The Power of BLS Airway in Pediatrics

Much of what we do in Prehospital care is not based on science or evidence. We do things based on what we have done before and what we think we understand about excellent patient care at any point in time. However we are now moving into an era of evidence-based practice. It is happening in every health care setting and it is happening in EMS.

One decision coming to our county for 2008-2009 is the planned elimination of pediatric intubation for children below 40 kg. Although this may be difficult for many to accept it is the perfect example of evidence-based medicine and shifts the emphasis to what really improves outcomes in EMS—excellent BLS and rapid transport to definitive care. Over and over, studies emphasize the importance of BLS in the prehospital setting in both adults and children. ALS depends on BLS to be effective. Excellent BLS is the most important skill EMS providers have in their arsenal of tools to save lives. Prehospital providers need to be BLS experts first and foremost.

A recent call demonstrates this point dramatically. Transport medics were called to the office of a local pediatric cardiologist evaluating a 6-week-old (4 kg) infant with a heart murmur in respiratory distress. The cardiologist was intermittently ventilating the infant with BVM for episodes of apnea when EMS arrived. Oxygen saturations were low on room air but increased to 100% with BVM and 100% O2. Breath sounds revealed crackles bilaterally. HR was 160 and strong brachial pulses were palpable although a blood pressure was difficult to obtain. Albuterol was administered en route but made no apparent difference. The infant was rapidly transported with BLS airway to the nearest emergency department. At the ED multiple attempts at intubation were made and each time providers returned to BLS measures to effectively control the infant’s airway. The infant was air transported to Children’s Oakland. Air medics also attempted intubation prior to transport without success. BLS airway was used to transport the infant who was admitted to the ICU for pneumonia. In the pediatric ICU the infant was successfully intubated and was being weaned off the ventilator 24 hours later. The infant made a full recovery.

In this case, an ALS airway was unable to be obtained by numerous skilled operators. The clinical condition of the child was effectively stabilized with the front-line alternative of BLS airway. This was the first and best EMS airway for this patient. So what is the take-home message? BLS airway is very effective in pediatrics. Be confident in your ability to manage a patient’s airway with BLS. Hone your skills in this area…..it is what matters most and is what has been consistently shown to have the “best outcomes” for pediatric patients.

12-Lead Placement in Review

Limb leads should be placed on distal extremities if possible and may be moved to proximal if needed. Chest leads should be placed in the following fashion:

- Locate the sternal angle found at the 2nd rib level (Angle of Louis)
- V1 – 4th intercostal space at the right sternal border
- V2 – 4th intercostal space at the left sternal border
- V3 – Directly between V2 and V4
- V4 – 5th intercostal space at left mid-clavicular line
- V5 – Level of V4 at left anterior axillary line
- V6 – Level of V4 at left mid-axillary line

Remember good skin prep decreases artifact!
Length-based color-coded tapes have been effective in helping emergency personnel in urgent situations rapidly find the right equipment and medication in pediatric emergencies. These tapes are widely used in pediatric settings, but their greatest benefit has been helping health care providers who see pediatric patients infrequently to be prepared for the worst.

That is why it is used throughout our EMS community from first responders to emergency room physicians. It works because it is easy to use! But there are some considerations EMS providers must be aware of. First, there are many medications listed on the tape that are out of paramedic scope. Just because the medication is listed on the tape does not mean it is approved for medic use in our county.

These tapes include information on rapid sequence intubation pre-medications and chemical sedation. The current version, 2007 Edition B lists the endotracheal route for drugs which are no longer recommended by current PALS standards. Even ALS guidelines de-emphasize that route and ETT administration of emergency medications has been recently eliminated from our county protocols. References like these can lag behind changes in national standards. The tapes are expensive so your agency may not have the most recent version. Since 1998 the tape has been updated several times. The size of the color zones changed in 2002 and has not changed since.

Medication doses on the tape can be difficult to read due to the small print. Some medications have doses listed in both mgs and ml’s while others do not. This has led to confusion and the wrong amounts of medication have been given. Each tape has a disclaimer that states: “These tools while helpful should be a guide only in determining specific drug dosages.” That is why Contra Costa EMS limits the tapes use for determining approximate weight and the equipment selection. The pediatric drug dose charts in the prehospital care manual should be used for drug doses. You will find the dose in mg and ml on these charts.

Another limitation of the tape is its accuracy in obviously obese children. Drug doses are weight based in pediatrics, and children who are obese require larger doses. During a consultation with Dr. Broselow he stated that going up one color zone in the case of a clearly obese child is reasonable. Regardless of the limitations these tapes are an important tool for the EMS community. In our 2008-2009 EMS update our current pediatric drug charts will be updated to be consistent with color coded length based tapes currently in use. We believe that this will decrease confusion and simplify care when seconds count!

Amiodarone...Atropine...Midazolam Clarifications for the field

Last year’s EMS Update brought a vast number of changes to our prehospital care manual. Change can be a challenge, and we continue to see situations in which amiodarone, atropine and midazolam are not being used according to our current prehospital care guidelines.

In 2007 Amiodarone was added to several treatment guidelines where lidocaine was removed. However, amiodarone was not simply a replacement for lidocaine in these treatment guidelines and has significant differences in terms of properties and side effects. Amiodarone has an extremely long half-life (varies from 26 to 107 days), which means it stays in the body long after it is administered. It also will cause significant hypotension if it is administered rapidly to patients who have perfusing pulses.

In contrast, lidocaine has a very short life (1½ - 2 hours), and does not generally cause hypotension. Lidocaine was used as a bolus frequently in patients who had pulses or who were pulseless. Our rationale for the change to amiodarone was to provide field treatments consistent with AHA guidelines now being used in Emergency Departments.

In cardiac arrest (C3) field treatment guideline, Amiodarone is repeated only once and only if the ventricular rhythm persists. Amiodarone is not given post-conversion to a patient with a perfusing rhythm. In patients with stable ventricular tachycardia (C6), amiodarone is given over 10 minutes (not a bolus) and can be repeated if the patient remains stable. However, given the long administration time, we have not seen a repeat dose given. Because of the slow infusion rate needed with amiodarone, we often do not see rapid changes in rhythm after administration as we did with lidocaine.

For patients who have unstable ventricular tachycardia, cardioversion is the treatment of choice, and amiodarone is not given post-conversion.

As part of the 2007 EMS Update, atropine was moved down in the Bradycardia: Unstable (C8) field treatment guideline. Atropine should only be used when the availability of pacing is delayed or pacing is ineffective. Because atropine can worsen acute coronary ischemia or even increase infarct size, pacing is preferred. Atropine is also not generally effective in patients with heart block and wide QRS complexes, so external pacing has the advantage with these patients as well.

Atropine is no longer included in the Pediatric Cardiac Arrest (P3) field treatment guideline, though we occasionally have seen its use. Atropine has fallen out of favor and its use is not supported by research. Atropine is only a “consideration” in the pediatric bradycardia protocol (P4). Why? The majority of pediatric bradycardias are related to respiratory depression and only require support of ventilation. When hypoxia is corrected, the heart rate improves.

Midazolam (Versed) and morphine have very important roles in bradycardic patients, as pacing can be very uncomfortable. In most emergent situations however, pacing should be initiated before sedation or pain relief. Midazolam dosing should start with a 1 mg dose and be titrated in 1 – 2 mg increments to a maximum dose of 5 mg. Morphine similarly should be given in 1 mg increments to a maximum dose of 5 mg. On the other hand, an unstable patient who has a decreased LOC and low blood pressure may not need sedation, or should only be treated if vital signs improve.