



SAVING LIVES - REDUCING RISK

From The Editor



In our last TSG Quarterly Newsletter, we focused exclusively on Pediatric Emergency Medicine. After receiving very positive feedback on that Newsletter, we are taking the suggestion provided by many of our readers to offer a separate Pediatric Newsletter in addi-

tion to our normal TSG Quarterly Newsletter. Having said that, I would like to take a moment to introduce Dr. Todd Zimmerman, a recent addition to our TSG Advisory Board.

TSG is very excited to have Dr. Zimmerman organize this quarterly resource. To learn more about Dr. Zimmerman, please read his brief bio on the next page. **Welcome Dr. Zimmerman!**

As always, we appreciate your thoughts and comments on all of our offerings. **Your positive feedback and sug-**

Pediatric

Quick TIPS

By Dr. Todd Zimmerman

Although these tips should never supersede your own hospital's policies/procedures, it may act as a reminder to you or provide you with some important tips to keep in mind.

1 Referrals: Before referring your patient to the specialist on call, you may want to consider touching base with the patient's primary care physician. Many patients are in HMOs, and many practices are capitated. The extra step in calling the primary care physician regarding referrals may be critical to the primary care doctor. As ED physicians, we always want to practice as efficiently as possible, but taking this extra step will enhance communication and will be appreciated tremendously by the PMD. More and more PMDs will likely be requesting this communication as patients shift into HMOs and networked PPOs.

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gestions have helped us grow our TSG subscriber base to reach more than 20,000 readers every quarter!

Again, thank you for all of your support and your continued interest in TSG. We look forward to having another great year together!

Dr. Todd Zimmerman

Dr. Zimmerman is the Medical Director for EmergiKidsSM, the Pediatric Emergency Medicine program of Alexian Brothers Health System, and was the CMO and co-founder of PIRRG/MDMC, a single specialty risk retention group.

He is board certified in pediatric emergency medicine and in general pediatrics, and he is an expert witness in the fields of pediatrics and pediatric emergency medicine. As an independent medical consultant, he has developed content and architecture for both paper and electronic pediatric medical record charts.

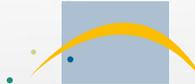
As always, I enjoy the educational content provided by The Sullivan Group. It is relevant and pertinent to my line of care. The way in which the material is presented makes the courses interesting and ultimately enjoyable to take. Thank you.



Karen Black
Trident Regional MC
Pediatric Infections

2 If you decide to use a **skin adhesive** such as Dermabond to close a wound, explain the risks to the parents. I always tell the parents the following when I use Dermabond:

1. By using a skin adhesive, there will still be a scar, but we may minimize the scar a little more and avoid potential pockmarks.
2. Just like when we use regular sutures, there is a possibility when using a skin adhesive that the wound could open up again. If this happens, the wound would have to heal from the inside out, and could be fixed at a later time by a plastic surgeon. This is unlikely to happen, but it is a possibility whether we use a skin adhesive OR stitches.
3. Just like when we use regular stitches, when we use a skin adhesive, there is a possibility of your child getting a wound infection. If this happens, the skin adhesive would have to be removed, the wound would heal from the inside out, and it could be fixed at a later time by a plastic surgeon. There is possibility of a wound infection whether you use stitches OR a skin adhesive.



Bronchiolitis Coming Soon To A Hospital Near You

By Dr. Todd Zimmerman

This is an edited reprint of an article I wrote for Peds ED Notes in 2007. As we are now in the Bronchiolitis season, I thought this would be a good refresher. Since the original publication of this article, there have been no new changes in management of this disease process, although the use of CPAP or high-flow nasal cannula is utilized more and more in these patients.

Bronchiolitis season is here!!! I thought it would be a good idea to have an informal review of this disease process.

Bronchiolitis is typically a disease that affects children under 2 years of age. Bronchiolitis is caused by a viral infection that produces inflammation and mucous plugging of the lower airways. Since the bronchioles in children under 2 years of age are so small, it does not take a significant amount of plugging and inflammation to cause some respiratory compromise. When we think of Bronchiolitis, RSV often quickly comes into mind. This is a very common cause of Bronchiolitis, but it is important to keep in mind there are many other viruses that can result in this disease entity; e.g., Adenovirus, Influenza, Parainfluenza and Metapneumovirus.

Keep in mind that Bronchiolitis can present in many different ways with varying degrees of illness. Some patients may only have cold symptoms while others may come in with florid respiratory distress and even full-blown respiratory failure. It is difficult to say which kids will become seriously ill from this disease.

However, we do know that certain children are more prone to developing more serious signs/symptoms; in particular, be aware of kids that have a history of Prematurity, Underlying

3 Your 10-year-old patient twisted his ankle and has point tenderness over the distal fibula. The X-ray appears to be WNL. Do you call it a sprain and be done with it? The prudent course of action is to discuss a type of injury called the **Salter Harris Type 1 fracture** with the caretaker.

According to the *Textbook of Pediatric Emergency Medicine*, 4th Edition, by Fleisher and Ludwig, 2000 (p. 1436):

“...when radiographic studies are negative but physical findings are suggestive of a Salter Harris Type 1 injury (i.e., point tenderness over a growth plate), immobilization and follow-up exam are essential.” Salter Harris Type 1 fractures are almost always benign, but note that even a Salter Harris Type 1 fracture can result in premature closure of the growth plate, which can be quite messy if left undiagnosed and not treated. The proximal radius, proximal and distal femur, and the proximal tibia all have a higher chance of premature growth plate closure after injury.



Lung Disease, Underlying Congenital Heart Disease, and kids with a history of Reactive Airway Disease. Children with these other medical conditions should put the practitioner at “High Alert.”

During your assessment of the child with suspected Bronchiolitis, it is also important to keep in mind that you can typically view this disease process as a 9+ day illness; in other words, it is safe to say as a general rule of thumb that your patient with Bronchiolitis will typically get sicker over 3 days, then stay that sick for 3 days, then gradually improve over 3 days. Those patients that are mild to moderately ill and may not meet admission criteria upon presentation to the ED may only be in the first 3 days of their illness. There is a real chance they WILL get sicker and may benefit from an observation admission.

Signs/symptoms of Bronchiolitis include varying degrees (if any) of coughing, nasal congestion, nasal discharge, tachypnea, retractions, rales, rhonchi, wheezes and fever. Keep in mind to monitor and document the patient’s O2 saturation, RR, HR, cap refill and appearance, as these are critical to portraying an image of wellness/illness in your documentation.

Your treatment for these patients will vary according to the severity of illness, but your treatment/work-up modalities for Bronchiolitis need to include VS monitoring, O2 sat monitoring, Albuterol Nebbs, suctioning, IVF, steroids, CXR, and possibly ABG.

(This paragraph has been updated with the new verbiage underlined.) The data varies a bit for the use of steroids in Bronchiolitis. A safe take-home message regarding the use of steroids in Bronchiolitis is that there likely is a very small subset of patients that will benefit from steroids. Those are the patients that have a wheezing or asthma history that improves with Albuterol Nebbs; the current wheezing, if any, significantly improves with Albuterol Nebbs as well.

In your monitoring of these patients, it is also important to keep in mind that RSV can cause apnea, especially in the neonates! If you have seen this before,



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Patients in the ED will often have abnormal Vital Signs (VS) due to their illness and possibly their apprehension of being in the ED in the first place. Now, when talking about kids, it seems like they always have abnormal VS when in the ED. So what do we do? Do we disregard the tachycardia because there is fever? Do we disregard the tachypnea because they are crying? **The answer is unequivocally NO!** We must not ignore these abnormal VS. We do not have to keep children in the ED until their VS are normal, but we do want to keep them in the ED until the VS are **normalizing** within reason for that specific patient.

Battery Ingestion

by Dr. Kristin Huynh

you will not forget it. Your patient will likely be tachypneic and retracting, obviously in respiratory distress. However, these kids can stop breathing out of nowhere, and that is not necessarily a function of them “tiring out,” but rather a function of the RSV affecting the immature respiratory center in the brain. If this does happen to your patient, it would be wise to try a high-flow nasal cannula O₂ rate; if it looks like you may need to intubate, a trial of CPAP or BIPAP first may stimulate breathing and prevent the need for intubation. Again, keep in mind the differentiation of the patient that is tiring out versus the patient that is suffering from apneic spells due to RSV.

A last pearl of wisdom to keep in mind is that these patients are often tachypneic and will lose a lot of fluid through their high surface area respiratory tract epithelium. You must address this in order to keep your patient euvolemic; otherwise you may be adding to the patient’s potential physiologic acidosis.

One final note. When obtaining a specimen for RSV testing, make sure the swab actually wipes up against the tissues and that you are not simply suctioning out nasal discharge, because you need epithelial cells to have an adequate specimen. ■

Ingestion of button batteries occurs more often than cylindrical batteries, with the majority occurring in children less than five years old and peaking at 1-2 years of age. Button batteries power a range of items such as watches, hearing aids, calculators, electronic games, and key chains. Button batteries are made with different metals; the anode is usually zinc and the cathode is silver oxide, mercuric oxide, manganese dioxide, or lithium manganese. All are 1.5 volts, except lithium batteries, which are 3 volts. Between the anode and cathode is a solution of potassium hydroxide or sodium hydroxide. The battery is enclosed in a steel or nickel case.

The ingested battery can cause corrosive injury by content leakage, current discharge, and pressure necrosis. The size and location of the battery in the GI tract and the integrity of the battery itself determine the amount of damage incurred by each mechanism. Another possible mechanism of injury is the absorption of heavy metals when the battery fragments in the acidic environment of the stomach. Mercury toxicity remains a concern; however, there have been no reports of mercury toxicity with battery ingestion even in the presence of elevated urine or serum mercury levels.





This is thought to be due to the conversion of mercuric oxide to elemental mercury in the presence of iron, which is less readily absorbed.



The National Button Battery Ingestion Hotline and Registry (NBBIHR) was established in 1982 to collect and analyze data on button battery ingestions in

order to generate treatment recommendations. According to the NBBIHR, only 6% to 13% of all ingestions resulted in clinically significant effects (with variability depending on the type of battery ingested). However, the most severe clinical course, including life-threatening symptoms or permanent disability, was linked to lithium battery ingestion. It is not known if this is due to the higher voltage and/or larger size of the battery.

Most patients present with either a witnessed battery ingestion or the child has told the caregiver about the ingestion. In only 10% to 20% of cases are there reported symptoms of battery ingestion; these could include chest pain, cough, anorexia, nausea/vomiting, hematemesis, diarrhea, epigastric/abdominal pain, fever, drooling, dysphasia, or black flecks in the saliva.

The location of the battery in the GI tract and length of time it has been there determine the severity of the tissue damage. The most worrisome situation is a battery lodged in the esophagus, which is a medical emergency. Esophageal edema can lead to airway compromise in as little as 3 hours; tissue damage occurs within 4 hours; and severe damage occurs within 8-12 hours. Rare but serious complications are esophageal perforation, tracheoesophageal fistula, and esophageal stenosis (all of which may not be present at the time of endoscopy). Because of this, management depends on the location of the battery. Any battery in the esophagus must be emergently removed endoscopically.

Fortunately, 80% to 90% of button batteries pass through the GI tract and do not cause symptoms. If symptoms do occur, the most common is mild GI irritation. The first step in management is to establish location



of the battery with anteroposterior and lateral radiographs from the nasopharynx to the anus. If located in the esophagus, emergent endoscopic removal is indicated. If it has passed to the stomach or intestines, outpatient management is acceptable since there is little evidence it causes injury unless it becomes impacted. According to the NBBIHR, 86% of batteries cleared the GI tract within 96 hours of ingestion, and only 4.5%

took more than one week. Repeat radiographs are indicated when the battery has not passed through the stool within one week. Other indications for endoscopic or surgical removal include any signs of GI injury or a lithium battery arrested in the stomach or intestines for more than 48 hours.

References: Barber, TE, Menke, RD. The relationship of ingested iron to the absorption of mercuric oxide. *Am J Emerg Med* 1984; 2:500. Bass, DH, Millar, AJ. Mercury absorption following button battery ingestion. *J Pediatr Surg* 1992; 27:1541. Kuhns, DW, Dire, DJ. Button battery ingestions. *Ann Emerg Med* 1989; 18:293. Kulig, K, Rumack, CM, Rumack, BH, Duffy, JP. Disk battery ingestion. Elevated urine mercury levels and enema removal of battery fragments. *JAMA* 1983; 249:2502. Litovitz, T, Schmitz, BF. Ingestion of cylindrical and button batteries: an analysis of 2382 cases. *Pediatrics* 1992; 89:747. Litovitz, TL. Button battery ingestions. A review of 56 cases. *JAMA* 1983; 249:2495. Litovitz, TL. Battery ingestions: product accessibility and clinical course. *Pediatrics* 1985; 75:469. Mant, TG, Lewis, JL, Mattoo, TK, et al. Mercury poisoning after disc-battery ingestion. *Hum Toxicol* 1987; 6:179. Reilly, DT. Mercury battery ingestion. *Br Med J* 1979; 1:859. Maves, MD, Carithers, JS, Birck, HG. Esophageal burns secondary to disc battery ingestion. *Ann Otol Rhinol Laryngol* 1984; 93:364. Thompson, N, Lowe-Ponsford, F, Mant, TG, Volans, GN. Button battery ingestion: a review. *Adverse Drug React Acute Poisoning Rev*, 1990; 9:157. Voteler, TP, Nash, JC, Rutledge, JC. The hazard of ingested alkaline disk batteries in children. *JAMA* 1983; 249:2504. ■



- ➔ Appendicitis
- ➔ Appendicitis in Children (coming soon)
- ➔ Case 02: A 15-year-old male with Abdominal Pain
- ➔ Case 04: A 14-month-old Febrile Child
- ➔ Case 06: A 23-month-old child with a Fever
- ➔ Case 13: Pediatric Missed Meningitis
- ➔ Cognitive Errors in Medicine Part 1
- ➔ Cognitive Errors in Medicine Part 2
- ➔ Community-Acquired Methicillin-Resistant Staph Infections (CA-MRSA)
- ➔ Head Injury
- ➔ Neonatal Emergencies
- ➔ Optimizing Communication in the Emergency Department
- ➔ Orthopedic Injuries Part 1
- ➔ Pediatric Abdominal Emergencies
- ➔ Pediatric Infections
- ➔ Pediatric Meningitis
- ➔ Pediatric Respiratory Emergencies
- ➔ Torsion Testicle

[Click on course name to see course description.](#)



By Dr. Todd Zimmerman

Testicular Torsion: Practitioners will sometimes forget to examine and/or document the genitalia exam. There is some data that shows at least 30% of children with testicular torsion will have a chief complaint of abdominal pain.



Appendicitis: This is difficult to diagnose in the little ones, as their presentation may not be the classic presentation for appendicitis. Data has shown that when very young children have appendicitis, they are often perforated, as it is difficult to get a good exam on such young children. Keep the diagnosis in mind; take your time to get a good abdominal exam; try distraction techniques.

Fractures: Missed fractures upset parents. Missed fractures make plaintiff attorneys happy. This does not mean we X-ray every child with an injury. But if you have point tenderness, swelling, bruising, etc., do not 'brush it off' and tell yourself that you do not need to get an X-ray, thinking that even if this is a fracture, it is so minor there will be no harm done. If you are concerned there is a fracture, do an X-ray. Communicate what you believe the X-ray results are to the parents, and tell them that you will notify them if the radiologist picks up anything additional on the X-ray. Keep in mind that you can have a Salter Harris Type 1 fracture with a normal X-ray.

Dehydration: Assess dehydration properly. Look and document the following: vital signs (very important); HR - look for tachycardia; overall appearance; mucous membranes and lips - dry, tacky or moist; urine output - adequate, increased or decreased; eyes - normal or sunken; skin turgor, and check the

abdomen for skin turgor; extremities - warm, good pulses, normal capillary refill; see if there are tears with crying.

Slipped Capital Femoral Epiphysis:

This usually occurs in tall, big, pre-teen males. Do they have an unexplained limp or a history of vague hip or knee pain? Are they complaining of knee pain alone with a normal knee exam. On these kids with this type of body habitus that have knee pain, you need to get not only knee X-rays, but also hip X-rays to assure there is no SCFE. Ensure you document not only a complete knee exam, but also a complete hip exam on every child with knee pain. Ensure you document internal and external rotation of the hip in addition to flexion and extension of the hip and the child's gait.

Meningitis: Sometimes it is very easy to diagnose, and sometimes it is literally impossible to diagnose. Document your next exam and whether Kernig's and Brudzinski's signs are present. Is there a bad HA, nausea, vomiting or fever? Is there any irritability or lethargy, not just fussiness or tiredness? Is there any photophobia; is it without focus or is it just some simple mild "viral" symptoms? Is your young patient consolable?

Communicate to the family that you feel there is sufficient data and clinical evidence to support that your patient does not have meningitis. However, also communicate that meningitis can evolve, and although there is no evidence of meningitis now, this disease process certainly can develop over a period



of time. Let them know that if they have any concerns or if the signs or symptoms continue or progress, they should return to the ED at once.

Myocarditis: This is also very difficult to diagnose. Key tip – look for tachycardia out of proportion to the fever or presenting complaint. This is often overlooked. If you have tachycardia out of proportion to the fever or illness, you have a duty to prove that your patient does not have myocarditis. Simply

check an ECG. If you have further suspicions, check a troponin, call a cardiologist, and get an echo stat. Things to keep in mind are whether the patient has vague deep chest pain, any SOB, and any positional chest pain.

Medication Errors: Nobody is immune to this, and every physician will likely order the wrong medication and/or dosage at least once. Always check the patient's weight in kilograms. Ensure that the conversions are correct; make sure that kg weren't entered

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What Are These Filler Pictures?

By Dr. Todd Zimmerman

Like everyone else, I like to show off my kids; but these are not just routine filler pictures. These are pictures of my son Mathew, every couple of years since his birth in November of 2002. He has Congenital Hypopituitarism. You can see a dramatic change between the 2nd and 3rd pictures, and then again between the 4th and the 5th pictures, and so on. He was started on Growth Hormone around the time of the 3rd picture, and has been on it since. So as noted, yes, I like to show off my kids, but I see this as a learning opportunity as well.

Congenital Hypopituitarism can have varying degrees of expression. Thankfully Mathew's Serum Cortisol has always been normal, but there are many children that are not as lucky as Mathew.



This is why it is important that we as ED physicians are aware of this condition. Due to an ACTH deficiency, some children with hypopituitarism do not produce sufficient Cortisol for the stress response the body needs during times of illness, fevers and other major stressors. The take-home message - when we have a patient in the ED with hypopituitarism who is having a significant illness, a fever, or other significant stressor, there is a good chance this patient may need a pulse dose of steroids; hydrocortisone is usually the preferred choice, but check with the patient's endocrinologist at the earliest possible time. Without a pulse dose of steroids, your patient may develop hypotension and shock, possibly rapidly. ■



in the system as pounds and then converted again in kg, or vice versa. After you write your prescription, get into a habit of rechecking the dose after you sign the prescription. Make it a habit to "Write, Sign, Check" your prescriptions and/or medication orders. Every once in a while call down to the pharmacy and simply ask the pharmacists if they always check the doses; it may seem overly simple, but it can remind people to do their jobs consistently. Remember that common mistakes are made with decimal points; write out your milligrams, etc.



Child Abuse: You may be wondering how child abuse can lead to malpractice claims. Remember, we are all mandated reporters. Essentially, if you think of child abuse when you see a patient, then you must notify your local Department of Children and Family Services.

But here's the kicker; your responsibility does not end in any way, shape, or form with simply making a phone call to DCFS. We have all been in the situation where we have a major concern of abuse, and DCFS simply tells you to send the child home and they will follow up. If you really have a suspicion that the child is in danger, you should strongly consider taking custody of the child yourself in the ED and letting DCFS know that you did it or are contemplating it. Then you should respectfully demand that a caseworker evaluate the

patient and family in the ED. Documenting that you called DCFS and DCFS telling you the child can go home is **NOT** adequate. It would not be uncommon for you to be the child's last hope for safety; remember that, and be polite and respectful, but be aggressive. ■

Thank You.

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