Pediatric Myocarditis

Section 1: Case Summary

Scenario Title:	Pediatric Myocarditis
Keywords:	Pediatric myocarditis
Brief Description of Case:	A 4 year-old boy is brought in with chest pain, difficulty breathing, and fever. He has had flu-like symptoms, malaise, muscle weakness, and vomiting. His status worsens with fluid administration. He develops a wide-complex tachycardia and pulmonary edema.

Goals and Objectives	
Educational Goal:	
Objectives: (Medical and CRM)	**Medical:** • Recognize the nonspecific presentation of myocarditis in children, and have a low threshold of suspicion in a child presenting with fever and respiratory symptoms • Recognize cardiogenic shock • Recognize management of wide-complex tachycardia with a pulse • Discuss basic myocarditis management principles **CRM**: Demonstrate effective team communication
EPAs Assessed:	

Learners, Setting and Personnel				
Target Learners:	☐ Junior Learners	☒ Senior Learners	☐ Staff	
	☐ Physicians	☐ Nurses	☐ RTs	☐ Inter-professional
	☐ Other Learners:			
Location:	☐ Sim Lab	☐ In Situ	☐ Other:	
Recommended Number of Facilitators:	Instructors:			
	Confederates:			
	Sim Techs:			

Scenario Development	
Date of Development:	April 2, 2020
Scenario Developer(s):	Navid Deghani
Affiliations/Institutions(s):	
Contact E-mail:	Kpatel5@shaw.ca
Last Revision Date:	
Revised By:	
Version Number:	

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Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name: Kyle			Age: 4	Gender: M	Weight:
Presenting complaint: chest pain, SOB					
Temp: 38.2	HR: 180	BP: 72/38	RR: 38	O_2Sat: 91%	FiO_2: R/A
Cap glucose:			GCS: (E V M)		
Triage note: 2 week hx intermittent fever, cough, SOB, body aches, vomiting. Now has difficulty walking.					
Allergies: none					
Past Medical History: none			Current Medications: none		

Section 2B: Extra Patient Information

A. Further History	
Include any relevant history not included in triage note above. What information will only be given to learners if they ask? Who will provide this information (mannequin's voice, confederate, SP, etc.)? Info only given if asked: -no recent travel -immunizations up to date -mom is sick with a "cold"	
B. Physical Exam	
List any pertinent positive and negative findings	
Cardio: no murmurs, sinus tachycardia	Neuro: Awake,
Resp: mild increased work of breathing, coarse crackles throughout	Head & Neck: normal oropharynx and tymp membranes, no neck stiffness
Abdo: soft nontender	MSK/skin: pale, mottled skin
Other: pale, appears tired, lethargic	

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Section 3: Technical Requirements/Room Vision

A. Patient
☒ Mannequin *(specify type and whether infant/child/adult)*
☐ Standardized Patient
☐ Task Trainer
☐ Hybrid
B. Special Equipment Required
Pediatric defib pads
C. Required Medications
D. Moulage
E. Monitors at Case Onset
☐ Patient on monitor with vitals displayed ☒ Patient not yet on monitor
F. Patient Reactions and Exam
Include any relevant physical exam findings that require mannequin programming or cues from patient (e.g. – abnormal breath sounds, moaning when RUQ palpated, etc.) May be helpful to frame in ABCDE format. Coarse breath sounds with crackles Complains of chest pain when lying down

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Section 4: Confederates and Standardized Patients

Confederate and Standardized Patient Roles and Scripts	
Role	*Description of role, expected behavior, and key moments to intervene/prompt learners. Include any script required (including conveying patient information if patient is unable)*

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Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
LOC: lethargic, pale, toxic **HR: 180 with weak pulse and sluggish cap refill** **BP: 72/38** **RR: 38** **Sats: 91%** **Temp: 38.2** **Gluc: 3.2**	*Pale, tachypneic, appears very tired, little movement and doesn't cry or smile*	Expected Learner Actions ☐ Place child on cardiac monitor, apply O2 ☐ Obtain IV, bedside glucose ☐ Stat CXR, septic panel ☐ Recognize hypotension and order IV fluid bolus 10-20cc/kg NS ☐ order ECG	Modifiers -RN to prompt for dextrose if none given -No O2 placed >>O2 drops to 88% Triggers -post fluid bolus or 5 minutes passes >>clinical deterioration>>stage 2	
2. **LOC: unresponsive** **HR: 198 and wide complex with a weak pulse** **BP: 68/24** **RR: 48** **Sats: 86%**	Extremely drowsy, moans to sternal rub. Very weak peripheral pulses, cool and mottled skin.	Expected Learner Actions ☐ Recognize wide-complex tachycardia on monitor ☐ Place defib pads for synchronized cardioversion>>0.5J/kg then 2J/kg ☐ Persistent tachypnea + CXR results interpreted for pulmonary edema >> consider BiPAP (call RT) or intubation, Lasix 1mg/kg ☐ Consult Peds/PICU>>consider inotropes (milrinone, dobutamine), antiarrythmics	Modifiers -Converts to NSR after 2 cardioversion attempts>>blood pressure improves -CXR results given after cardioversion -If no cardioversion by 5 minutes >> cardiac arrest -if no further respiratory support >> RN alerts to worsening tachcypnea>>cardiac arrest Triggers -Calls PICU/BiPAP>> end scenario	

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		☐bedside EDE for pericardial effusion		

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Appendix A: Laboratory Results

Cap gas :	
pH 7.19	
pCO2 55	
pO2 60	
Bicarb 11	
BE -11	
Electrolytes	
Na+ 128 mmol/L	
K+ 5.8 mmol/L	
Cl– 92 mmol/L	
glucose 2.9 mmol/L	
BUN 11 mmol/L	
Creat 83 umol/L	
CRP 27	
CK 1200	
cbc	
WBC 26.1 x 10*9/L	
Hgb 101 g/L	
Platelets 540 x 10*9/L	

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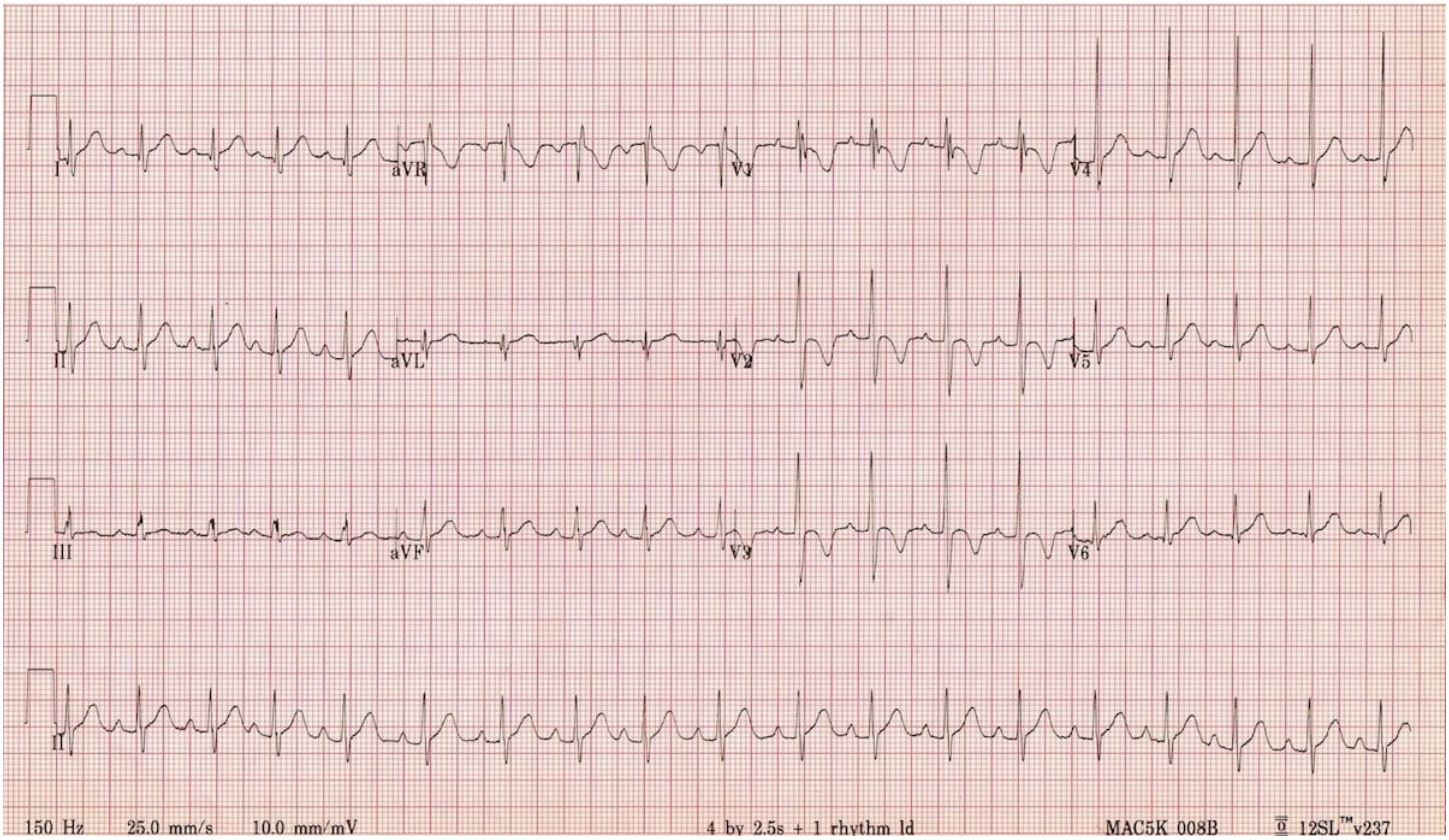
Appendix B: ECGs, X-rays, Ultrasounds and Pictures

Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!

Initial EKG:



https://litfl.com/wp-content/uploads/2018/08/ECG-Incomplete-RBBB-Normal-Pediatric-2-year-old.jpg

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https://litfl.com/wp-content/uploads/2018/08/Monomorphic-ventricular-tachycardia-VT-8.jpg

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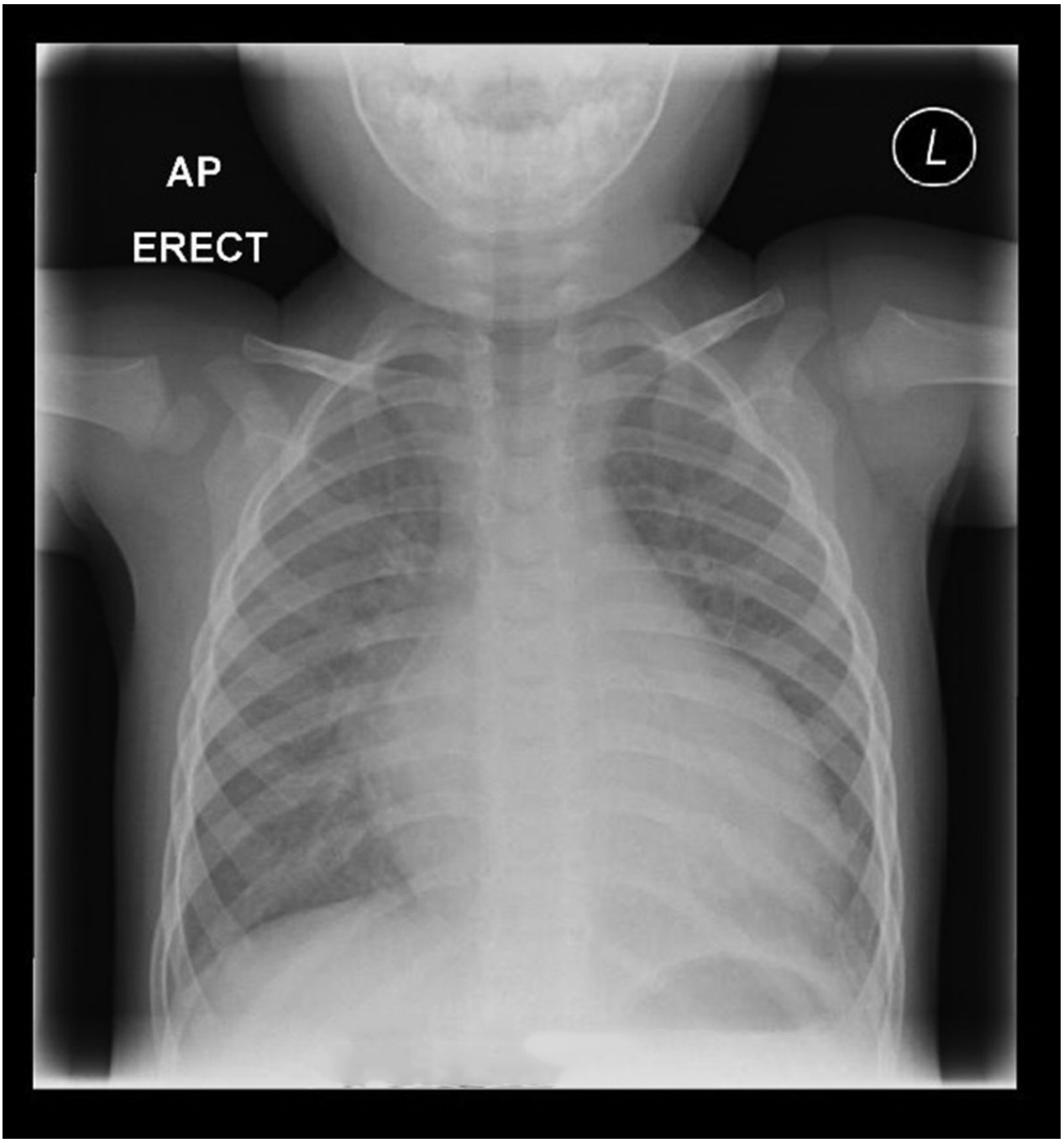
CXR:



https://adc.bmj.com/content/archdischild/101/Suppl_1/A88.1/F1.large.jpg

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US Source:
https://www.thepocusatlas.com/echocardiography/xg2awokhx1zx8q3ndwjju5cu4t1adq

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Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.

- Viruses most commonly associated with myocarditis include Coxsackie virus, Adenovirus, Parvovirus B19, and Human Herpes Virus 6.
- Pathophysiology consists of three stages:
  - Myocardial cell direct viral injury
  - Autoimmune reaction leading to myocardial cell injury
  - Dilated cardiomyopathy
- Fulminant myocarditis is a distinct entity and is a sudden (< 3 days) onset of cardiogenic shock and is more often seen in infants.
- Due to nonspecific symptoms, most patients are initially misdiagnosed. Presenting symptoms include shortness of breath (69%), vomiting (48%), poor feeding (40%), URTI symptoms (39%), fever (36%), and lethargy (36).
- Physical exam often reveals tachypnea, tachycardia, cyanosis, hypoxia, crackles/rales, gallop, hepatomegaly, and peripheral edema. Workup recommended includes ECG, CXR, troponin, and POCUS to assess function. Inflammatory markers and Brain Natriuretic Peptide (BNP) lack sensitivity and specificity.
- Treatment consists of judicious fluid management, diuretics, afterload reducing inotropes, cardioversion, and anti-dysrhythmics. Mechanical ventilation and ECMO ay be required to take work off of strained myocardium.

ECMO – consult PICU early in all cases to arrange for early transfer

References

1. Myocarditis and Pericarditis in the Pediatric Patient: Validated Management Strategies. EB Emergency Medicine Practice. 12 (7). 2015 (July)
2. https://emergencymedicinecases.com/pediatric-respiratory-failure/

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