Pregnant Cardiomyopathy

Section I: Scenario Demographics

Scenario Title:	Pregnant Cardiomyopathy
Date of Development:	(16/04/2018) Revised 04/05/2021
Target Learning Group:	Juniors (PGY 1 – 2) Seniors (PGY ≥ 3) All Groups community ED staff

Section II: Scenario Developers

Scenario Developer(s):	Nadia Primiani and Sev Perelman
Affiliations/Institution(s):	Mount Sinai Hospital
Contact E-mail (optional):	

Section III: Curriculum Integration

Learning Goals & Objectives	
Educational Goal:	To manage acute CHF and cardiogenic shock in a pregnant patient with cardiomyopathy
CRM Objectives:	1. Effectively lead a team through the uncommon presentation of cardiogenic shock in pregnancy 2. Demonstrate closed-loop communication between team members 3. Collaborate early with consultants in the management of a sick pregnant patient
Medical Objectives:	1) Recognize and respond to a critically ill pregnant patient with cardiogenic shock 2) Hypothesize the differential diagnoses of dyspnea in pregnancy 3) Facilitate safe intubation with considerations for a pregnant patient

Case Summary: Brief Summary of Case Progression and Major Events

A 38-year-old female G2P1 at 36 weeks GA presents with acute on chronic respiratory distress in addition to chronic peripheral edema. She undergoes respiratory fatigue and hypoxia requiring intubation. She then becomes hypotensive which the team discovers is secondary to cardiogenic shock, requiring vasopressor infusion and consultation with Cardiology/ ICU.

References
Marx, J. A., Hockberger, R. S., Walls, R. M., & Adams, J. (2013). *Rosen's emergency medicine: Concepts and clinical practice*. St. Louis: Mosby.
Chris Nickson. (2013). Peripartum Cardiomyopathy. Accessed April 27, 2018 from https://lifeinthefastlane.com/ccc/peripartum-cardiomyopathy/

Section IV: Scenario Script

A. Clinical Vignette: To Read Aloud at Beginning of Case
You are working in a community ED and your team has been called urgently by the nurse to see a 38-year-old female who is G2P1 at 36 weeks gestational age. She was brought in by her sister, who is quite agitated and upset, saying "everybody has been ignoring her symptoms for the last 4 weeks". The patient has just experienced a syncopal episode at home.

B. Scenario Cast & Realism			
Patient:	X Computerized Mannequin	Realism:	Conceptual
	X Mannequin	*Select most important dimension(s)*	Physical
	Standardized Patient		Emotional/Experiential
	X Hybrid		Other:
	Task Trainer		N/A

Participants	Brief Description of Role
Consultant	Available via telephone to assist team

C. Required Monitors		
Cardiac Monitor	Temperature Probe	
NIBP Cuff		Capnography
Pulse Oximeter		**Other: Fetal Doppler**

D. Required Equipment		
Gloves	Nasal Prongs	Bougie
Stethoscope	BiPap Mask	

	Non-Rebreather Mask, Nasal Prongs & Face Mask	Cricothyroidotomy Kit
IV Bags/Lines	Bag Valve Mask	
IV Push Medications, PDTM or medication resource guide, syringes, needles & labels	Laryngoscope	Central Line Kit
	Video Assisted Laryngoscope	Arterial Line Kit
	ET Tubes	Other: tilting wedge or blankets
Intraosseous Set-up	LMA or King Tube with Syringe	Other: rolled blankets for ramping

E. Moulage
Pregnant belly +2 pitting edema to bilateral lower legs (memory foam under pantyhose)

F. Approximate Timing					
Set-Up:	5 min	Scenario:	20 min	Debriefing:	20 min

Section V: Patient Data and Baseline State

A. Patient Profile and History			
Patient Name: Sunny Mills	Age: 38		Weight: 75 kg
Gender: M F	Code Status: Full		
Chief Complaint: Syncopal episode, now difficulty breathing			
History of Presenting Illness: Aching legs with edema x 4 weeks. Mildly dyspneic since start of third trimester, dyspnea much worse today. Syncopal episode at home.			
Past Medical History:	Single gestation pregnancy confirmed on 3rd trimester U/S	Medications:	Prenatal vitamins
Allergies: None			

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Social History: No drugs, no EtOH, lives with husband and child. No psychiatric history.				
Family History: Non-contributory				
Review of Systems:	CNS:	Nil		
	HEENT:	Nil		
	CVS:	Peripheral edema, bilateral legs > arms.		
	RESP:	Dyspnea worsening over 3rd trimester.		
	GI:	Nil		
	GU:	Pregnancy unremarkable. No vaginal bleeding or abdominal pain.		
	MSK:	Nil	INT:	Nil

B. Baseline Simulator State and Physical Exam

X No Monitor Display	Monitor On, no data displayed	Monitor on Standard Display

HR: 110/min	BP: 90/50 (MAP 63)	RR: 35 /min	O_2SAT: 89% on RA
Rhythm: Sinus rhythm with PVCs	T:36.5 °C	Glucose: 5.8 mmol/L	GCS: 15 (E4 V5 M6)

General Status: Moderate respiratory distress			
CNS:	Alert, oriented, PEARL 3mm, normal reflexes, no clonus		
HEENT:	Nil		
CVS:	Sinus rhythm with PVC's, peripheral edema 2+ to bilateral legs		
RESP:	Respiratory distress, 2-3 word sentences, crackles to bases, tripoding and unable to tolerate supine		
ABDO:	Normal		
GU:	Fundus palpated at xyphoid, non-tender		
MSK:	Nil	SKIN:	Nil

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Section VI: Scenario Progression

Scenario States, Modifiers and Triggers			
Patient State	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State	
1. Baseline State Rhythm: Sinus tachycardia with frequent non-perfusing PVCs HR: 110/min BP: 90/50 (63) RR: 35/min O_2SAT: 89% RA T: 36.5°C Gluc: 5.8 GCS: 15 (4E, 5V, 6M) FHR: 150 bpm	Moderate respiratory distress, crackles on exam, tripoding, will not tolerate laying supine +2 pitting edema bilateral lower legs	<u>Learner Actions</u> - History & physical (ABC's) - O2, IV x 2 with NS TXVO, monitors - Left lateral tilt with wedge - Glucose check - Fetal heart monitor or check FHR with Doppler - Labs – including trop, LFTs, and coags - CXR portable - ECG - POCUS (FAST & OB normal Cardiac shows poor EF, Lung shows B lines) - Call RT for BiPap - Call OB for urgent C/S - Trial 250-500ml IV NS bolus	<u>Modifiers</u> *Changes to patient condition based on learner action* - No O2 placed: SpO2 to 85%, O2 applied, Sp02 increases to 92% - No lateral tilt: BP to 75/40 (52) and patient feels weak/decreasing LOC <u>Triggers</u> *For progression to next state* - All actions complete or 5 mins into case → **2. Respiratory failure**

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2. Respiratory failure Rhythm: Sinus tachycardia with PVC's HR: 115/min BP: 95/50 (63) RR: 40/min, O_2SAT: 87% on bipap, despite 100% FiO2 T: 36.5^{o}C Gluc: 5.8 GCS 14 – drowsy (E3, V5, M6)	Worsening respiratory distress, drowsy. **+++crackles and wheeze bilaterally** SpO2 starts dropping despite prior management Decreasing LOC, is drowsy, no longer candidate for bipap Patient now tolerates lying flat Mallampati Class III airway	<u>Learner Actions</u> <u>Plan for intubation:</u> - Call RT - Call Anesthesia/ OB/ Cardiology/ NICU STAT - - Airway assessment (presume difficult airway) -Apenic Oxygenation NP 15L/min under BVM -Ramping to sniffing position while maintaining left lateral displacement - RSI medications ordered and drawn up - Vasopressor at bedside (norepi, epinephrine, push dose phenylephrine) -	<u>Modifiers</u> - Optimized oxygenation for intubation -> Sp02 to 95% No left lateral displacement-> BP to 75/40 (52) Not ramped ->Mallampari Class IV ELM applied- improved Mallampati by 1 class

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3. Intubation Rhythm: Sinus tachycardia with PVC's HR: 125/min BP: 90/50 (63) RR: 40/min, O_2SAT: 87% despite 100% FiO2 T: 36.5°C GCS 14 – drowsy (E3, V5, M6) EtCO2: 46		**Learner actions:** MRP to state airway plan to team with considerations for a difficult airway / positioning *(Example):* A) Glidescope B) Direct C) iGel/Cric BVM with PEEP or NIPPV prior to intubation Meds: -Consider push dose phenyl Ketamine then Roc with – closed loop communication Intubation + PEEP -Confirmation of placement via auscultation, ETCO2, chest rise & call for portable cxr - Verbalize vent settings - Post-intubation sedation initiated -OG and Urinary Catheter inserted	<u>Triggers</u> - Intubation→ **3. Hypotension** PPV prior to intubation → SpO2 up to 95% GCS to 3 post induction

4. Hypotension Rhythm: sinus with PVCs HR: 100/min BP: 75/35 (48) RR: 20 O2 sat: 95% with PEEP 10 EtCO2: 46 GCS: 3	Sedated Intubated Ventilated	<u>Learner Actions</u> - Consultants called (if not yet done) - Start vasopressor (Norepinephrine ideal) - Inotropes discussed +/- given (dobutamine *2.5-20 mcg/kg/min*) - ± Set up for arterial line	<u>Modifiers</u> - Norepi started: BP to 80/40 (53) <u>Triggers</u> - Inotropes started→ **4. Improvement**

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5. Improvement Rhythm: sinus rhythm HR: 80/ min BP: 100/70 RR: 20 O2 sat: 95% on CMV EtCO2: 44 GCS: 3	Sedated Intubated Ventilated	Learner Actions - Initiates inotropes and furosemide based on Cardiology's recommendations if not yet done - STAT formal Echo - Arterial line, central line (if not done) - Call OB again Handover to consultant or prep for transport	Modifiers Triggers - Cardiology staff or paramedic transport team arrives after 3 mins→ END CASE

Section VI: Scenario Progression

Section VII: Supporting Documents, Laboratory Results, & Multimedia

Laboratory Results						
Na: 140	K: 3.8	Cl: 109	HCO_3: 25	BUN:	Cr: 65	Glu: 5.8
Ca: 2.5	Mg: 1.0	PO_4: 0.90	Albumin: 35			
VBG	pH: 7.20	PCO_2: 32	PO_2: 98	HCO_3: 23	Lactate: 2.8	
WBC: 16	Hg: 120	Hct: 0.370	Plt: 280			
Trop: 60						

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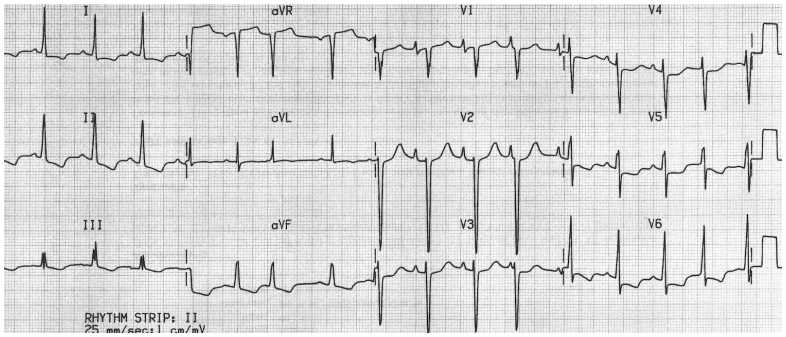
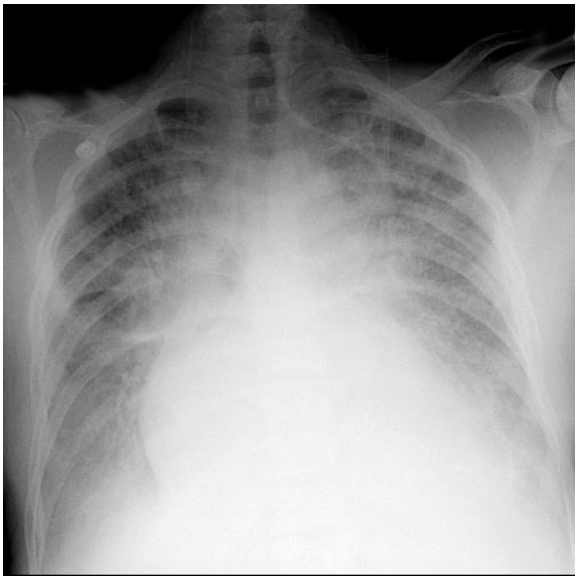
Images (ECGs, CXRs, etc.)

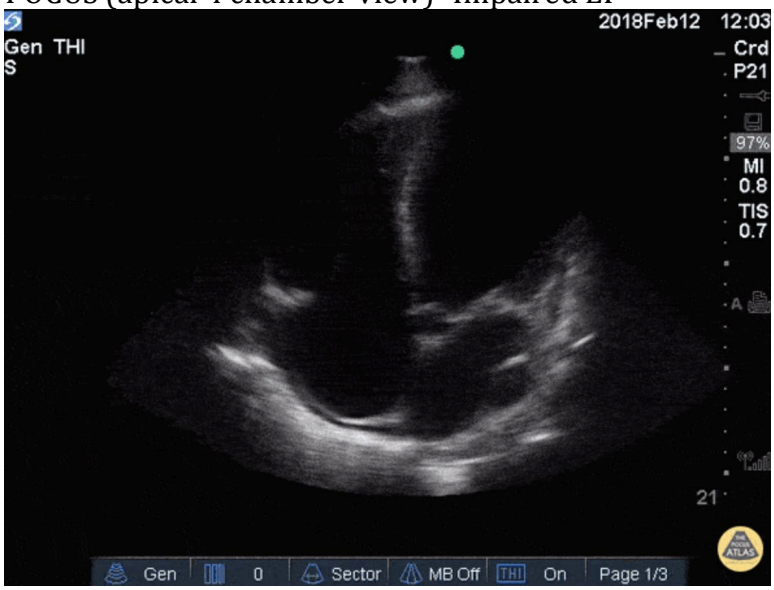


https://lifeinthefastlane.com/ecg-library/dilated-cardiomyopathy/



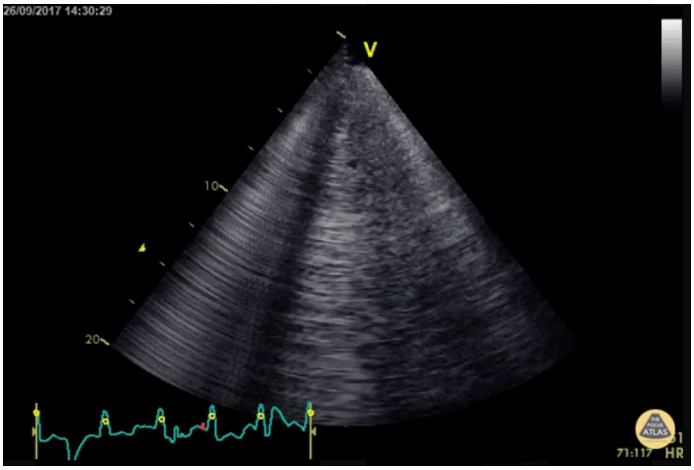
https://www.med-ed.virginia.edu/courses/rad/cxr/postquestions/posttest.html

POCUS (apical 4 chamber view)- Impaired EF



http://www.thepocusatlas.com/echo/2hj4yjl0bcpxxokzzzoyip9mnz1ck5

POCUS Lung Views (Bilat)



http://www.thepocusatlas.com/pulmonary/

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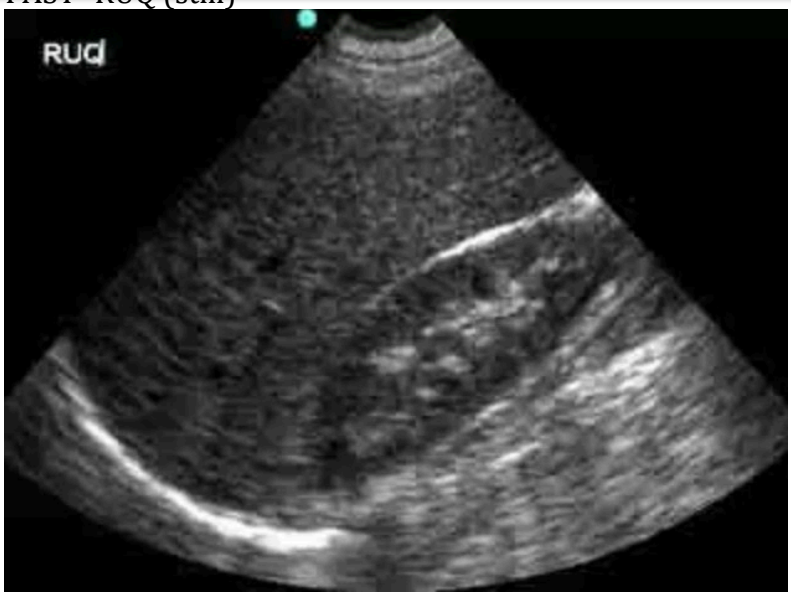
FAST- RUQ (still)	FAST- OB with FHR
 http://sinaiem.us/tutorials/fast/us-ruq-normal/	https://www.youtube.com/watch?v=SKKnTLqI_VM

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Section VIII: Debriefing Guide

General Debriefing Plan			
Individual	Group	With Video	Without Video

Objectives

Educational Goal:	To manage acute CHF and cardiogenic shock in a pregnant patient with cardiomyopathy
CRM Objectives:	1. Effectively lead a team through the uncommon presentation of cardiogenic shock in pregnancy 2. Efficiently utilize closed-loop communication between team members 3. Communicate with consultants early in the management of a sick pregnant patient
Medical Objectives:	1. Recognize a critically ill pregnant patient with cardiogenic shock 2. Work through the differential diagnosis of dyspnea in pregnancy 3. Facilitate safe intubation with considerations for a pregnant patient

Sample Questions for Debriefing

1. What are the physiological and anatomical considerations in the resuscitation of a pregnant patient?
2. Describe your differential for dyspnea in pregnancy
3. What is on the differential for etiologies of cardiogenic shock? How can you clinically differentiate between these on initial examination?
4. What are some risk factors for peripartum cardiomyopathy?
5. What considerations must be made in the airway management of a pregnant patient? What about RSI medications?

Key Moments

1. Recognizing and managing shock in a pregnant patient
2. Intubation planning for the pregnant patient
3. Providing inotropic support in a patient with cardiogenic shock