

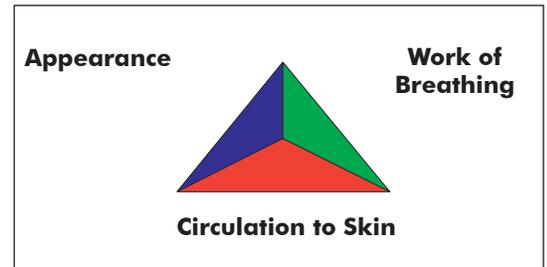
Pediatric Case Review: Choking in a 3-year-old

Glenda Grawe, MD
Paul Sirbaugh, DO
Manish Shah, MD

Does the thought of a pediatric call make you hyperventilate? Is there any way to make the prehospital triage, evaluation, management and transport of the pediatric patient less anxiety provoking? In an attempt to reduce at least some of that anxiety, we introduce something new to *Texas EMS Magazine* – The Pediatric Case Review. Occasionally we will present an interesting prehospital pediatric case from beginning to end and include an interactive piece as well as a discussion section. This issue the Baylor Pediatric Prehospital Group will walk us through what appears to be one of the most common presenting complaints for the EMT — the choking child. The discussion will reference techniques in assessment and treatment demonstrated in the Pediatric Education for the Prehospital Provider (PEPP) Manual, the primary text for the course for prehospital providers developed by the American Academy of Pediatrics.¹

Keystone to the principles taught in PEPP is the Pediatric Assessment Triangle (PAT)¹.

The PAT is an initial “general impression” of the child using a developmentally appropriate approach. It is performed before you even touch the child. The triangle has three features: appearance, work of breathing and circulation. From your initial impression you can then establish a level of severity, determine the immediate need for life support, and the general type of physiologic problem (i.e. in shock vs. not in shock).



Pediatric Assessment Triangle

Case Progression	Questions/Concerns	Appropriate Responses to Questions and Concerns
<p>Dispatch Difficulty breathing, choking child. Three-year-old choking on possible food substance. Unknown duration. Adult caretaker states child is breathing, but uncooperative.</p>	<p>What other questions would I like to know from the history?</p>	<p>Remember SAMPLE (see box, page 29). Dispatch can help with this, too. A definition of uncooperative would be helpful, as well as if the child is breathing, conscious or if any interventions have been attempted.</p>
<p>BLS Scene Arrival Apartment bedroom, adult male with 3-year-old girl on the floor partially wrapped in a towel, naked, listless, agonal respirations, gray coloring.</p>	<p>What do you know immediately from your Pediatric Assessment Triangle (PAT)? Is this what you expected from the dispatch report?</p>	<p>This child is near arrest and the PAT suggests shock.</p>
<p>BLS Assessment Child does not respond to verbal greeting or vigorous stimulation/pain. Respirations are gasping and become absent while vital signs are obtained. Pulse is 40, difficult to detect and weak. Pulse oximetry is not reading well and intermittently gives a SaO₂ of 60 percent. Capillary refill is >5 seconds. Unable to obtain a blood pressure. The child has bruising on the chest and abdomen.</p>	<p>Check ABCDE (airway, breathing, circulation, disability/level of consciousness, expose/evaluate) Why is she naked and why the bruising? Can coloring of the bruise tell you age of the incident? Do you wait for ALS or load and go?</p>	<p>A: Given history this may be the cause of her respiratory failure B: Not breathing C: Shock D: AVPU=U E: Naked and bruises of varying colors While numerous studies have tried to date bruising no scheme has been proven consistent. When recording bruising, it is best to describe size, color and location and not attempt any correlation with dating. This will differ for each agency. In larger cities, ALS might be dispatched with BLS – in smaller, rural areas there may only be BLS response available.</p>

BLS Intervention

Jaw thrust maneuver does not change respiratory effort. No foreign body is observed with minimal secretions and no vomit. She is easily ventilated with bag-valve mask (BVM). Few crackles are heard with initial BVM, but clear, aeration is equal bilaterally. Heart rate and pulse are difficult to detect and AED is placed (no shockable rhythm reported). Chest compressions are initiated. Pulses present with CPR. CPR is continued, rechecking AED rhythm every five cycles.

What is your priority until ALS arrives?

Current AHA guidelines stress “hard and fast” chest compressions with minimal interruptions. In pediatric patients respiratory failure is a common initial pathway to arrest. In this case, dispatch reported choking, suggesting respiratory failure would be the reason for this child’s condition. Remember, children with primary respiratory failure recover quickly with only airway and breathing support unless the insult was prolonged and children have become profoundly acidotic.

ALS arrival and assessment

A 3-year-old naked girl in cardiopulmonary arrest, currently receiving CPR, color is ashen, body appears flaccid. Findings on exam consistent with BLS observations. Only available history is choking. Mother’s boyfriend is on scene. Mother is reportedly en route from the grocery store. BLS on scene for 10 minutes, CPR in progress for approximately eight minutes.

ABCDE:

A: Good mask seal with BVM, mild stomach distention
 B: No spontaneous respirations. Good chest rise with BVM 100% O₂
 C: Compression pulse is palpable during CPR; however, color remains ashen, possible hypovolemia
 D: Remains unresponsive: AVPI=U
 E: Exposure suggest possible trauma

ALS Intervention

Intravenous access was obtained in the right antecubital fossa on the first attempt. Glucose 98. Cardiac monitor was placed, sinus bradycardia, unable to palpate pulses. CPR continued.

Attempts/time to place an IV?

Two attempts or 30 seconds.

What intervention(s) do you consider?

Vascular access and airway management with minimal interruption in compressions.

What are the current PALS guidelines for further intervention at this point?

Current PALS guidelines give the option of placing an advanced airway and are determined by medical direction for your group. Once access is gained, administration of epinephrine at 0.01mg/kg every 3-5 minutes, after rhythm evaluation, and continued chest compressions.

What are your other options?

Interosseous access delivers medication very effectively, but become easily displaced and must be adequately secured. If airway is established, access through the endotracheal tube (ETT) could be considered, but is not recommended if other avenues such as an IV or IO are possible.

Endotracheal intubation was performed on first attempt.

Cuffed or uncuffed? What size ETT?

Most systems utilize uncuffed ETT in children less than eight; however, in children beyond the newborn period, cuffed ETT may be used if cuff inflation pressures are less than 20. The preferred method is length based, but if not available the following calculation can be used, or the size of the patient’s little finger may serve as a rough guide.
 Uncuffed ETT size = Age(yrs)/4 + 4
 Cuffed ETT size = Age(yrs)/4 + 3

If you could, would you RSI?

The advantage of RSI is to reduce muscle tone and laryngospasm. Some RSI meds also reduce associated increase in intracranial pressure. Child was obtunded and flaccid; no report of trauma, but this child may be at risk of an anoxic brain injury and increased intracranial pressure.

Endotracheal intubation was performed on first attempt.	What does an ETCO ₂ of 75 mean?	While ETCO ₂ of 75 is high, elevated ET CO ₂ is correlated with better return of spontaneous circulation (ROSC). It is an indication of circulation of the lungs and effective CPR. Low CO ₂ may suggest esophageal intubation (no CO ₂ exchange in the stomach) or that circulation is insufficient and is correlated with a poor prognosis.
No foreign body or food particles were noted when tube was passed through the cords. Placement was confirmed: ETCO ₂ of 75, positive mist in the tube, bilateral breath sounds confirmed after no air movement in the stomach-however stomach was distended.	Why is the abdomen distended?	BVM was performed prior to ETT placement.
	What else should you consider?	Orogastric decompression should be considered.
Monitor continues to show sinus bradycardia and possibly faint rare palpable pulses. CPR continues with BLS assist.	What is this?	Pulseless Electrical Activity (PEA)
	Do you pause for ventilation now that the ETT is placed?	No
Epinephrine was given in three successive rounds. Med control requested papillary exam followed by a dose of atropine along with a fluid bolus of NS. Before atropine pupils were 5mm and nonreactive.	What is the dose of Epi to fluids?	Epi 1:10,000 0.1 mL/kg NS 20 mL/kg
	What weight would you use?	Weight based on length of tape; or 3-year-olds weigh about 13 kg or 30 pounds.
	Why papillary exam?	Atropine causes papillary dilation.
	Why atropine? What dose?	In this case the medics thought they may have palpated a pulse and it was opted to try a dose of atropine (PALS brady algorithm). Atropine 0.02 mg/kg, min dose 0.1 mg max dose 1 mg.
Wide complex bradycardia on monitor, no pulses. Transport to Children's Hospital.	Why the fluid?	Remember the 5 H's and 5 T's H ypoxia/ H ypoventilation, H ypovolemia, H ypothermia, H ypoglycemia, H ypokalemia (or hyper), T amponade, T oxins, T ension (pneumothorax), T hrombus, T rauma.
	Is the child adequately exposed for evaluation and are there findings that suggest etiology of the arrest?	

Children's Emergency Center

On arrival to the hospital CPR continued. Sinus bradycardia on monitors with no palpable pulses.

ETT placement verified by direct visualization and CXR.

Additional IV access obtained. Labs drawn.

Additional three rounds of epinephrine given.

pH 6.79 reported from stat blood gas.

Team review of current status. Child remains unresponsive to pain; pupils fixed and dilated total resuscitation time in excess of 45 minutes with no pulses.

Consensus of team to terminate resuscitative efforts on arrival of family. Code terminated after family discussion.

How is code termination determined?

No predictors are proven to predict survival in children. Children with a witnessed collapse, bystander CPR and rapid arrival of EMS have a better chance at ROSC. Prolonged efforts may be considered in patients with recurrent or refractory ventricular tachycardia/ventricular fibrillation (VF/VT), toxic exposures or hypothermia. In this case the child had PEA, no palpable pulses and no response to interventions.

Always be thinking, "What else could be going on?" Keep an open mind and continually reassess as more information comes available. Previously healthy 3-year-old children don't just die.

Case Review:

The boyfriend stated he was “cleaning her up” when the choking started. He did not give any further description. He had called the mother on her cell phone and later called 9-1-1 when the child would not respond, stating this was what the mother told him to do. He waited to call 9-1-1 hoping she would become more “cooperative.” On the physical there were some discrepancies with what the medics found and what the boyfriend reported as to what had happened. There was no stridor with the agonal respirations she had initially, plus there was no resistance with the BVM. In addition, the basic medic asked the paramedic when the child was intubated if there was “anything” in the airway, then asked the boyfriend what the child had choked on. The answer was tortilla chips. It was in the morning, and there was not any evidence of tortilla chips on or near the body. The boyfriend said he had been “cleaning her up” when it happened and that’s why she was naked in the towel.

These discrepancies were reported to the docs at the hospital and most importantly **recorded** in the run sheet.

Police were contacted and the investigation began in the ED. Autopsy revealed massive internal hemorrhage from abdominal trauma. No evidence of foreign substance in the airway.

These actions made the difference in the conviction of the abuser in this case.

If you question what you see, document it! Such as the 3-week-old who “rolled onto the carpeted floor” and now has a bulging fontanel and rib bruises; and the 6-month-old with the displaced femur fracture from what appears to be a minor fall. Others will see the contradictions as you did. If you write only your observations of the scene and the child you will make a difference. This is a role that is often not stressed in training, but is invaluable for the care of children.

Good work!

Reference:

¹American Academy of Pediatrics: PEPP: Pediatric Education for Prehospital Providers, Second Edition. Sudbury, MA, Jones and Bartlett Publishers, 2006.

For more information on the prehospital assessment, management and transport of the pediatric patient, please reference PEPP (www.peppsite.com).

Paul E Sirbaugh, DO, Glenda Grawe, MD, and Manish Shah, MD, are with Baylor College of Medicine, Department of Pediatrics, Texas Children’s Hospital, Section of Emergency Medicine, Pediatric Prehospital Group

Questions to make you think of the call in general:

When you arrived, is this what you expected from the dispatch report?

Why is the child naked and why the bruising?

Given the scenario, does the story fit?

Do you have any other concerns?

Anything else you want to know?

Are you sure there is no trauma history?

Is there something to be learned from this patient, something that doesn’t fit?

Why did this child die?

Points to make note of:

Delay in care is always a red flag.

The story does not fit, also be wary of the story that changes, record all of them.

Since the boyfriend is not the child’s father and the mother is not home, what is their relationship?

You cannot “infer” in your run sheet, but you can document what you found. Not all boyfriends are bad, but studies have shown a higher rate of abuse with non-related care givers...e.g., boyfriends.

Think about who is caring for the child and their relationship.



photo from Department of Family and Protective Services Child Abuse Prevention kit

Pediatric Sample Components

Component	Explanation
Signs and symptoms	Onset and nature of symptoms of pain or fever
	Age appropriate signs of distress
Allergies	Known drug reactions or other allergies
Medications	Exact names and doses of ongoing drugs (including over-the-counter, prescribed, herbal, and recreational drugs)
	Timing and amount of last dose Time and dose of analgesics or antipyretics
Past medical history	Previous illnesses or injuries
	Immunizations History of pregnancy, labor, delivery (infants and toddlers)
Last oral intake	Timing of the child’s last food and drink, including bottle and breastfeeding
Events leading to illness	Key events leading to the current incident or injury
	Fever history