ImPACTS
IMPROVING PEDIATRIC ACUTE CARE THROUGH SIMULATION

Section 1: Case Summary

Scenario Title:	**Infant Cardiac Arrest**
Brief Description of case:	6-month-old, 7 kg infant, Flu B positive, who develops cardiac arrest during transport

Goals and Objectives	
Scenario Goal:	To review the management of an intubated, sedated infant who evolves to cardiac arrest, per the **American Heart Association / Pediatric Advanced Life Support 2020 Guidelines.**
Learning Objectives: (Medical and CRM)	1. Verbalize asystole/Ventricular fibrillation promptly in a pediatric patient. 2. Implement the appropriate PALS algorithm. 3. Perform defibrillation correctly during transport.

Learners, Setting, and Personnel			
Target Learners	☒ *Transport Team Personnel (based on each center team configuration)		
Location	☐ In Situ (Transport vehicle)	☐ Simulated vehicle	☐Other:
Simulation personnel	☐ **Facilitator(s) / Sim operator ☐ Embedded Participants: ● ED personnel (to give the report in section 3) ● MD for medical control-via phone ● Vehicle operator if utilized by the team		

Personnel:

*Transport team will include members based on the team or transport center configuration that would typically be used for the ground transport of an infant with this referral indication.
**The simulation team will provide facilitators and the opening vignette, including referral information.

Type of simulator:

Type of Simulator:
Infant – mid to high technology
Examples: Baby HAL, SimBaby Laerdal, or SimNewB Laerdal.

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Supplies and Fluids	Medications
Infant/Pediatric Transport Cot Transport Bags Defibrillator, pads, electrodes **Respiratory equipment** Nasal cannula Masks / NRB NPA, OPA Bag/mask sets LMA **Intubation supplies** Range of sizes - Tubes - Stylets - Laryngoscopes Colorimetric CO2 detectors Capnography cannula Transport Ventilator Suction supplies and devices **Fluids and Flushes** D5 ½ NS D5NS, NS, LR ☐D10 ☐D25 ☐D50 IV & IO supplies Pull-Push Setup	**Code Medications** Epinephrine 0.1mg/mL (code dose) Based on center supply/concentration Amiodarone 50 mg/mL (undiluted, straight drug) Bicarbonate 0.5 mEq/mL (4.2%) or 1 mEq/mL (8.4%) Calcium (Chloride or Gluconate) 100 mg/mL **Intubation Medications** Lidocaine 10 mg/mL Fentanyl 50 mcg/mL Atropine 0.1 mg/mL Etomidate 2 mg/mL Ketamine 10, 50, 100 mg/mL available NMB: Rocuronium 10 mg/mL, Vecuronium 10 mg/mL (has to be reconstituted with 10 mL NS) **Hyperosmolar Meds** Hypertonic saline (3% HTS) Mannitol 20%, 25% **Seizure meds** Lorazepam 2mg/mL and 4mg/mL Midazolam 1mg/mL and 5mg/mL Diazepam 5mg/mL Phenobarbital 65mg/ml or 130mg/mL Levetiracetam 100 mg/mL – depends, can vary! Valproic Acid 100 mg/mL Fosphenytoin 50mgPE /mL **Antibiotics** generic antibiotics

These supplies and equipment should be available in a fashion that mimics the actual supplies for the transport team.

Section 2: Information to Transport Team upon Deployment

(Transport team will be in the waiting room or any other location that is not the transport vehicle)

Initial Report (Can be via phone or by paging depending on the center)					
Patient's Name: Leo	Age: 6 months		Gender: Male		Weight: 7 kg
Presenting complaint: URI and respiratory distress					
RR: 69	HR: 175	0_2 Sat: 94%	BP: 80/50	Temp: 37.2	F_iO_2: 100
Blood glucose: 95 mg/dL			GCS: 13		
Narrative: 6-month-old (7kg) male being transported by pediatric critical care transport team from the outside hospital ED to accepting PICU. The patient was diagnosed with Flu B. He presented today to the ED with 2-day h/o decreased feeding and lethargy was found to be tachypneic with saturations in the mid-80s. His CXR showed enlarged cardiac silhouette RML and RLL opacities. He was initially placed on HFNC with no improvement so was then intubated by the ED team due to his hypoxemia and lethargy. Calculated transport time 35 minutes.					
Allergies: None					

Past Medical History	**Current Medications**
Received 4-month vaccines No surgeries or hospital admissions Rarely gets sick Older sibling Flu B positive	None

Section 3: Information to Transport team upon arrival to referring ED (transport team is at bedside)

Referring ER Report
ER nurse at the bedside states: This is Leo. He is a 6-month-old who presented today with a 2 day history of decreased feeding, lethargy and is confirmed Flu B positive. Upon the arrival of the transport team, the patient was already intubated for hypoxemia and lethargy using ketamine (7mg) and rocuronium (7 mg) and is currently on a fentanyl drip in the right AC PIV. He received a 20mL/kg NS bolus and the ED team started him on an Epi infusion at 0.03 mcg/kg/min in the left Antecubital PIV given his hypotension and poor perfusion. He also received additional boluses of ketamine and rocuronium prior to transport team arrival. There are two PIV 22 gauges in the bilateral ACs. On exam, he is sedated and paralyzed, with cool extremities and a 3-second cap refill. Parents will follow in their vehicle. ETT: 3.5 cuffed secured at 11.5 cm at the lip ED Vent setting: FiO2 100% Rate 24, Vt 50, PEEP: 6, PS: 10 Post-intubation VBG: pH 7.2 pCO2 50 pO2 40 HCO3 14 BE -8. Chemistry: Na: 139, K 3.3, iCa: 1.25, BUN: 15, Crea: 0.6 The patient was placed on a transport ventilator with matched settings. Transport Vent setting: FiO_2: 100, Rate: 24, Vt: 50 ml, PEEP: 6, PS: 10, Wave Capnography connected and at 45 **PMH if asked:** Term delivery after uncomplicated gestation. Received 4-month vaccines, No previous surgeries or hospital admissions. **Social history if asked:** Lives at home with parents, no second-hand smoke exposure

Vital Signs					
HR: 170	RR: 24	SpO_2: 95%	Temp: 37.2	BP: 69/38	$ETCO_2$: 40

Physical Exam If a physical exam finding is not specified in the case, it is within normal limits.	
Cardiac: Sinus tach, no murmurs	Neuro: Pupils equal 3mm (pt sedated, muscle relaxed)
Respiratory: Coarse/crackles breath sounds	Head and Neck: normocephalic atraumatic
Abdomen: Soft, slightly distended	MSK/Skin: No rashes, no petechiae
If asked what labs were done:	**Infusion drips**
VBG: pH 7.2 pCO2 50 pO2 40 HCO3 14 BE -8 Chemistry: Na: 139, K 3.3, iCa: 1.25, BUN: 15, Crea: 0.6 Coags: Normal INR 1.2 CBC: WBC 15K, Hg 13, platelets 245 K Blood Cx: Obtained	☒ Fentanyl 1 mcg/kg/h ☒ Epi 0.03 mcg/kg/min

Following the initial report and then the ED report to the transport team, the team will be instructed to move to the transport vehicle to start the actual transport.

Section 4: Scenario Progression

(This will be the beginning of the actual simulation in the transport vehicle. If the transport team calls medical control prior to departure, they will be prompted to load and transport the child.)

Scenario States, Modifiers and Triggers			
Patient State/Vitals	**Patient Status**	**Learner Actions**	**Modifiers & Triggers to Move to Next State**
1. First Phase (duration 3 min) SINUS TACHYCARDIA HR: 170 BP: 69/38 RR: 24 Wave Capnography: 45 O_2 SAT: 94% Oxygen: 100% Temp: 37.5	Cold extremities, poor pulses, sedated. Muscle relaxed	*Expected Learner Actions ☐ Verbalize abnormal vital signs ☐ Continue Wave Capnography	(20 min ETA to receiving) - If another fluid bolus given, HR goes up to 200, sats drop down to 90%
2. Second Phase (duration 5-7 min) ASYSTOLE HR: drops to 40 over 3 minutes Then 30 seconds to asystole Wave Capnography drop slowly from 40 to 15 with the HR drop (All vitals disappear once the asystole button is pushed)	Patient unresponsive	*Expected Learner Actions ☐ Verbalize asystole ☐ Ventilate patient at a rate of 20-30 breaths/min (1 breath every 2-3 seconds) ☐ Start chest compression (100-120 bpm) ☐ Administer a dose of epinephrine (0.07 mg or 0.01mg/kg) IV ☐ Verbalize Waveform capnography to monitor the quality of CPR ☐ Notifies med control or receiving facility by phone	(10 min ETA to receiving) - Asystole for 2 rounds of CPR then switch to V-Fib - If the team asked about Wave Capnography, it is 15-20 - The patient will remain in asystole for 2 rounds of PALS regardless what actions are performed. - At 2nd pulse check, switch to V-Fib phase. - Wave Capnography 15-20 with high-quality chest compressions
3. Third Phase (Duration 3-5 min) V-FIB	Patient unresponsive	*Expected Learner Actions ☐ Check pulse/rhythm ☐ Verbalize Vfib ☐ Ventilate patient at a rate of 20-30 breaths/min ☐ Defibrillate with 2-4 J/kg	(5 min ETA to receiving) - If the team asks about wave capnography, it is 15-18 - ROSC after shock is delivered

		☐ Resume chest compression (100-120bpm) after the shock ☐ Verbalize Waveform capnography to monitor the quality of CPR	- If 2 cycles passed without recognizing Vfib, the end case
4. Fourth Phase ROSC Rhythm: Sinus HR 175 BP 65/35 RR 24 (or rate provided by manual ventilation) Wave Capnography: 25 O2 Sats: 90% Oxygen: 100% Temp: 36.4	Patient unresponsive	Expected Learner Actions ☐ Check pulse/rhythm ☐ Verbalize ROSC ☐ Resume ventilation at a rate of 20-30 breaths/min (manually or through the vent) ☐ Contact receiving facility to notify of an incident	- Case completed with ROSC

Team can contact medical control anytime during the case for recommendations based on their center practice and policies. Please refer to the scripted medical control below:

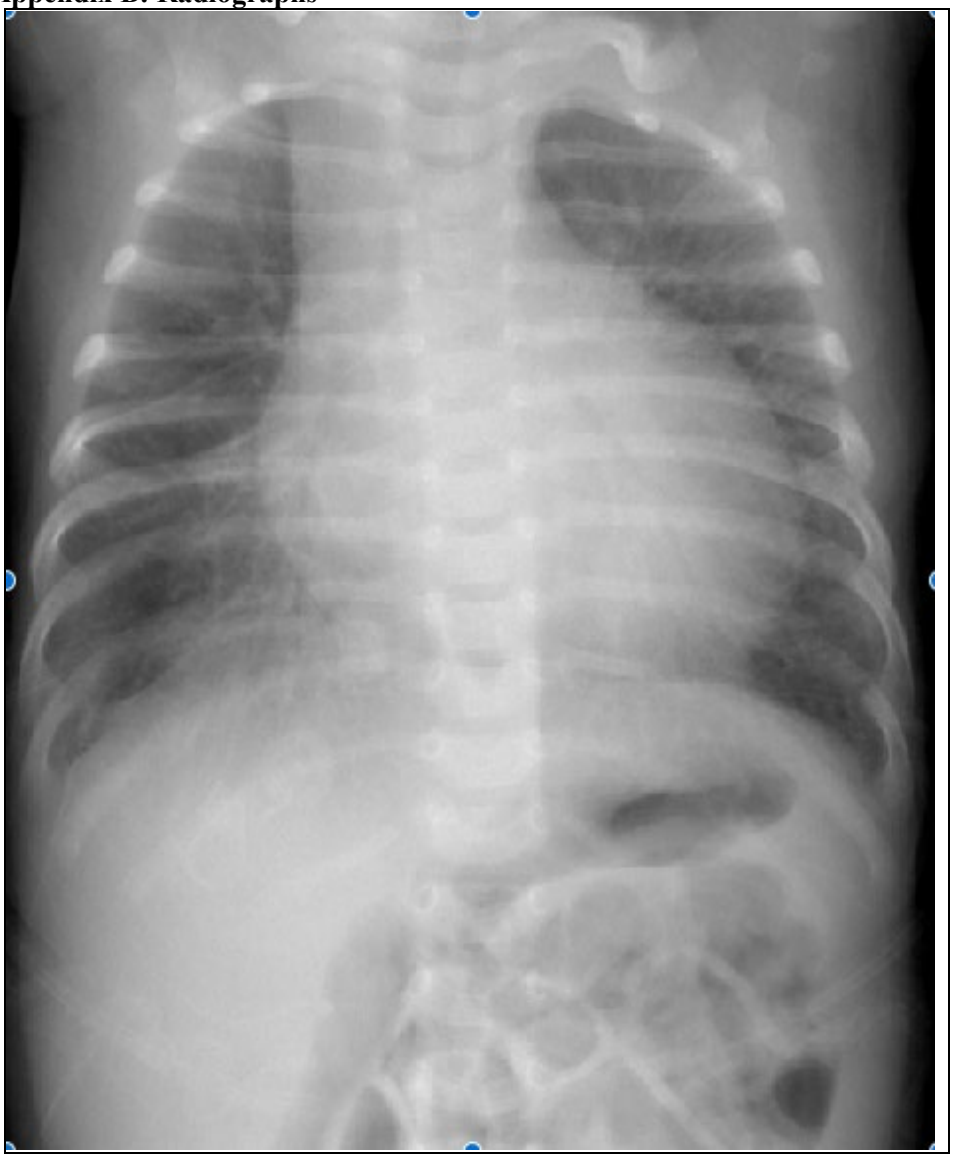
If team calls for recommendations/update at immediate start of asystole: "Please continue to follow your PALS, complete two cycles of CPR and epinephrine administration and call me back with an update."

Please refer to your institution's guidelines/protocols for guidance on cardiac arrest during transport to provide guidance to the team.

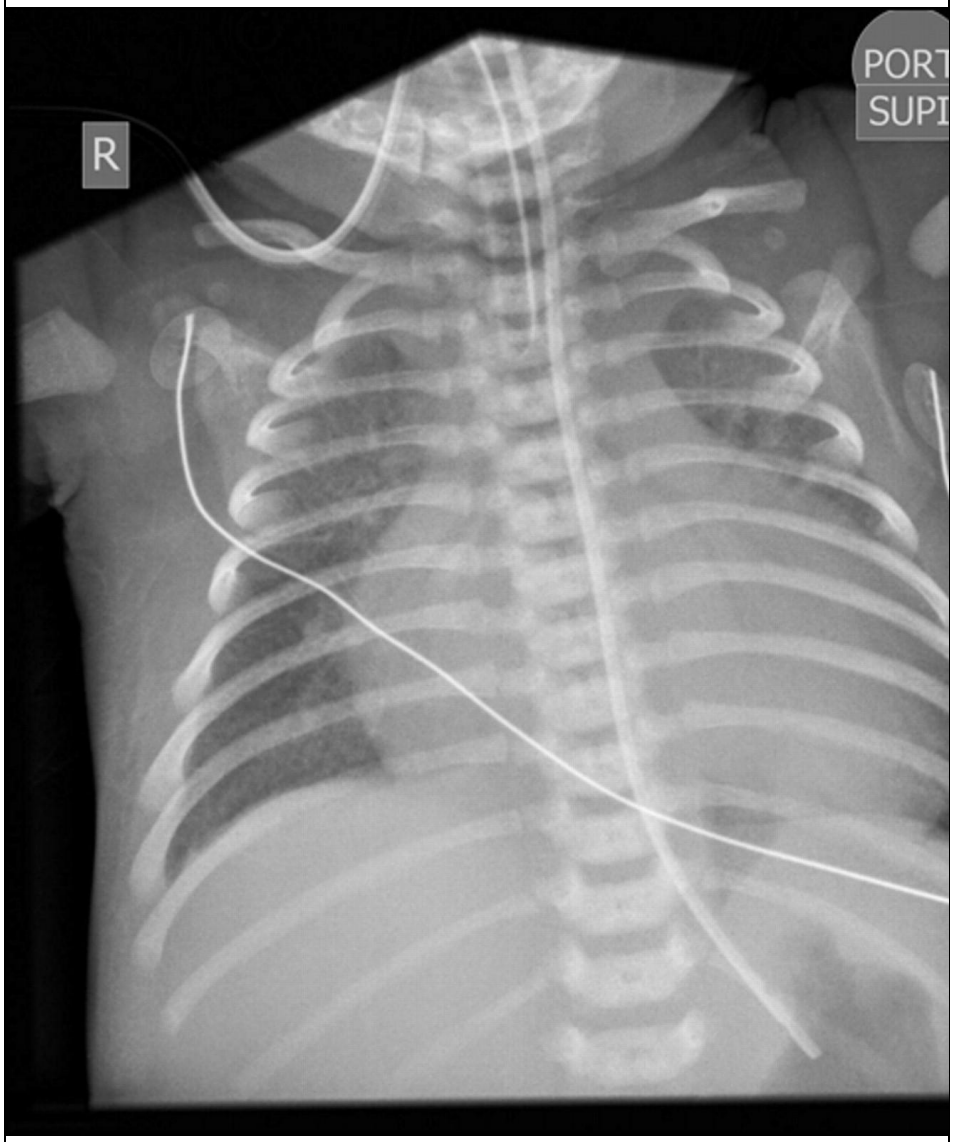
Appendix A: Laboratory Results

VBG: pH 7.2 pCO2 50 pO2 40 HCO3 14 BE -8.
Chemistry: Na: 139 mEq/L, K 3.3 mEq/L, iCa: 1.25 mmol/L, BUN: 15 mg/dL, Crea: 0.6 mg/dL, glucose: 95 mg/dL
Coags: Normal
CBC: WBC 15K, Hg 13, platelets 245 K
Blood Cx: Obtained

Appendix B: Radiographs



CXR on arrival to the ED before intubation



CXR in the ED after intubation