Section I: Scenario Demographics

Scenario Title:	Thyroid Storm/CHF
Date of Development:	(16/02/2022)
Target Learning Group:	Seniors (PGY ≥ 3) All Groups

Section II: Scenario Developers

Scenario Developer(s):	Dr Jeanne Macleod
Affiliations/Institution(s):	Providence Health Care
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Section III: Curriculum Integration

Learning Goals & Objectives	
Educational Goal:	Recognition of signs and symptoms of thyrotoxicosis/ CHF
CRM Objectives:	Situational awareness, Shared Mental Model, Call for Help/Consult early. Avoiding fixation error and maintaining a broad differential diagnosis
Medical Objectives:	Treatment of thyrotoxicosis and CHF. Management of atrial fibrillation in thyrotoxicosis

References

Choudhury RP & MacDermot J. (1998). Heart failure in thyrotoxicosis, an approach to management. *British journal of clinical pharmacology.* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1873689/

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A. Patient Profile and History

Case Summary: Brief Summary of Case Progression and Major Events

49-year-old woman with palpitations, diaphoresis, tremor, anxiety, hyperactivity. Initially symptomatic, if untreated, progresses to moderate congestive heart failure. Pulmonary Edema progresses to hypoxemia and atrial fibrillation if untreated.

Patient Name: Glynda Yee	Age: 49	Weight: 50kg
Gender: Female	Code Status:	

Chief Complaint: Cough and shortness of breath

History of Presenting Illness: Coughing for several months and in past few days started to feel more short of breath, especially when she exerts herself. No fever, Infectious type of symptoms, non productive cough, initially was during the day, now has progressed to bothering her at night, especially when she lies down. Increasing dyspnea in the past week. Now has dyspnea when she walks up her stairs. Feeling generally unwell and stressed out. Legs feel swollen and heavy but she feels that she has overall lost 10 lbs unintentional weight loss.

Past Medical History:	well	Medications:	nil
	No risk factors for VTE		
	No Hx of chest pain or CAD		

Allergies: nil

Social History: unremarkable

Family History: nil

Review of Systems: (may provide to learner or wait until asked)	CNS:	Feeling anxious over past few months, “stressed out” can’t sleep…		
	HEENT:	Swelling over neck		
	CVS:	palpitations		
	RESP:	Cough x 2 months, worsening, increased dyspnea when she tries to walk, feels “winded” all the time		
	GI:	diarrhea		
	GU:	nil		
	MSK:	Bilateral leg heaviness	INT:	Weight loss 10lbs over 2 months.

B. Baseline Simulator State and Physical Exam

		Monitor on Standard Display	
HR: /min 115	BP: 135/90	RR: /min 20	O_2SAT: % 95
Rhythm: sinus tachycardia	T: °C 38	Glucose: mmol/L 6	GCS: 15 (E V M)

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General Status: JAUNDICED, ANXIOUS, SLIGHT TREMOR			
CNS:	Scleral icterus		
HEENT:	If looks at thyroid, then tender and slightly swollen thyroid, If looks then JVP is elevated ++		
CVS:	Normal		
RESP:	Decreased air entry to left base, crackles to right base		
ABDO:	Normal, not tender		
GU:	nil		
MSK:	Slight resting tremor	SKIN:	Scleral icterus

Section IV: Scenario Script

A. Clinical Vignette: To Read Aloud at Beginning of Case	
49 year old previously healthy woman presenting with cough and dyspnea to the ED. She is triaged as a CTAS level 3 because she is slightly tachycardic and appears to have mild respiratory distress. She is concerned that she may have a respiratory illness such as COVID.	

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Section V: Patient Data and Baseline State

Scenario States, Modifiers and Triggers			
Patient State	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State	
1. Baseline State Rhythm: sinus HR: 115 /min BP: 135 /90 RR: /min O_2SAT: 95 % T: 38 ^oC	Patient initially not on a monitor. Appears anxious and slight tachypnea.	<u>Learner Actions</u> -IV/Monitor/ Primary Survey shows decreased air entry to left base with mild crackles on the right. - Proceed with more detailed history -Proceed with secondary survey and trigger at this time that patient has scleral icterus. -If learner asks then provide details about elevated JVP -If legs are examined then provide that they have bilateral swelling, mild edema. -non tender abdomen -ECG/LAB/CXR ordered	-If bedside US, then shows left pleural effusion, no pericardial effusion, FAST negative (if actually does, no DVT) - ECG shows sinus tachycardia - CXR shows pleural effusion on the left - <u>Broad differential</u> -May pick up on CHF/Hyperthyroidism at this point and order TSH/BNP -Differential still includes PE/Sepsis/Infection/malignancy - Can start with fluid bolus but should have picked up on concern of CHF signs.
2. Change to atrial fibrillation: - Patient starts to feel more "nervous", "I can't breathe" -cardiac monitor should switch to atrial fib, rate=150 BP: 100/70 O2 sat'n: 94%		<u>Learner Actions</u> -Repeat ECG shows A fib -Avoid more fluid -Add TSH to lab -Consider agent to rate control: Metoprolol 5mg IV, repeat x 3 q 5 min. (can also use propranolol 0.5-1mg IV push to effect q 15 min if available) -Recognizes CHF signs/symptoms, gives Lasix 40mg IV -Learner should recognize that cardioversion unlikely to be successful if profoundly hyperthyroid and should consult cardiology and endocrinology	<u>Modifiers</u> --IF not recognizing hyperthyroidism signs or asking for symptoms and gives diltiazem, then make hypotensive. -If doesn't recognize CHF, then make sat'n decrease and patient becomes more tachypneic. Can proceed to intubation if does not address signs of CHF and atrial fibrillation - -If cardioversion is going to be attempted, then provide TSH result. If cardioversion goes ahead, then not successful. - -
3. Provide TSH Results= <0.1			

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3.Recognition of thyrotoxicosis		Learner Actions -Hydrocortisone 100mg IV -Methimazole 20mg PO or propylthiouracil 200mg- 600mg PO -Verbalize that 1 hour post treatment above to give Potassium Iodide (Lugol's sol'n) 5-8 drops PO - - - -	Modifiers - - - - Triggers - -
4.		Learner Actions - - - - - -	Modifiers - - - - Triggers - -

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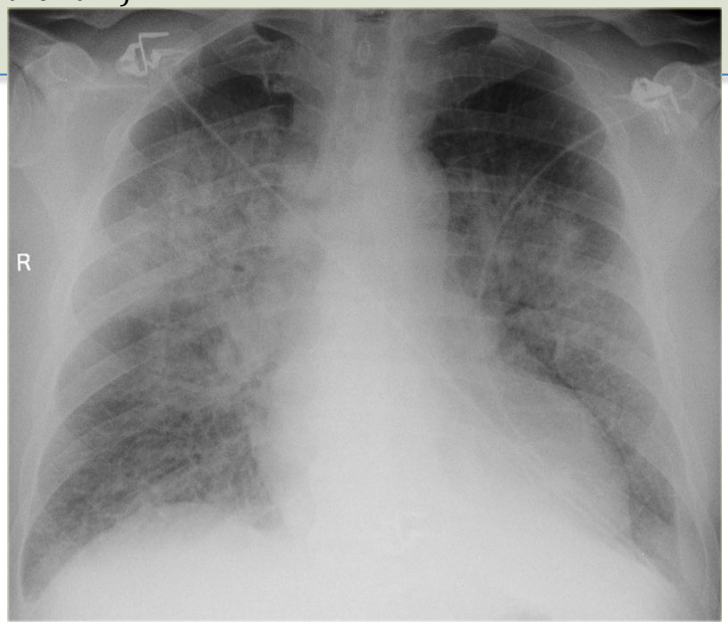
Section VI: Scenario Progression

Section VII: Supporting Documents, Laboratory Results, & Multimedia

Laboratory Results						
Na: 142	K: 4.5	Cl: 109	HCO_3: 24	BUN:	Cr: 60	Glu: 6
Ca:	Mg:	PO_4:	Albumin:			
TSH 0.1 T3 and T4 pending						
VBG	pH:	PCO_2:	PO_2:	HCO_3:	Lactate:2.5	
Bilirubin: 45 micromoles/L (normal 2-17) ALT:60 IU/L (normal 0-45) AST: 70 IU/L(normal 0-35) GGT: 100.IU/L (normal 0-30) Alkaline Phosphatase: 200 IU/L (normal 30-120)						
WBC: 13	Hg: 117	Hct:	Plt: 350			

Images (ECGs, CXRs, etc.)	
(CXR source: *http://www.radiologyassistant.nl/en/p4c132f36513d4/chest-x-ray-heart-failure.html*) 	

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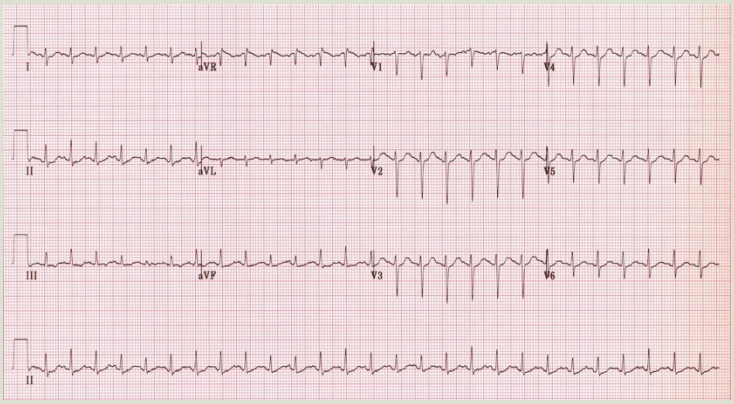
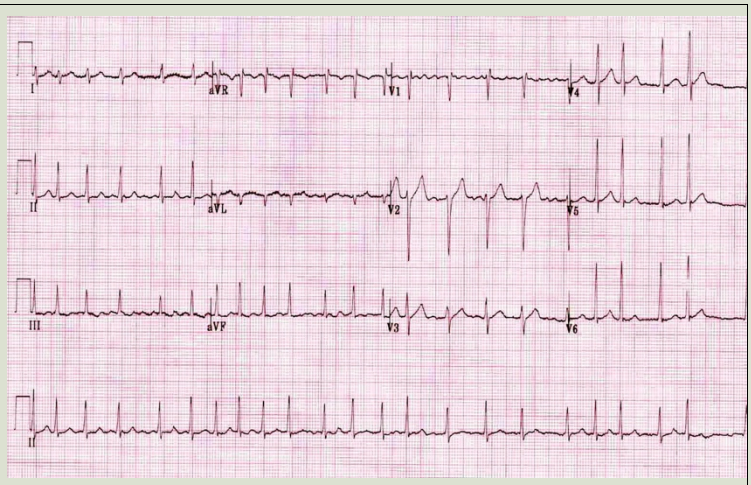
Sinus Tachycardia  (ECG source: *http://lifeinthefastlane.com/ecg-library/hyperthyroidism/)*	 Atrial fibrillation (ECG source: *http://lifeinthefastlane.com/ecg-library/atrial-fibrillation/)*
Ultrasound Video Files (if applicable)	
https://www.bcpocus.ca look under presenting problems dyspnea: What to scan: LVEF and pulmonary Edema. Under findings: decompensated CHF	

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Section VIII: Debriefing Guide

General Debriefing Plan			
Individual	Group	With Video	Without Video

Objectives	
Educational Goal:	Recognize signs and symptoms of thyrotoxicosis
CRM Objectives:	In this case, trying to keep a broad differential, avoiding fixating on infection/sepsis as an only diagnosis. Recognizing that patient had right and left sided heart failure, treating the failure but recognizing the signs and symptoms of thyrotoxicosis.
Medical Objectives:	1) Recognizing and treating CHF 2) Management of Atrial Fibrillation with thyrotoxicosis 3) Consulting cardiology/endocrinology and initiating treatment of thyrotoxicosis.

Sample Questions for Debriefing

Key Moments
Recognition of CHF, scleral icterus secondary to right sided heart failure
Repeating vitals and second ECG to determine atrial fibrillation
Recognition of hyperthyroidism precipitating CHF/Atrial Fib and managing appropriately.

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