THE POLHILL REPORT
Dedicated to Lifelong Learning
A Quarterly Newsletter of the UAB Pediatric Emergency Department

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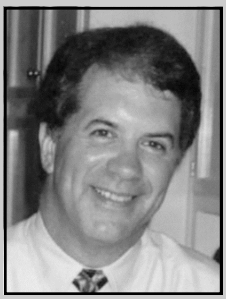

Rud Polhill, MD

Back to Basics...Part 3

You are seeing a 7 yo previously healthy female, who is presenting to your office with fever, vomiting, and abdominal pain. With the exception of a temperature of 101° F and a mildly tender but non-localizing abdominal exam, the rest of your exam is normal. The rapid strep is negative, and the urine dip has 3+ leukocyte esterase, 1+ blood, and + nitrites. Slam dunk, right? Well, yes and no…

Urinary tract infections (UTIs) are common in childhood, affecting approximately 1% of boys and 3-5% of girls, with up to half of these children experiencing at least one recurrence. Annually, there are about 1.5 million ambulatory visits for UTIs in the United States. Treatment has traditionally been directed toward minimizing long term renal sequelae, but some of the procedures that have been considered standard for many years have come into question and, I think, bear reviewing.

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Epidemiology/Risk Factors

Consistently, UTIs are observed in uncircumcised male neonates and females less than 2 years of age, with the highest prevalence found first in uncircumcised boys less than 3 months of age, followed by girls less than 12 months. In the neonatal population alone (< 60 days of age), uncircumcised males have a UTI incidence of 21% compared with 5% for their female and 2.3% for their circumcised counterparts. In uncircumcised patients, several mechanisms can be implicated including heavy peri-urethral colonization by uropathogens and the inability to fully retract the foreskin. Because of this, it is typically recommended that uncircumcised patients be screened for UTI until the age of 12 months, while circumcised males over the age of 6 months have a much lower likelihood of infection.

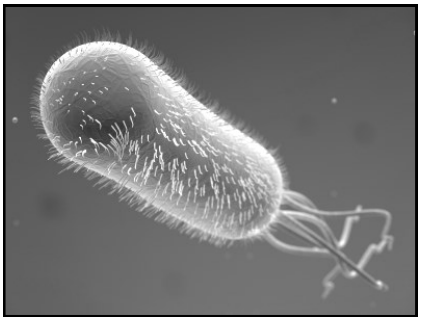
Interestingly, race has a role as a risk factor for UTIs, with Caucasians being twice as likely as African American children. Very specifically, white females under the age of 2 years with a fever of at least 102.2°F have rates of UTI approaching 16%.

Of the behavioral concerns related to UTIs, the only ones that have been possibly implicated in the development of infection are constipation and dysfunctional elimination syndrome, although the latter has been recently questioned. Bubble baths, direction of wiping, urgency-frequency syndrome and nocturnal enuresis are often thought to be risk factors, but none have been proven. Successful treatment of constipation, however, has been shown to reduce the risk of recurrent UTIs.

Anatomic risk factors essentially stem from anything that will obstruct the flow of urine and leads to urinary stasis. They are typically either anatomic or neurologic. The anatomic causes include posterior urethral valves or urethral strictures, while the neurologic causes tend to be congenital or acquired spinal cord issues.

Pathogenesis

Overwhelmingly, *Escherichia coli (E. coli)* is the most commonly found uropathogen, followed by *Klebsiella pneumonia*, *Proteus* spp., and *Enterococcus* spp, with the latter being more common in those with abnormal urinary tracts and/or previous antibiotic treatment for UTI.



E. coli is a gram negative rod and a facultative anaerobe normally found in the intestine, although some strains are pathogenic. They are often motile by means of a flagella. Spread is typically through contaminated food or water, through person-to-person transmission, or contact with contaminated items.

Back to Basics...Part 3, continued on page 10

Journal Search

Clinical Practice Guidelines for Pediatric Appendicitis Evaluation Can Decrease Computed Tomography Utilization While Maintaining Diagnostic Accuracy

Russell, WS, et al. *Pediatric Emergency Care* 2013;29(5):568-573.

We have all become more aware of the potential risks associated with increased radiation exposure in children. Well, at least we know there potentially is a risk. And since I don't think we really know the long term outcomes of radiation exposure on developing brains, it's easier to assume the worst.

Having said that, appendicitis is the most common cause of a surgical abdomen in childhood and, as we all know, children don't read the textbooks. Their presentations are highly variable, and the younger they are, the higher the risk of perforation before the diagnosis is made. Historically, CT has been the test of choice for appendicitis because of its higher sensitivity and specificity over ultrasound, but the concerns for long tern effects has brought that into question. Is there a way to safely, accurately, and reliably diagnose appendicitis in children?

This study implemented a clinical practice guideline that focused on early surgical consultation prior to imaging. They gathered data on CT utilization rates before and after introducing the guideline into their practice. The pre and post groups were similar in terms of age, gender, clinical presentation, and rate of negative appendectomies. **They demonstrated a 42% decrease in CT use for all patients undergoing appendectomy without an increase in the negative appendectomy rate. They also demonstrated a 33% increase in US use after implementation of the guideline, and only one case of delayed diagnosis.** Based on these findings, the authors recommend early surgeon involvement, and using US as the initial imaging modality. Now all we need is more ultrasound techs...

Randomized, Double-Blind, Placebo-Controlled Trial to Determine Whether Steroids Reduce the Incidence and Severity of Nephropathy in Henoch-Schönlein Purpura (HSP)

Dudley, J et al. *Arch Dis Child* 2013;98:756-763.

Steroids or no steroids...the question always comes up. When, if ever, do you give steroids in HSP? In my informal polls, most people will say they give it for persistent abdominal pain. Others say they might give it for extreme joint pain. Still others treat based on the renal involvement. But, do we know if it really helps, especially in the development of nephropathy?

This randomized, controlled trial assigned patients under 18 years of age to one of two groups:

- ◊ Prednisolone 2 mg/kg/day (max 80 mg) for 7 days followed by 1 mg/kg/day (max 40 mg) for 7 days, or
- ◊ Placebo for 14 days.

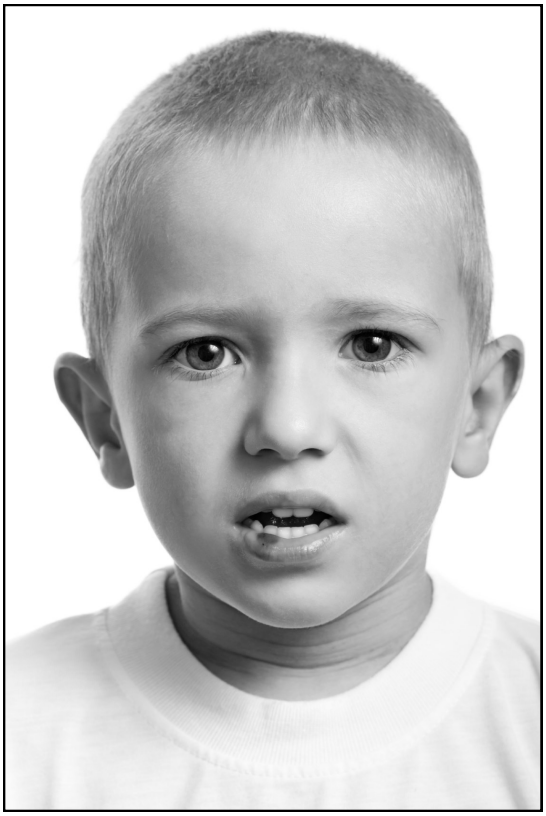
There were three primary outcomes, and the two that had clinical implications were the presence of proteinuria at 12 months (defined as a urine protein:creatinine ratio > 20 mg/mmol), and the need for additional treatment (for hypertension, renal biopsy anomaly, or treatment of renal disease) in the 12 month study period.

Even after adjusting for baseline proteinuria and medications known to affect proteinuria, there was no significant difference between the two groups in terms of urine protein:creatinine ratio at 12 months. There was also no difference in the time needed for additional treatment in the two groups. Long term follow-up was not performed, nor was there any discussion of treatment of abdominal or joint pain, which is often the pressing issue we face in the ED or in the office. Will this change what you do?

Topical Lidocaine to Improve Oral Intake in Children With Painful Infectious Mouth Ulcers: A Blinded, Randomized, Placebo-Controlled Trial

Hopper SM ,et al. *Ann Emerg Med* 2013.

Mouth ulcers and gingivostomatitis are painful and frustrating illnesses and, like bronchiolitis, we are always looking for a way to make it more tolerable. The most common related issue is dehydration from decreased oral intake. Use of viscous lidocaine containing solutions is often considered. I know I shy away from using it, especially in the younger kids, with the concern for excessive oral ingestion and other potential complications. This study looked at the effectiveness of its use.



Children ages 6 months to 8 years who presented with oral ulcers and decreased oral intake were eligible for the study. Children were randomized to receive either lidocaine or placebo (flavored gel), in a weight-based dose. For 1 hour after administration, oral intake was actively encouraged. At the 60 minute mark, the treating physician evaluated the amount of fluid intake, and given the opportunity to give the other study drug (ensuring all study participants had access to the treatment) and/or give oral analgesics such as acetaminophen or ibuprofen. The study period ended at 90 minutes with a review for any potential adverse events, namely signs of aspiration.

Baseline characteristics of the two groups were similar. **They found no significant difference between groups in terms of amount of fluid taken in (8.5 mL/kg in the placebo group vs. 9.3 mL/kg in the lidocaine group).** Does this mean that just the coating of the mouth improves intake, even without anesthetic properties? This supports my practice. I think I'll continue with the Maalox® therapy.

Pediatric Abdominal Radiograph Use, Constipation, and Significant Misdiagnoses

Freedman SB et al. *J Pediatr* 2013.

In primary care settings, half of children with abdominal pain are diagnosed with constipation and, although they lack reliability and have been not recommended in previous studies, abdominal x-rays are performed in 75% of patients seen in pediatric emergency departments with constipation. This study set out to identify the proportion of misdiagnoses in those initially diagnosed with constipation and, secondarily, evaluate if there was an association between those patients and whether or not they underwent abdominal x-rays.

This was a retrospective review of children < 18 years of age with an ICD-10 code consistent with constipation presenting to the pediatric emergency department were eligible. Misdiagnosis was defined as an alternative diagnosis given within 7 days of the visit with all the following:

1. Resulting in hospitalization or outpatient procedure
2. Required a surgical or radiographic procedure
3. Likely related to the index visit, and
4. Not identified at the index visit.

Of the 3685 eligible visits, 46% had an abdominal x-ray. A misdiagnosis was identified in 20 children with the following:

- 7 with acute/perforated appendicitis
- 2 with intussusception
- 2 with bowel obstruction
- 1 each of the following: ovarian torsion, brain tumor, ALL, perianal abscess, cardiomyopathy, bladder rhabdomyosarcoma, pancreatitis, perforated Hartman's pouch, and ileal volvulus.

Abdominal x-ray was performed more often in children who were misdiagnosed than in those who were not (75% vs. 46%). Children who were misdiagnosed presented more commonly with a chief complaint of abdominal pain (70% vs. 49%) and were more likely to have abdominal tenderness on exam (60% vs. 32%). X-ray findings in terms of stool burden were similar in the two groups.

Even though only 1% of the cohort was misdiagnosed as defined by their criteria, it is important to note that there were several other significant diagnoses that were missed including UTI, HSP, pneumonia, and renal failure just to name a few. Although they are the minority, take an extra minute with the ones with significant pain and tenderness. It will probably still be constipation, but just in case...

Judicious Use of Antibiotics in

As pediatricians, one of our day to day challenges is the judicious use of antibiotics. On average, 20% of ambulatory visits result in an antibiotic prescription, with as many as 10 million of those prescriptions aimed toward respiratory conditions for which the antibiotics will have no effect. There is evidence to demonstrated that the prescribing of broad-spectrum antibiotics has increased, when many times a more narrow-spectrum option would be preferable. Potential overuse can lead to drug related adverse events, antibiotic resistance, and additional cost. This clinical report focuses on the most common pediatric respiratory conditions that require antibiotics and the application of three guiding principles:

1. Determine the likelihood of a bacterial infection
2. Weighing the benefits and harms of antibiotics
3. Implementing judicious prescribing strategies.

Determine the Likelihood of a Bacterial Infection

The three respiratory infections we see most commonly that may (or may not) require antibiotics are acute otitis media, acute bacterial sinusitis, and pharyngitis. Any of these could be viral in etiology as well, and there are guidelines to help decide if there is a bacterial cause.

Acute Otitis Media

Updated clinical practice guidelines regarding the treatment of acute otitis media were published by the American Academy of Pediatrics and the American Academy of Family Physicians earlier this year. It may be defined as "the rapid onset of signs and symptoms of inflammation of the middle ear." Signs may include bulging of the tympanic membrane with or without erythema, and symptoms may include otalgia, irritability, otorrhea, and fever with the caveat that a careful otoscopic examination is always required. AAP guidelines recommend diagnosis of acute otitis media requires one of two conditions:

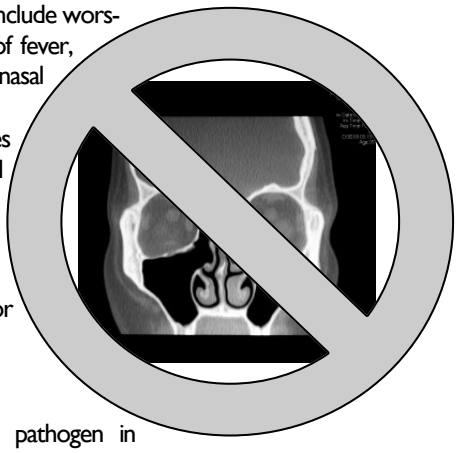
1. Evidence of middle ear effusion as demonstrated by moderate to severe bulging of the tympanic membrane (may be mild bulging is accompanied by intense pain or erythema), or
2. New onset of otorrhea that is not attributable to otitis externa.

Because acute otitis media is often a self-limited disease, once the diagnosis is made, further decisions regarding treatment can be based on those who are at higher risk. Those are ones with bilateral involvement, more severe disease, and younger (≤ 23 months).

Acute Bacterial Sinusitis

Evidence based guidelines to distinguish acute bacterial sinusitis from a viral upper respiratory infection were published this year as well. Acute bacterial sinusitis should be diagnosed in cases where symptoms are:

1. Persistent and not improving. These most commonly are nasal drainage and daytime cough that has persisted for at least 10 days.
2. Worsening. This can include worsening or new onset of fever, daytime cough, or nasal drainage.
3. Severe. This includes fever ≥ 102.2° F, and purulent nasal drainage for at least three days.



Imaging is not recommended for routine diagnosis.

Acute Pharyngitis

The most important bacterial pathogen in acute pharyngitis is *β—hemolytic* Group A Streptococcus (GAS). Patients with two or more of the following features should undergo testing:

1. Absence of cough
2. Presence of tonsillar exudates or swelling
3. History of fever
4. Presence of swollen, tender anterior cervical lymph nodes
5. Age < 15 years

These authors do not recommend testing children < 3 years of age as rheumatic fever is uncommon in that age group. They also recommend testing only those children with the above characteristics, as the carrier rate can approach 20%.

Pediatric Respiratory Tract Infections

Weigh Benefits Versus Harms of Antibiotics

Once a bacterial infection has been identified, the outcomes relevant to benefits of treatment should be considered. They include: cost, symptom reduction, prevention of complications, and secondary cases. Outcomes relevant to harms of treatment include antibiotic related adverse events, development of resistance, and cost.

AOM

Meta-analyses of trials regarding treatment of AOM have shown:

1. At least 50% of patients with AOM will recover fully without treatment.
2. Recovery is more likely and is accelerated by antibiotic therapy as compared with placebo.
3. Recover without treatment is less likely for (surprise, surprise) those who are younger, those with bilateral involvement, and those with more severe disease.

The same meta-analyses failed to showed significant benefit to antibiotics preventing concerning complications, including mastoiditis, and it is estimated that you would need to treat 5000 cases of AOM to prevent one case of mastoiditis.

Acute Bacterial Sinusitis

There is limited evidence evaluating the effectiveness of treatment of acute bacterial sinusitis in children, and what there is shows mixed results. Of the three randomized controlled trials in children, two showed improved symptom reduction at 3 and 14 days, but the other showed no benefit over placebo. Of note, the studies that did show benefit used more stringent diagnosis criteria. The benefits of antibiotics preventing secondary complications, including orbital cellulitis or intracranial abscess is undocumented.

Harms of Antibiotic Therapy

Antibiotics are responsible for the largest number of unplanned medical visits for medication related issues in children. Antibiotic associated adverse events can range from mild (rash and diarrhea), to life-threatening. I think we have all seen the adverse effects antibiotics can have. One thing I didn't know about is the growing body of evidence relating antibiotic exposure early in life to the development of such afflictions as inflammatory bowel disease, obesity, eczema, and asthma. This is felt to be due to disruption of the microbial balance in the body. And, then, there is the whole azithromycin prolonging the QT interval issue. With the exception of penicillin allergic patients with GAS pharyngitis, azithromycin use in the patients we have been discussing is likely not giving adequate coverage for the most common pathogens anyway. And, antibiotic use and the development of resistance in both the individual and in the community has been well established. OK...enough of that...let's move on.

Implementing Judicious Prescribing Strategies

This article outlines 4 possible strategies for use in practice:

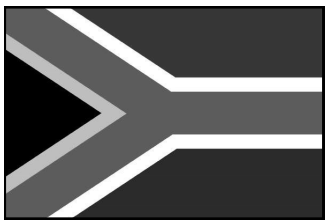
1. Selecting the antibiotic agent that treats the most likely pathogens, taking into account local resistance patterns
2. Selecting the appropriate dose
3. Treating for the shortest duration possible
4. Consider the use of delayed prescribing strategies, if appropriate.

Seems simple enough...definitely some things I can try. Maybe not all AOMs need to be treated for 10 days. What will you do to change your practice?

Reference
Hersh AL et al. Clinical Report: Principles of Judicious Antibiotic Prescribing for Upper Respiratory Tract infections. *Pediatrics* 2013;132(6):1146-1154.

My First Call in Africa

by: Ari Shirk, MD



Medicine in Africa is a paradox of peace and chaos, of freedom and restriction. When I got off the plane in Kenya, I had few expectations. We drove through the countryside, weaving in and out of moto-taxis and vans where people would taking a running start to jump in the moving vehicle to go to work. My girls, 4 and 7 pointed out the donkey carts, sheep, and cows that ambled across the highway and grazed beside oncoming traffic. Suddenly, we turned abruptly down a 6 kilometer dirt road by a rough wood sign that said hospital. We bounced through a forest of trees as our driver deftly maneuvered the ridges and valleys and potholes in the road.

When we arrived at the hospital, 30 hours after leaving the states, I left my husband with the girls and scurried off to the hospital to get check-out on the 24 inpatients I would be rounding on that week - a 3 year old with tuberculosis and liver failure, a 12 year old with lower limb paralysis and pancytopenia, an 8 year old with acute flaccid paralysis, infants with severe acute malnutrition from breast feeding failure, a 7 month old with heart failure from myocarditis, a 2 year old with horrible herpetic stomatitis, countless patients with massive hydrocephalus that needed to grow to be able to get a shunt, patients with genetic anomalies or TORCH infections, children with unexplained seizures - and then the things I knew - bronchiolitis, asthma, gastroenteritis, pneumonia, urosepsis, meningitis.

I cradled my stack of cards, smiled at the 3 interns and two clinical officers assigned to my service, and dove into the medicine. I had 4 days until the other 4 pediatricians in Kijabe left town for the weekend, and I needed to learn everything I could. As the week went on, I gradually remembered the rhythm of resuscitating a newborn baby and how to maneuver the challenges that come when every test you order equals a week's wages for the family. I ordered Ceftriaxone, Zosyn, and Merrem gingerly (grateful they were available), and I learned which lab results were trustworthy and which ones tended to mislead. I learned how to call the neurosurgeons, pediatric surgeons, and orthopedic doctors I was so grateful to have.

On Friday, as I got check out on the ICU and NICU, I was tired, but cautiously optimistic - and grateful to be able to give these amazing physicians a much needed weekend away. Saturday at 7am, I walked into a toddler with a heart rate of 220 who was combative with fever and saturations of 60% and a head injury the day before . . . and sent my first child to the ICU. We settled him in upstairs, and then we rounded on our 24 inpatients. As we finished rounds, I was called to the nursery to put a 27 weeker on CPAP and did 3 lumbar punctures while my intern went to round on the surgery patients. I received the LP trays wrapped in a sterile towel with some betadine, three plastic microtainers and an 18 gauge needle. I prepped the patient, felt for my landmarks, and got three champagne taps in a row. We admitted several children from the ER and then one of the 27 week preemies that I had resuscitated that Thursday stopped breathing and I sat with his 16 year old mother as she held her baby for the last time.

I walked home for lunch with the girls and watched as the gaggle of Australian, American, and Kenyan kids made mud cakes and flower soup in the front yard of our two bedroom apartment, drinking in the sunshine and waiting for my pager to beep. I was called back to the hospital for some more deliveries and admissions and came home at 2am.

Photographs courtesy of David Shirk Photography.

Sunday, I rounded by myself; my wards patients were improving and I took a deep breath and reveled in the small victories of getting patients off oxygen and stopping IV fluids. I enjoyed being able to just sit on the beds and play with the children and talk to the moms. I finished rounds and was on my way out the door to work when I got called to the nursery to fill out a death certificate, tap another child with fever, and then the 24 week gestational age preemie, who they have been resuscitating and caring for so valiantly for the last 44 days in the nursery went apneic on her CPAP created from a nasal cannula at 10L and soda bottle with a makeshift cover. We could not get a heart rate back, could not get the oxygen up - the nurses did compressions and bagged with dexterity and passion and we pushed epinephrine and fluids and breathed silent prayers. And then I held the mother's hand as she cried and mourned her only child was dead.

At that moment, my pager started singing with the emergency code - a comatose child in the ICU who had been breathing on his own all week was now breathing only 8 times a minute and needed to be put on the 1970s German ventilator. I read my handbook and deciphered foreign words and worked with the nurses to figure out the correct way to set it. His saturations began to rise and his pulses strengthened and I noticed with a bit of hope that one of his nonreactive pupils had a glimmer of movement. I took a deep breath and smiled.

And then I got called to the ER to see a patient with saturations of 50% on room air. In her yellow lace dress she gazed at me with panicked eyes. She had such a large heart on chest x-ray that I could not see her lungs. At 10 months, she looked like an 80 year old man in florid heart failure with pulses in her neck and a liver I could feel all the way down to her hip bones. I gave Lasix, placed her on a 10 L non-rebreather and paused as I realized we had no more ventilators - the Lasix would need to work fast.

I turned around to see a patient whose parents had just walked in the door. In a sweater and corduroys with a gray wool hat, he sat in his mom's lap with his chin extended and was grunting with every breath. This 9 month old had a heart rate of 230 and was gray, so sleepy, and blue on 5 liters of oxygen. I ran to the ICU to tell them I needed the last bed and told my intern to get the nurse to get an IV. When I returned the child was apneic and bradycardic - his hands were so cold and saturation wouldn't register. He wasn't responding as we desperately stuck him trying to get an IV - we put in an IO and intubated but could still not get his heart rate up. . .. And I had to tell yet another mom that her child was dead . . . and she sobbed and held me and the father held the child and wept.

And then the anesthesiologist that had helped me get an IV, told me to call the chaplain because we were needed in "Theatre" (the OR) to help deliver twins - that shared one heart. They had just completed the ultrasound to prepare for C-section and saw conjoined twins, full grown and inseparable. So we sprinted to the theatre and delivered two beautiful baby boys - one crying in protest from the minute he was born and the other silent, needed our help to remind him to breathe. They had perfect hands, perfect toes, beautifully rounded heads, and they shared one chest- one heart, two lungs for two baby boys. We rushed them to the nursery were the promptly peed on each other and then began to cry and stick their hands in each other's eyes and mouths. We started an IV, and just sat in disbelief and marveled. We looked up the statistics- baby boys, joined at the heart, delivered alive - about 1 in 10 million - and we watched them breathe.

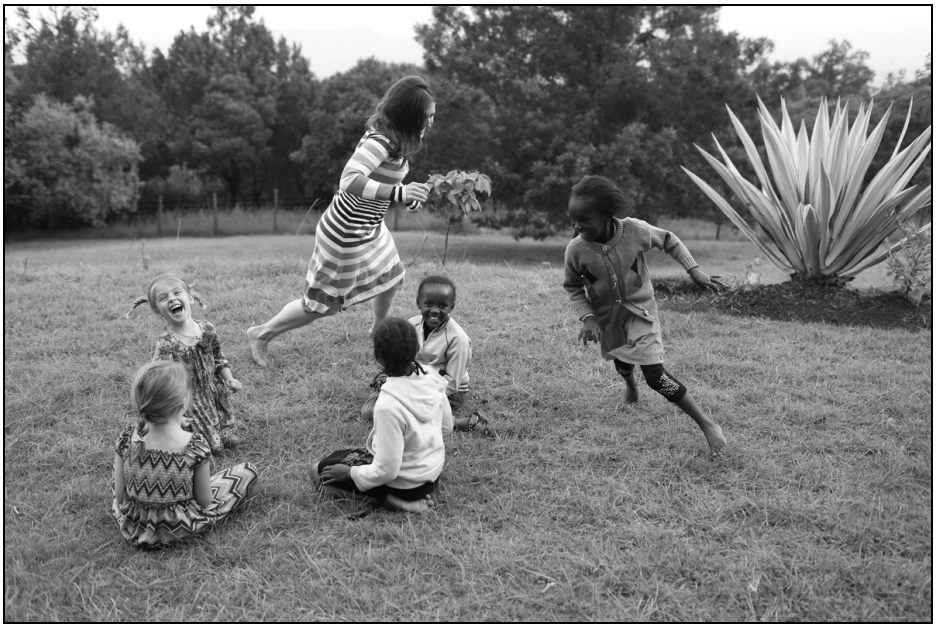
My First Call in Africa

continued from page 7.

When I started my pediatric emergency medicine fellowship, I wanted to build on the skills residency had given me - in resuscitation, procedures, and rapid fire differentials. I wanted to learn more from the mentors and nurses that had walked me through the beginning of my life as a doctor. In my three weeks in Kijabe, I tested everything I have learned for the past 11 years. After my call weekend (which I was told was especially bad), I had no more deaths and had the privilege of discharging patients home better and with a second chance. I watched many of our chronic kids improve on my service and taught my residents who were so eager to soak up any nugget or pearl. I learned the practice of pediatric emergency medicine has taught me specific skills, but more than that it has taught me to improvise well when the situation is not ideal, to read and search and apply quickly what I have learned, to manage chaos, to move with relative deftness from one crisis to the next, and the immense value of teamwork and trusting and teaching those around you. When we return to Kijabe next September for a 2 year commitment, I will think daily of the attendings, residents, nurses, pharmacists, and social workers who have so patiently and precisely taught me for the last 7 years and be forever grateful.

Then I got called back to the ICU because the boy on the ventilators blood pressure had sky-rocketed and he wasn't peeing - and the combative baby I had admitted the day before was requiring more and more oxygen - and the nurses in the nursery made me tea and we prayed and then I walked up the long hallways, weary, exhausted, and sure that I was far too tired to know what to do next. . . I climbed into bed at 5:30 am, and at 7:15, I woke up to go in to round.

The child with heart failure was doing better and smiling in her yellow dress. Our children with malnutrition were gaining weight slowly but surely. My bronchiolitics were eating better and weaning on their oxygen. We figured out the combative child in the ICU was probably cholinergic poisoning because of herbal medicine administration and he started improving almost instantly with atropine. Before heading home to sleep I went to check on the twins. They were intermittently fussing and waking each other up, wrapping each other in a fixed hug with stable vital signs and surrounded by family. The nursery attending was preparing to send them to Nairobi for evaluation. At the end of all the chaos, a negotiated peace had emerged.



About the author: Arianna Shirk graduated from Wake Forest School of Medicine in 2007. She completed her pediatrics residency at UAB, where she was chosen to be pediatric chief resident. She is currently in her third year of pediatric emergency medicine fellowship, and plans to move to Kijabe for the two years following completion. Her husband, David, is a professional photographer, and they have two beautiful daughters. Ari is truly an inspiration, and I have no doubt that she will make an absolute difference in the lives of those she serves. I know she has in mine.

The Search is On...

The end of an era. That's really the only term that comes to mind when I think about the pending retirement of Dr. Sergio Stagno as our Chair of Pediatrics. Some of that likely stems from the fact that I don't know any different. When I got here in 1997 (following a boy and leaving the only home I knew, on the good side of the state of Missouri), one of my first wards experiences was with Dr. Stagno as my attending. I remember it very clearly because not only was I terrified that the chair was my attending, but Clarissa Dudley was my resident...yikes! But, it didn't take long for me to realize how lucky I was. Clarissa was an awesome resident (anyone know where she is now?), and Dr. Stagno was, without a doubt, one of the best attendings I have ever had. And, I'm not just saying that.

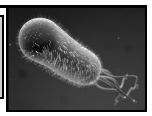
Each year when I interview pediatric residency applicants, I often get asked what I like about UAB. Without hesitation, the words are out of my mouth each time…"the people." My usual spiel involves such phrases as, "A children's hospital here is going to be very similar to a children's hospital in (insert city). The difference comes with the people." And, "People who come to UAB tend to stay at UAB. In fact, many of the attendings I called in the middle of the night when I was an intern and resident are still the same people I call in the middle of the night now from the ED." People are happy to be here, and that is a direct reflection of leadership.

UAB pediatrics has a fantastically successful residency program. I might be a bit biased (class of 2000 really was the best, though), but I look at where our previous residents have gone and what they have done. Some are chairs at other institutions. Some are working on curing diseases that have plagued us for centuries. And, many are the real heroes, seeing pediatric patients in their offices and clinics every day, making a true difference in the world. The education and training we received from our dedicated program directors and faculty prepared us to do whatever it was we wanted to do. And, that is a direct reflection of leadership.

Life as junior faculty can be challenging as you are trying to be productive and find your niche. As a clinician educator in an academic institution, one of my biggest fears was that I wouldn't be able to compare. I wasn't doing groundbreaking research. I didn't have external funding. I wasn't wearing out the printer with copies of my peer-reviewed publications. I saw patients in the basement of the building...and that's what I loved doing. And, still do as a matter of fact. I know I likely speak for others when I say it has been so refreshing to have my work appreciated, valued, and recognized. I look at what our faculty has done on the regional and national level, and none of it could have been done without endless support and guidance of our colleagues, mentors, and directors. And, that is a direct reflection of leadership.

As I transition in my career to a more administrative role, I have become increasingly aware of the (several) other roles Dr. Stagno has served in, much to the benefit of the school of medicine and the university. It's so amazing to me to think about the impact he has had on my life and career, and know there are several hundred more people that feel the same way. Not to mention the thousands of children whose lives he has directly or indirectly affected over the years. I fondly remember watching horrified faces as he was tied to a backboard and carried out of morning report as part of our senior skit (Andrew Gregory the crocodile hunter finally captured the ever elusive Great Silver Hair), and feel so fortunate to have had a Chair that would agree to do that! And (seem to) enjoy it! And so, Dr. Stagno, I would like to take this opportunity to thank you. Thank you for your amazing clinical knowledge. Thank you for your guidance and support. Thank you for letting us know it was ok to have some fun along the way. And, thank you for teaching us to be leaders in the most effective way...by being an outstanding leader yourself. I know I speak for several (hundred) people when I say I feel so fortunate to call you my teacher, my mentor, my advocate, and my friend.

Back to Basics...Part 3, continued from page 1.



Diagnosis

As with many pediatric illnesses, the evaluation and diagnosis of UTI is dependent on the age of the child. In infancy, the symptoms may be very vague, and become more specific with age. But, much like the little old ladies that present to the adult ED with altered mental status, keep a high index of suspicion for the infants with non-specific symptoms with or without fever. Of note, in neonates, occult UTI has been associated with the presence of jaundice, especially if the elevated bilirubin is conjugated and presented after 8 days of age.

Duration of symptoms and height of fever have also been identified as risk factors. A child with fever ≥ 100.4° F for more than two days without a source has a + likelihood ratio of 3.6, while temperatures ≥ 102.2° F increase that likelihood to 4. It can also be a co-infection, especially in children less than 2 years of age. Proven viral infection (i.e. RSV or influenza) decreases the rate of UTI, but > 5% of infants with proven RSV will have a UTI. There has not been a specific sign or symptom that is proven to reliably exclude UTI.

Obtaining urine for evaluation is also age dependent. In the non-toilet trained child, a bag specimen is often preferred by the parents. However, contamination of bagged cultures has approached 60% in some studies, leading to unnecessary testing and treatment. Because of this unreliability, a catheterized specimen or suprapubic aspiration is recommended in this population. In patients who are toilet trained, proper instructions on a clean catch specimen will likely lead to an acceptable result.

Urine culture remains the gold standard for the diagnosis of a UTI. But, who do we treat in the meantime? Urine dipsticks can detect the presence of leukocyte esterase (released when leukocytes are broken down) and nitrites (a byproduct of uropathogenic bacteria). These are both helpful tests, but have their limitations as well. One meta-analysis reported that leukocyte esterase has a sensitivity and specificity of 79% and 87%, respectively. Or, in other words, it misses more than 20% of children with a true UTI, and falsely suggests the presence in about 10%. Nitrites are more specific (98%), but have very poor sensitivity (49%) because not all uropathogens produce nitrites. It can also be falsely negative if the urine is too dilute. Non-toilet trained patients experience more frequent voiding, leaving the urine in the bladder for a decreased period of time, making the release of nitrites less likely. So, if nitrites are present, go ahead and treat. But don't assume the urine is clean if they are absent.

Using microscopy as part of your diagnosis may be helpful, but the true value has yet to be determines. Some people will use a WBC cutoff of ≥ 10 per hpf, but others will argue that it really doesn't add a lot to your investigation, and that your dip results are enough as long as a culture is obtained. In terms of the culture, most sources will accept the following:

* > 100,000 CFU/mL of a single organism is diagnostic
* > 50,000 CFU/mL of a single organism is suggestive
* > 10,000 CFU/mL of a single organism from a cath specimen is suspicious
* Any growth of a single organism from a suprapubic aspiration should be considered a true infection.

Treatment

The choice of antibiotic and route of administration for a UTI should take into consideration several things:

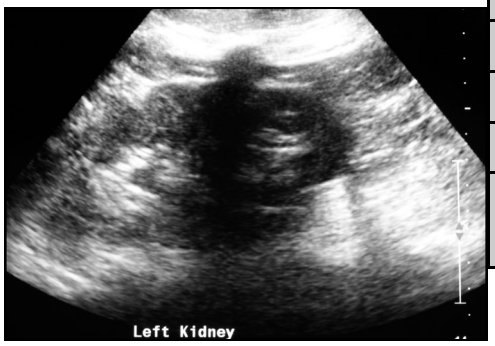
* Age of patient
* Severity of infection
* Location of infection (lower vs. upper)
* Presence of complications
* Local antibiotic resistance patterns.

Recent recommendations state that oral and parenteral antibiotics are equally effective, and IV antibiotics should be reserved for patients with UTIs who are toxic in appearance or unable to tolerate oral medications. Therapy (whether oral, parenteral, or a combination of both) should be for 7-14 days. There is no evidence to support 7 vs. 10 vs. 14 days of therapy, but it has been shown that a 3 day course of antibiotics for febrile UTIs is inferior. See Table 1 on page 11 for common antibiotic choices and doses.

Imaging

Post-infectious imaging seems to be where the biggest shifts have occurred in recent guidelines. In 2011, the AAP updated their recommendations. After an initial febrile UTI, an ultrasound is still recommended. Even though the yield is low, the benefits of detecting a potential abnormality (typically obstruction that could warrant further evaluation) outweigh the risks of the test. The most dramatic change in recommendations is that VCUG is no longer recommended routinely after an initial febrile UTI. The reasoning behind this was that there was no benefit to detecting vesico-ureteral reflux (VUR), as there has been no evidence to show that prophylactic antibiotics are of benefit in these children. The AAP does recommend performing a VCUG after the second febrile UTI, however, with the thought that recurrent UTIs will likely be associated with higher grade reflux. Even this is considered controversial in some circles, though.

Recently, in the pediatric urology literature, there was a study questioning this practice guideline. They retrospectively evaluated the charts and radiographic studies of patients with a diagnosis of VUR. What they found was that although 41% of the patients had an abnormal ultrasound initially (and, therefore, would have been identified as potentially at risk for renal scarring), 62% of those with a normal ultrasound had grade 3 or higher VUR. This raises concerns in pediatric urology circles that the diagnosis of clinically significant VUR may be missed or delayed if waiting for the second febrile UTI. I don't know the right answer, but I know I would trust whatever Dr. Joseph says!



Prevention

Prophylactic antibiotic use in patients with VUR has not been shown to reduce renal scarring, and is not a routinely recommended practice. But, there is some hope that cranberry juice preventing UTIs is more than just a folk remedy. It is postulated that cranberry products inhibit E. coli at the uroepithelium. Larger studies are needed to make formal recommendations, but at least it's a tasty option!

Effective treatment of constipation will help in patients with recurrent UTIs secondary to dysfunctional elimination syndrome. Addressing the higher risk of UTIs in uncircumcised males, the AAP feels the benefits of the procedure outweigh the potential risks.

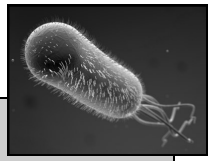
Conclusion

UTIs are a commonly encountered infection in pediatric patients. And, while the majority are simple, there are a subset that are recurrent and can lead to chronic renal issues. Careful evaluation and follow-up of these patients can help minimize complications. And, thank heavens for Dr. Joseph!

Table 1: Commonly Used Antibiotics for UTIs

Antibiotic	Dose
Oral	
Cephalexin	50-100 mg/kg/day in 3-4 doses
Cefuroxime	20-30 mg/kg/day in 2 doses
Cefixime	8 mg/kg/day in 1 dose
Amoxicillin-clavulanic acid	40 mg/kg/day in 2 doses
Trimethoprim-sulfamethoxazole	8-10 mg/kg/day trimethoprim in 2 doses
Parenteral	
Ceftriaxone	75 mg/kg every 24 hours
Cefotaxime	50 mg/kg every 8 hours
Gentamicin	2.5 mg/kg every 8 hours

Ref: Roberts KB. AAP Subcommittee on Urinary Tract Infection, 2009-2011. Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months. *Pediatrics* 2011;128(3):595-610.



References:

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2. Bhat RG, et al. Pediatric Urinary Tract Infections. *Emerg Med Clin N Am* 2011;29:637-653.
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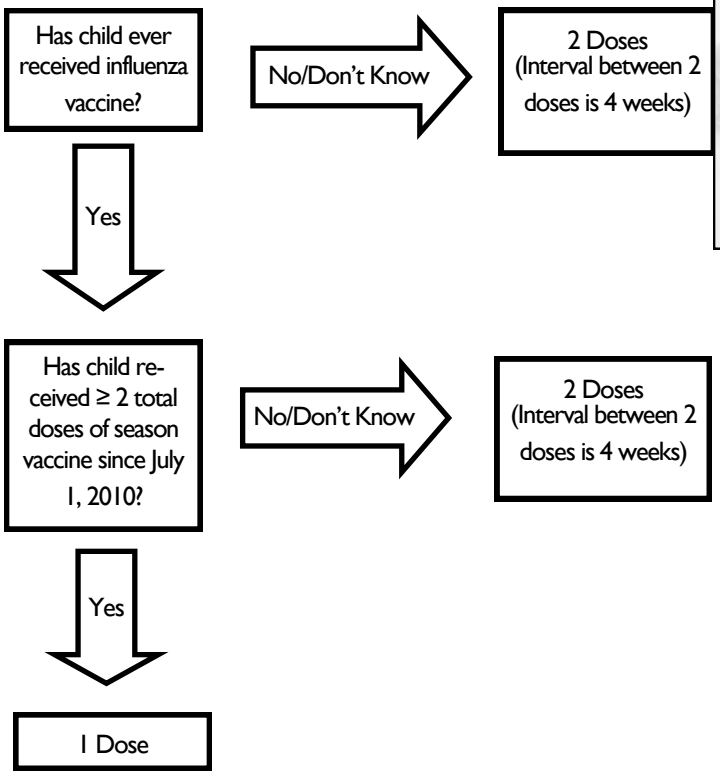
influenza update

As if the flu season wasn't bad enough, I find it annoying that each year it's different. Different strains, different prophylaxis, different treatment recommendations...can get very confusing, at least for me. Luckily, the AAP published a policy statement this year with recommendations for the 2013-2014 season, and I will attempt to summarize them here. Wish me luck.

The 2012-2013 influenza season was considered moderately severe with higher rates of both outpatient visits and hospitalizations, and more deaths than in the previous year. There were 158 confirmed pediatric influenza-associated deaths reported to the CDC, with 82 of these being Influenza B associated, and 69 Influenza A associated (subtype either known or unknown). The majority of pediatric deaths occurred in patients that had not been immunized against the flu. Of the patients hospitalized, 44% had no underlying disease that might make them at higher risk. This likely leads to the recommendation that **annual seasonal influenza vaccine is recommended for all people, including all children and adolescents, 6 months of age and older.** This is especially true for caretakers of children with special health care needs or co-morbidities.

The number of seasonal influenza vaccine doses in the 2013-2014 season depends on the age of the child. Influenza vaccines are not approved for children less than 6 months of age. Children 9 years of age and older only need one dose. For children 6 months through 8 years:



So, now that we know who to immunize, what should be used? There are inactivated influenza vaccines and live-attenuated influenza vaccines. Healthy children older than 2 years of age can receive either. **Certain populations should preferentially receive the inactivated vaccine,** including:

- Asthma or other chronic pulmonary diseases (including CF)
- Hemodynamically significant cardiac disease
- Immunosuppressive disorders or therapy
- HIV infection
- Sickle cell anemia or other hemoglobinopathies
- Diseases that require long-term aspirin therapy (i.e. Kawasaki disease or JIA)
- Chronic renal dysfunction
- Chronic metabolic disease, including DM
- Any condition that can compromise respiratory function or handling of secretions, increasing risk of aspiration (i.e. seizure disorder, neuromuscular disorders, spinal cord injuries, neurodevelopmental disorders)

Although universal immunization for all 6 months and older, other **populations that deserve special efforts for compliance include**:

- Household contacts and out-of-home care providers of children < 5 years of age and at-risk children of all ages (live or inactivated OK)
- Any woman who is pregnant, considering pregnancy, has recently delivered, or is breastfeeding (inactivated only)
- Children and adolescents of American Indian/Alaskan Native heritage
- Health care providers or health care volunteers
- Close contacts of immunosuppressed people

Are there people who **shouldn't receive the inactivated vaccine?**
Yes:

- Infants younger than 6 months
- Children with a moderate to severe febrile illness

And, the following **should not receive the live vaccine**:

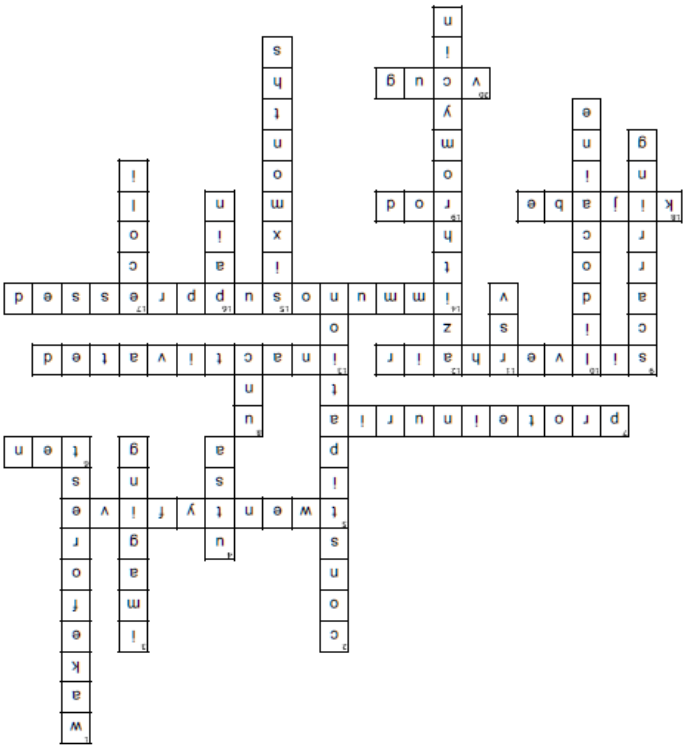
- Children younger than 2 years
- Children with moderate to severe febrile illness
- Children with an amount of nasal discharge that would impede vaccine delivery
- Children with chronic underlying medical conditions
- Children 2-4 years of age with a history of recurrent wheezing, or a medically treated episode of wheezing in the past 6 months
- Children who have received other live-viruses in the past 4 weeks
- Children with known or suspected immunodeficiency
- Children who are receiving salicylates
- Children with disorders that can compromise respiratory function or clearance of secretions
- Children currently taking an influenza antiviral (should wait 48 hours after stopping the antiviral)

Influenza Update continued on page 14

Wishing you every happiness this holiday season and all throughout the year! See you in 2014!

From the PEM family to yours

Pediatric Puzzler Answer



Influenza Update, continued

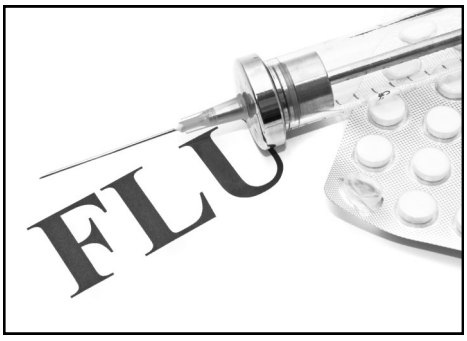
The next question is, who should be treated? **The following people with confirmed or suspected influenza should be given antivirals**:

- Children < 2 years of age
- Adults ≥ 65 years of age
- People with chronic pulmonary (including asthma), cardiovascular, renal, hepatic, hematologic, metabolic disorders, or neurodevelopmental disorders
- Immunosuppressed
- Women who are pregnant or < 2 weeks post-partum
- People < 19 years of age on long-term aspirin therapy
- American Indian/Alaska Native
- Morbidly obese (i.e. BMI ≥ 40)
- Residents of nursing homes or other chronic care facilities

For dosing guidelines, see table 1.

What about chemoprophylaxis? Does that fit in to the equation anywhere? **First, it should be mentioned that chemoprophylaxis is not a substitute for immunization. Having said that, there are some groups that would benefit from chemoprophylaxis during an outbreak**:

- Children at high risk for complications and for whom a vaccine is contraindicated
- Children at high risk during the 2 weeks after immunization
- Family members or health care providers who are unimmunized and likely to have ongoing exposure to unimmunized children at high risk or unimmunized children < 2 years of age
- Unimmunized staff and children in a closed institutional setting with children at high risk
- As a supplement to immunization at high risk, including those who are immunocompromised and may not respond to the vaccine
- As post-exposure prophylaxis for family and close contacts of an infected person if they are in a high risk group
- For children at high risk and their family and close contacts if the circulating strain is different than those covered by the vaccine.



Reference:
Committee on Infectious Diseases. Recommendations for Prevention and Control of Influenza in Children, 2013-2014. *Pediatrics* 2013;132(4):1-16.

Over the past few weeks, as I have seen the number of positive flu cases rise, it makes me a little uneasy about what the near future holds. But, I guess all we can do is wash our hands, and hold on tight for the ride we are all about to go on. Good luck!

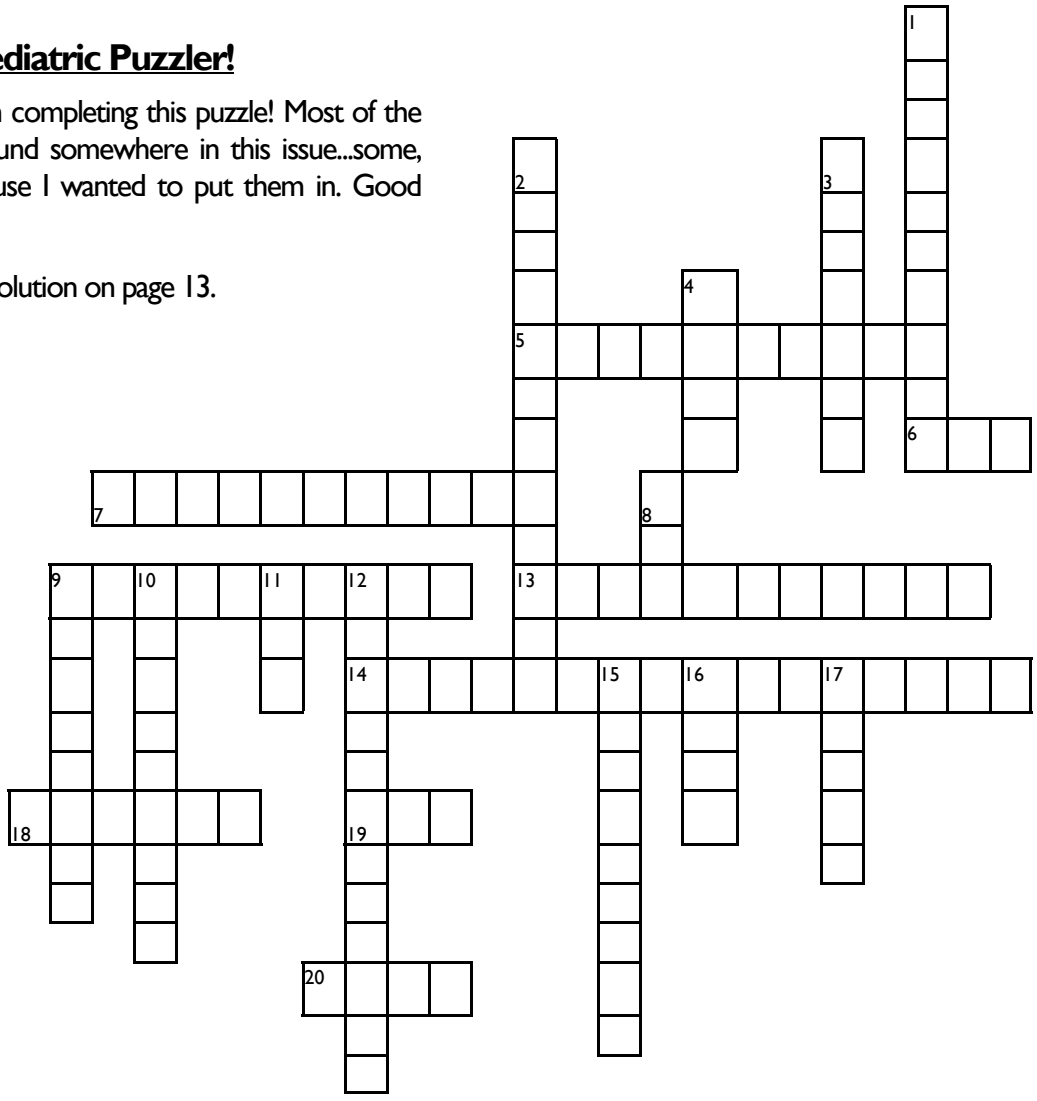
Table 1: Recommended Dosage and Schedule of Influenza Antiviral Medications for Treatment and Prophylaxis for the 2013-2014 Influenza Season: United States.

Medication	Treatment (5 d)	Prophylaxis (10 d)
Oseltamivir		
Adults	75 mg BID	75 mg QD
Children ≥ 12 mo		
≤15 kg	30 mg BID	30 mg QD
15-23 kg	45 mg BID	45 mg QD
23-40 kg	60 mg BID	60 mg QD
> 40 kg	75 mg BID	75 mg QD
Infants 9-11 mo	3.5 mg/kg/dose BID	3.5 mg/kg/dose QD
Term infants 0-8 mo	3 mg/kg/dose BID	3 mg/kg/dose QD (not recommended for infants < 3 mo)
Zanamivir		
Adults	10 mg BID (2 5 mg inhalations)	10 mg QD (2 5mg inhalations)
Children (≥ 7 y for treatment, ≥ 5 y for prophylaxis)	10 mg BID (2 5 mg inhalations)	10 mg QD (2 5 mg inhalations)

Pediatric Puzzler!

Hope you have fun completing this puzzle! Most of the answers can be found somewhere in this issue...some, well, are just because I wanted to put them in. Good luck!

Solution on page 13.



Across

5. Number of years Dr. Stagno has been Chair (2 wds)

6. Persistent cough and nasal drainage for ____ days may constitute the diagnosis of sinusitis

7. Steroids were not shown to affect _____ in patients with HSP

9. The crocodile hunter captured this in our senior video; the Great _____ (2 wds)

13. Children under two years should receive the _____ flu vaccine

14. Group of patients that should receive the inactivated flu vaccine

18. Where Ari will be spending the next two years

19. E coli is a gram negative _____

20. No longer recommended after first UTI

Down

1. Where Ari went to medical school (2 wds)

2. Known risk factor for development of UTIs

3. Routine _____ is not recommended in acute sinusitis

4. First home conference game opponent for the blazers on January 16th

8. Team UAB men's basketball upset on December 2nd

9. Prophylactic antibiotic therapy in VUR has not been shown to reduce renal _____

10. No benefit over placebo in symptomatic treatment of mouth ulcers

11. 5% of patients with ___ will also have a UTI

12. Associated with prolonged QT interval

15. Seasonal influenza vaccination is recommended for people _____ of age and older (2 wds)

16. Presence of ____ was more likely in children with abdominal pathology other than constipation

17. Most common uropathogen

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This newsletter is brought to you by UAB Division of Pediatric Emergency Medicine at The Children's Hospital of Alabama

Your feedback is important to us. Questions, comments and suggestions for this newsletter can be sent to:
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Welcome New Faculty!!

Please join me in welcoming our newest PEM faculty member, Dr. Heather Mitchell! Heather graduated from the UASOM prior to completing her pediatrics residency at UAB. We were fortunate to keep her as a fellow for the past three years and are even more fortunate to have her as faculty! Welcome to the team, Heather! We are so thrilled to have you!