A Curriculum for Simulation in Pediatric Emergency Situations: Improving Pediatric Residents Skills and Self Confidence

Price Ward, MD
price.ward@ufl.edu

Daphna Barbeau, MD
daphy@peds.ufl.edu

Nora Colman, MD
nora.colman@choa.org

Nicole Black, MD
blacknm@peds.ufl.edu

1Co-Chief Resident 2015-2016, Department of Pediatrics, University of Florida
2Co-Chief Resident 2014-2015, Department of Pediatrics, University of Florida
3Pediatric Program Director, Department of Pediatrics, University of Florida

Management of cardiopulmonary events in children can be a challenge for pediatric residents due to the rarity of events and lack of skills training during residency. Literature suggests that residents have deficits not only in procedural skills, but also in the confidence and communication proficiency to successfully run a code. At the University of Florida, aside from PALS certification, there was no formal curriculum devoted to learning and maintaining code skills or enhancing self-confidence in these situations. We developed a year-long curriculum for our pediatric residents using simulation training and mock codes to reinforce these skills and develop resident self-confidence and communication during code scenarios, with the ultimate goal of improving patient outcomes. The simulation training curriculum breaks down the PALS guidelines into 7 modules: (1) Patient Assessment & Team Roles, (2) Airway Management & Respiratory Failure, (3) Compressions & Circulation, (4) Rhythm Recognition, (5) IV/IO Access & Medications, (6) Shock, (7) “Putting it all together”. Residents are divided into groups of 5-8 and attend 30 minute training sessions which occur once weekly from 8:00-8:30 to review each module separately. Each module takes between 4-6 weeks to complete with the last module focusing on using the skills obtained throughout the year and running various patient scenarios. In addition, throughout the year, we hold 2-4 multidisciplinary mock codes per month which allow the residents an additional opportunity to practice and maintain their resuscitation skills.

References:


Module 1: Patient Assessment & Team Roles

I. Primary Assessment & Team Roles
   a. Airway
      i. Movement of the chest or abdomen
      ii. Listen for breath sounds and air movement
      iii. Feel the movement of air from the nose or mouth
   b. Breathing
      i. Respiratory rate
      ii. Respiratory effort
      iii. Lung sounds
      iv. Pulse oximetry
   c. Circulation
      i. Skin color and temperature
      ii. Heart rate and rhythm
      iii. Blood pressure
      iv. Pulses
      v. Capillary refill
      vi. Brain perfusion (mental status)
      vii. Renal perfusion (urine output)
   d. Disability
   e. Exposure

II. Secondary assessment
   a. Focused history using SAMPLE
      i. S: signs and symptoms
      ii. A: allergies
      iii. M: medications
      iv. P: past medical history
      v. L: last meal
      vi. E: events leading up to illness
   b. Focused physical exam

III. Team Roles
   a. Team Leader
   b. Assess the situation
   c. Identifies themself as code leader
   d. Assigns team roles
      i. Chest compressions (2)
      ii. Airway
      iii. IV access/Medications
      iv. Defibrillator
      v. Recorder
Module 2-Airway management & Respiratory Failure

I. Able to verbalize patient’s head position for oxygenation and ventilation
   a. Head-tilt chin-lift (non-cervical neck injury)
   b. Jaw thrust (suspected or confirmed cervical neck injury)

II. Mag/Mask ventilation
   a. Attached BVM mask to bag
   b. Extend reservoir
   c. Verbalize that BVM is attached to an oxygen flow and turned on to maintain oxygen saturations > 94%
   d. Appropriate placement and size of BVM
      i. Apex-positioned on the bridge of the patient’s nose
      ii. Base-positioned at patient’s chin
   e. Ensure mask is adequately sealed to the patient’s face using thumb and index finger on one hand in “E-C” clamp technique
   f. Provides two ventilatory breaths over one second at the end of each set of compressions using a compression to ventilation ratio of 30:2
   g. Visualization of chest rise
   h. Median time to endpoint

III. Intubation:
   a. Checks that suction is on and functioning before intubation
   b. Chose correct ET size
   c. Chose correct blade size
   d. Check laryngoscope light
   e. Patient pre-oxygenated before intubation
   f. Patient in sniffing position to intubate
   g. Use left hand to intubate
   h. Tube observed in trachea
   i. Median time to endpoint

Module 3-Compressions & Circulation

I. If pulseless, initiated and performed chest compressions
   a. Placed heel of the hand in the center of patient’s chest. Placed other hand on top of the first with the fingers interlaced
   b. Pushes hard and fast at a rate of 100 compressions per minute
   c. Pushed with appropriate depth (infant 1.5 inches, child 2 inches, adult 2 inches)
   d. Allows for complete recoil after each compression
   e. Minimized interruptions of chest compressions
   f. Switched providers to avoid fatigue when there was provider fatigue or one cycle was completed (2 mins)

II. Defibrillation:
   a. Correct placement of chest pads
   b. Charges defibrillator
   c. Discharges defibrillator
   d. Clears the table
e. Checks pulse after defibrillating
f. Median time to endpoint

Module 4-Rhythm Recognition
I. Rhythm Recognition
   a. Bradycardia with a pulse
   b. Tachycardia with a pulse and poor perfusion
      i. Narrow complex
         1. Sinus tachycardia vs SVT
      ii. Wide complex
         1. Possible Vtach
         2. Synchronized cardioversion
   c. Pulseless arrest
      i. VF/VT
         1. Performs CPR and defibrillation
      ii. Asystole/PEA
         1. Performs CPR

Module 5-IV/IO access & Medications
I. I/O placement
   a. Cleans I/O area
   b. Takes stylet out of line
   c. I/O stable in bone
   d. Flush I/O line
   e. Median time to endpoint

II. Medications
   a. Determines medication dosage using length based resuscitation tape
   b. Selection of drugs for RSI

III. Locations of items in the crash cart

Module 6: Shock
I. Recognize altered mental status and perfusion
II. Give oxygen and support ventilation
III. Establish vascular access
IV. Fluid resuscitation with 20 ml/kg boluses of isotonic fluid
V. Consider labs; VBG, ABG, lactate, glucose, ionized calcium, cultures, CBC
VI. Consider need for vasoactive drug therapy

Module 7-Putting it all together
I. Comfort and experience with critical pediatric resuscitation skills
   a. ability to lead and participate in resuscitation of critically ill patient
   b. resuscitation of respiratory failure requiring airway management
   c. resuscitation of shock requiring fluid resuscitation
   d. resuscitation of PEA
   e. resuscitation of bradycardia with hypotension
   f. evaluation and management of SVT and Vfib
   g. termination of resuscitation efforts