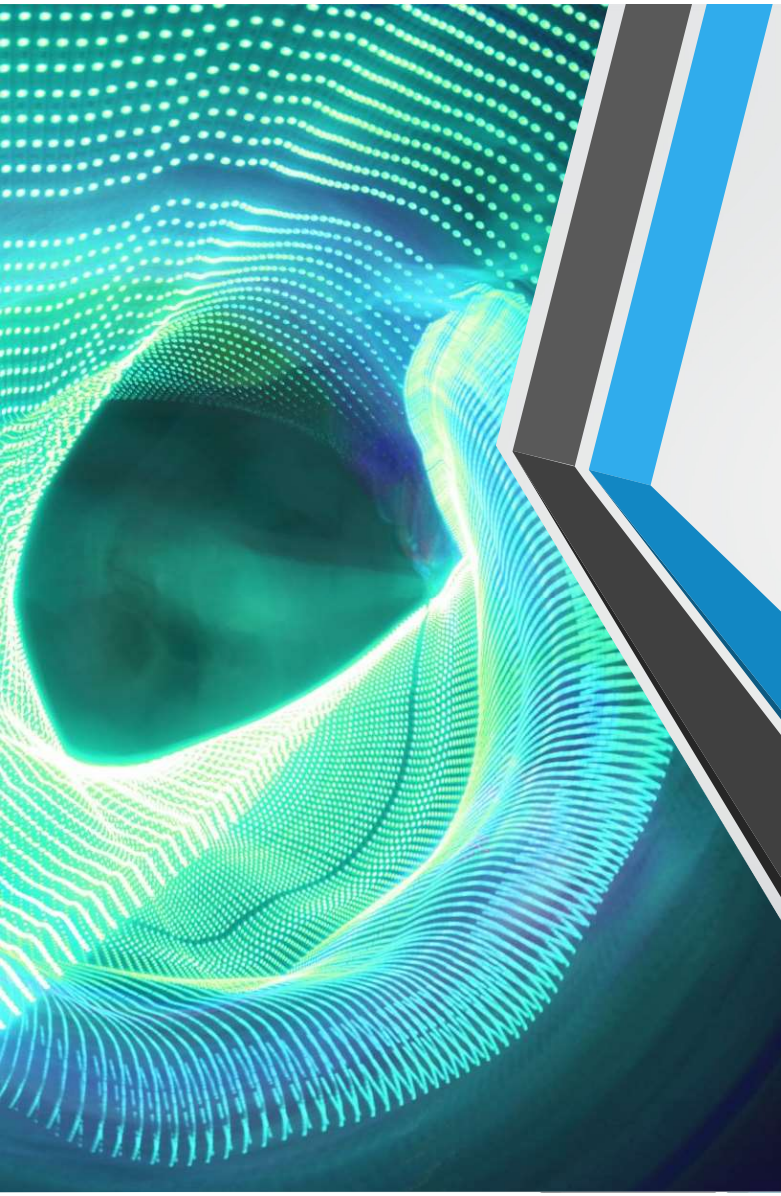

ESSENTIAL RISK STRATIFICATION FOR PRACTICING EVIDENCED BASED MEDICINE

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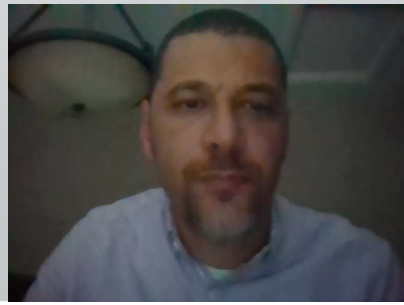
Disclosures

- I have nothing to disclose.

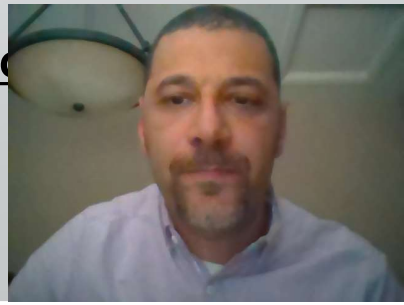


Objectives

- Become familiar with risk stratification calculations;
  - Review overall guidelines and know when and why they can and should be used.
- Calculate and interpret the CHA_2DS_2-VASc Score for Atrial Fibrillation and Stroke Risk
  - Provide audience with case history example, calculate CHA_2DS_2-VASc Score and determine disposition based on score.
- Calculate and interpret the HEART Score for Major Cardiac Events
  - Provide audience with case history example, calculate HEART Score and determine disposition based on score.
- Calculate and interpret the PERC Rule for DVT/PE
  - Provide audience with case history example, calculate PERC Score and determine disposition based on score.
- Calculate and interpret the CURB-65 Score for Pneumonia Severity.
  - Provide audience with case history example, calculate CURB-65 Score and determ based on score.

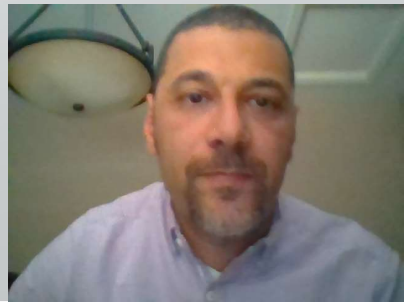
What is risk stratification?

- Risk stratification is defined as "the process of assigning a health risk status to a patient and using the patient's risk status to direct and improve care," according to the American Academy of Family Physicians (AAFP).
- Risk stratification tools have become increasingly popular and are essential in the medical decision-making process of patient disposition for PAs practicing in Primary Care, Urgent Care, Internal Medicine, Cardiology, or Emergency Medicine.
- Risk stratification tools are **highly tied to evidence-based medi**



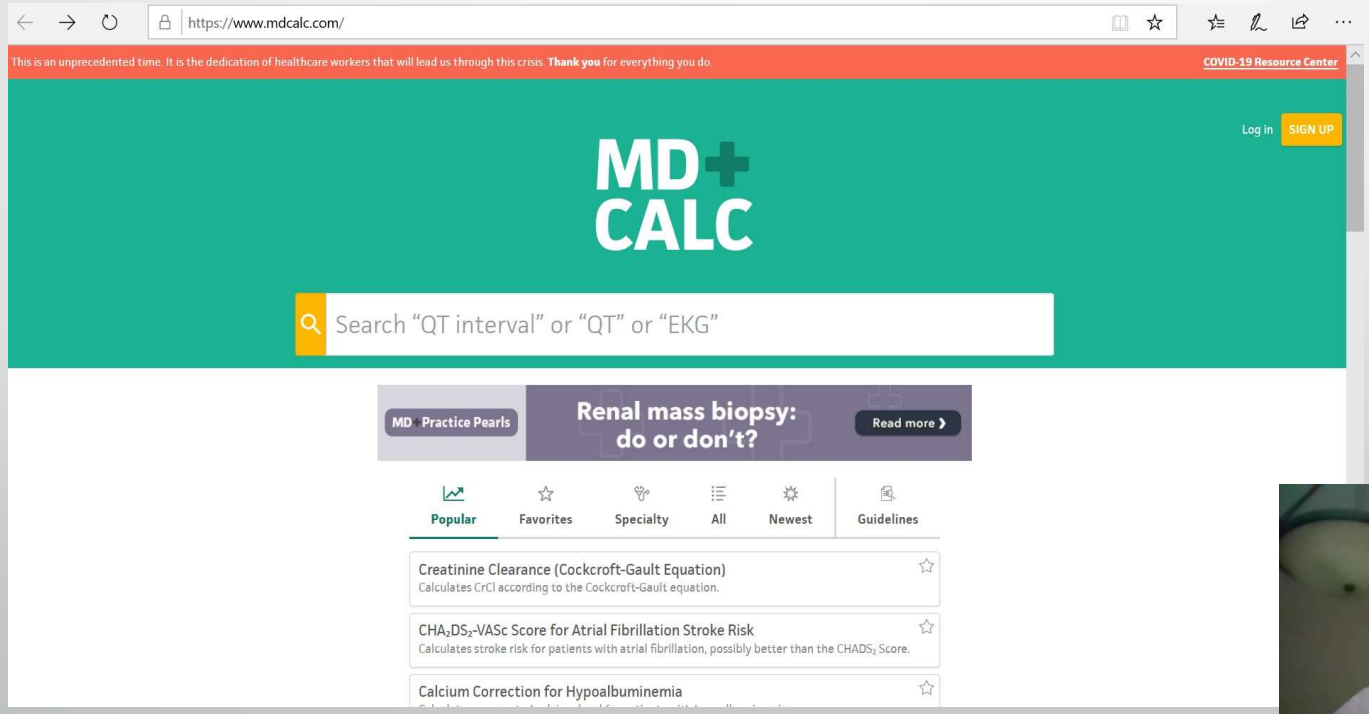
What's the point?

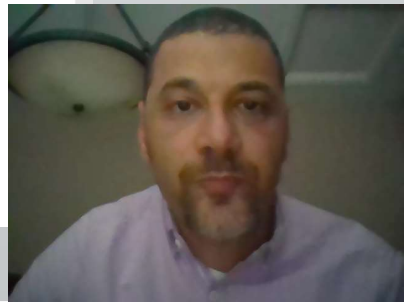
- The ultimate goal of risk stratification is to assist patients in achieving the best quality of life possible by stabilizing their current chronic conditions, preventing chronic disease, and potentially preventing the acceleration to higher-risk categories and higher costs.
- These tools not only help with identifying and calculating risk but when used and documented correctly, can provide a safety net that can prevent adverse patient outcomes and potentially prevent liability.



My best friend…

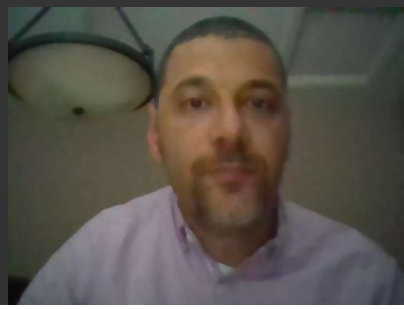
www.mdcalc.com





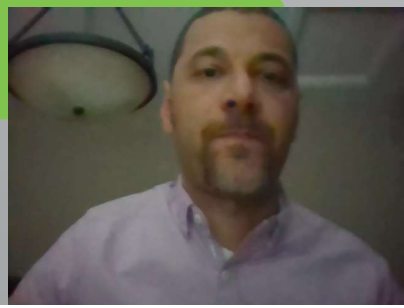
Case #1

HPi: A 67 y/o female patient with a PMHx of HTN and DM presents to your office today to establish care since her previous provider in the same practice retired. She denies any symptoms currently, but in passing, happens to mention that she has noticed some bilateral lower extremity edema for the last several weeks. Patient denies any provoking factors and reports that these symptoms seem to improve after sleeping at night and waking the following morning. Pertinent negatives include: denies chest pain, syncope and shortness of breath at rest. Pertinent positives include: endorses intermittent palpitations for two weeks, DOE and two pillow orthopnea.



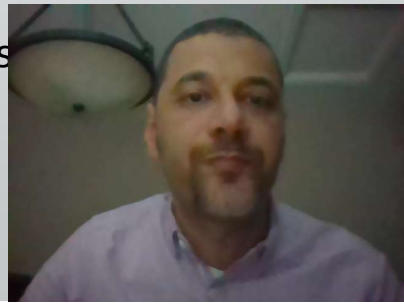
Case #1

- PMHx: HTN, DMII
- PSgHx: Cholecystectomy @ age 42
- Meds: Lisinopril 20mg QAM, Metformin 500mg BID
- Allergies: NKDA
- PFamHx: Father with an unknown arrythmia
- PSocHx: Social wine drinker



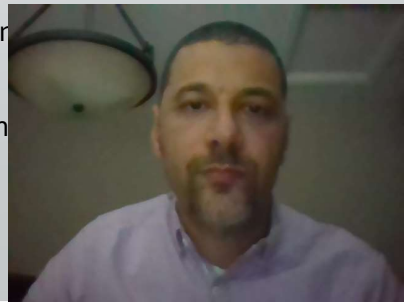
Case #1

- ROS:
  - GEN: + for intermittent fatigue, - for weight loss, fevers or chills
  - HEENT: N/C
  - NECK: - for neck pain for stiffness
  - PULM: per HPi
  - CARDIO: per HPi
  - GI: - for n/v/d
  - GU: - for dysuria/hematuria/polyuria
  - LYMPH/HEME: per HPi
  - MSK: per HPi
  - NEURO: - for focal or global weakness



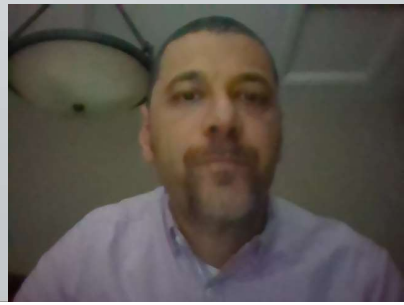
Case #1

- **VS: BP- 168/90, HR-68, SpO2: 96%, RR: 18**
- **Physical Exam:**
  - **General:** Awake, alert and oriented. No acute distress. Appears stated age.
  - **Skin:** Skin in warm, dry and intact without rashes or lesions. Nailbeds pink with no cyanosis or clubbing.
  - **HEENT:** Normocephalic, atraumatic. EOM are intact, PERRLA. No scleral icterus.
  - **Neck:** Supple, trachea midline, no JVD.
  - **Cardiac:** The external chest is normal in appearance without lifts, heaves, or thrills. Heart rate is normal, but irregular. No murmurs, gallops, or rubs are auscultated. S1 and S2 are heard and are of normal intensity.
  - **Pulmonary:** Bibasilar rales without rhonchi or wheezes .
  - **Abdominal:** Abdomen is soft, NT/ND.
  - **Genital/Rectal:** Negative guiac
  - **Extremities:** 1+ pitting bilateral lower extremity edema
  - **Neurological:** The patient is awake, alert and oriented X3, with nor abnormalities are appreciated.
  - **Psychiatric:** Appropriate mood and affect. Good judgement and in hallucinations. No suicidal or homicidal ideation.



Case #1

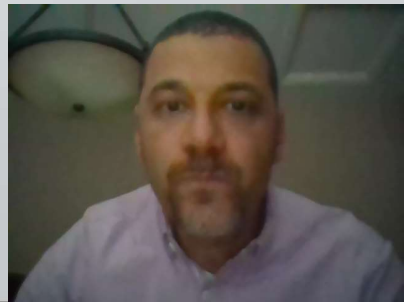
- Labs/Orders:
  - CBC
  - BMP
  - BNP?
  - ECG?
  - CXR?
  - UA?



Case #1

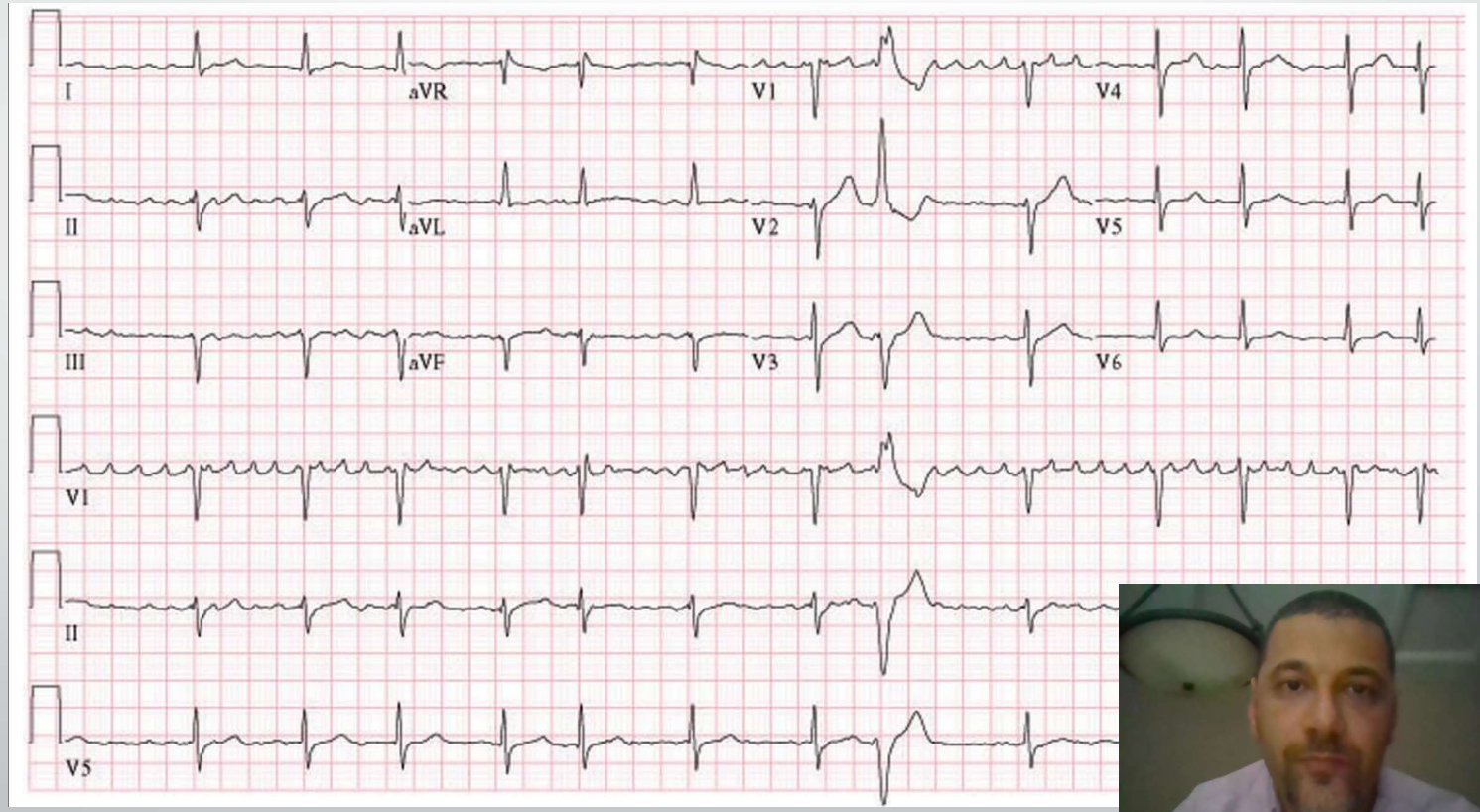
Labs/Orders Results:

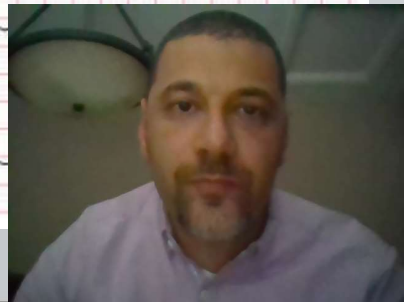
- CBC:
  - WBC: 6.9
  - HGb: 11.4
  - HCt: 34
  - Plt: 280
- BMP:
  - NA^{++} : 134
  - K^{+}: 5.7
  - Cl^{-} : 101
  - CO_2: 35
  - BUN: 18
  - Cr: 0.9
  - Gluc: 124
- BNP: 1840



Case #1

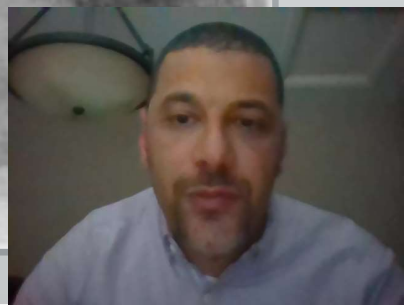
ECG





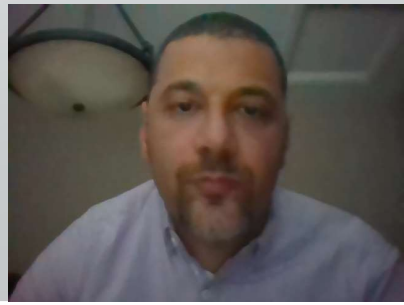
Case #1

CXR

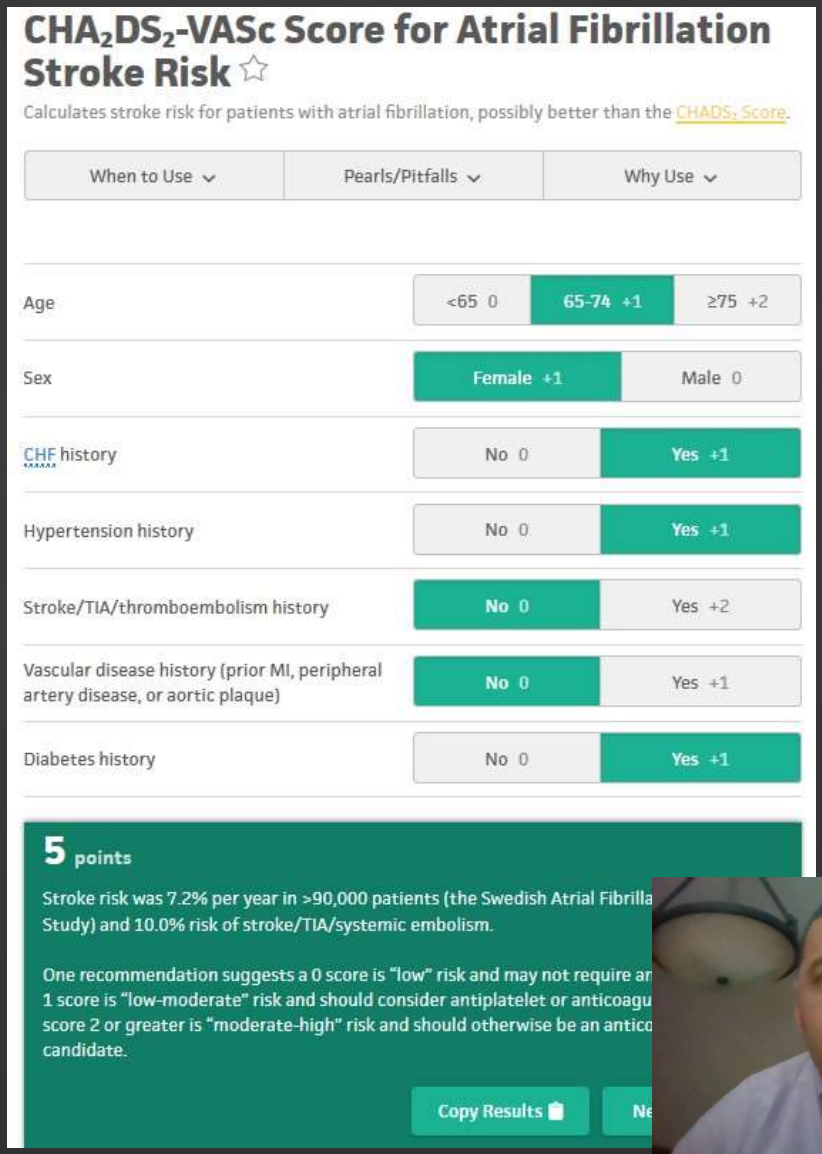


CHA_2DS_2-VASc Score for Atrial Fibrillation Stroke Risk

- When to use:
  - One of several risk stratification tools that can help you determine the one-year risk of a thromboembolic event in an uncoagulated patient with non-valvular atrial fibrillation.

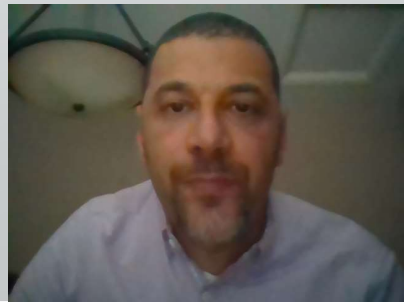


Case #1


CHA2DS2-VASc Score for Atrial Fibrillation Stroke Risk
Calculates stroke risk for patients with atrial fibrillation, possibly better than the CHADS2 Score.
When to Use
Pearls/Pitfalls
Why Use
Age
<65 0
65-74 +1
≥75 +2
Sex
Female +1
Male 0
CHF history
No 0
Yes +1
Hypertension history
No 0
Yes +1
Stroke/TIA/thromboembolism history
No 0
Yes +2
Vascular disease history (prior MI, peripheral artery disease, or aortic plaque)
No 0
Yes +1
Diabetes history
No 0
Yes +1
5 points
Stroke risk was 7.2% per year in >90,000 patients (the Swedish Atrial Fibrilla
Study) and 10.0% risk of stroke/TIA/systemic embolism.
One recommendation suggests a 0 score is "low" risk and may not require ar
1 score is "low-moderate" risk and should consider antiplatelet or anticoagu
score 2 or greater is "moderate-high" risk and should otherwise be an antico
candidate.
Copy Results

Case #1: Disposition

- What's your next step?
  - TTE? Would it still be important to assess for nonvalvular atrial fibrillation before starting your patient on a NOAC?
  - NOAC?
    - As soon you get the results of your patient's TTE, then start him on a NOAC…
      - I typically go with Apixaban (Eliquis) 2.5-5mg BID, or Rivaroxaban (Xarelto) 20mg QD, due to limited side-effect profile, but also dependent on their insurance coverage.

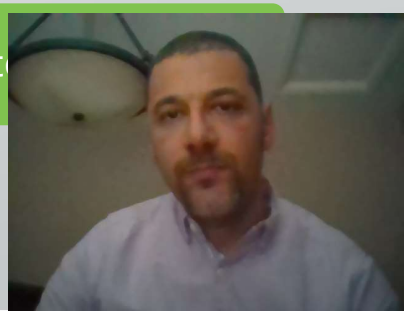


Case #2

- HPi: A 54 y/o male patient with history of HTN, HLD presents to the E.D. today with onset of left-sided jaw pain that started 2h pta. Pt reports that he was changing a wheel at work, and while removing the lug-nuts, had sudden onset of left jaw pain with associated chest heaviness. Pt states that immediately after the jaw pain, he felt nauseated and threw up once. Pt also reports mild diaphoresis and shortness of breath during the event, which lasted approximately 10 minutes. Pt currently denies any symptoms and denies any alleviating or aggravating factors.

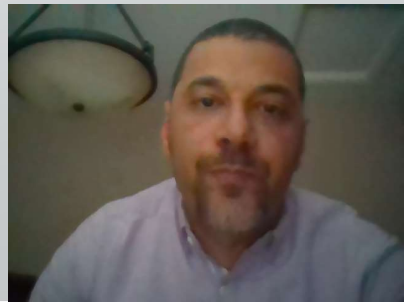
Case #2

- PMHx: HTN, HLD
- PSgHx: None
- Meds: Coreg 25mg BID, Crestor 20mg QD
- Allergies: NKDA
- PFamHx: Father had an MI @ age 51
- PSocHx: 24 pack-year history of cigarett



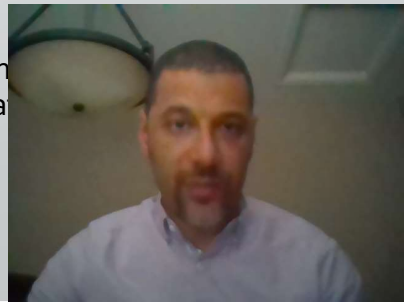
Case #2

- ROS:
  - GEN: Denies malaise, weight loss, fever
  - HEENT: N/C
  - NECK: N/C
  - PULM: + for SOB and DOE, - for cough
  - CARDIO: + for CP, - for palpitations
  - GI: + for N/V
  - LYMPH/HEME: N/C
  - MSK: - for LE edema
  - NEURO: N/C



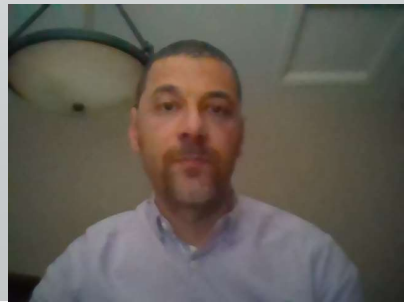
Case #2

- **VS: BP- 144/90, HR-78, SpO2: 94%, RR: 16**
- **Physical Exam:**
  - **General:** Awake, alert and oriented. No acute distress. Appears stated age
  - **Skin:** Skin in warm and intact without rashes or lesions. Mild diaphoresis noted to forehead. Nailbeds pink with no cyanosis or clubbing
  - **HEENT:** Normocephalic, atraumatic. EOM are intact, PERRLA. No scleral icterus
  - **Neck:** Supple, trachea midline, no JVD
  - **Cardiac:** RRR without murmurs, rubs, or gallops. Normal intensity of S1 and S2
  - **Pulmonary:** CTAB without wheezes, rales, or rhonchi
  - **Abdominal:** Abdomen is soft, NT/ND
  - **Genital/Rectal:** Negative guiac
  - **Extremities:** No lower extremity edema noted
  - **Neurological:** The patient is awake, alert and orien normal speech. No gait abnormalities are appreciat
  - **Psychiatric:** Appropriate mood and affect



Labs/Orders:

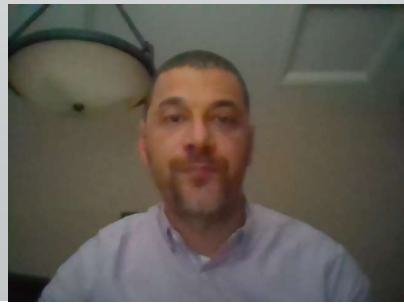
- CBC
- BMP
- BNP?
- Troponin
- PT/INR?
- ECG
- CXR?



Labs/Orders Results:

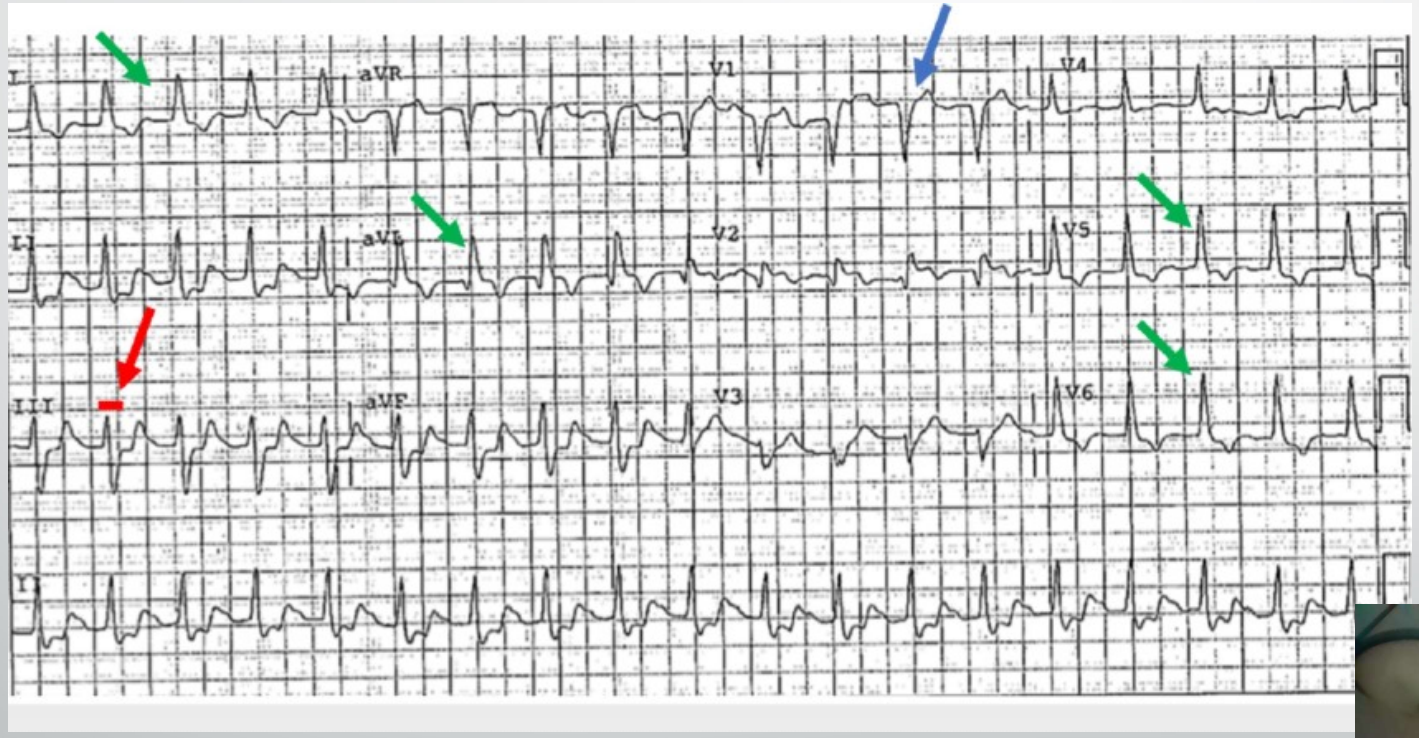
- CBC:
  - WBC: 8.8
  - HGb: 12.1
  - HCt: 37
  - Plt: 244
- PT/INR: 11/0.9
- Troponin: 0.05

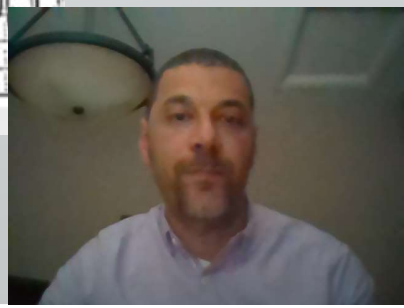
- BMP:
  - NA^{++} : 131
  - K^{+}: 5.4
  - Cl^{-} : 99
  - CO_2: 31
  - BUN: 16
  - Cr: 1.2
  - Gluc: 131



Labs/Orders Results:

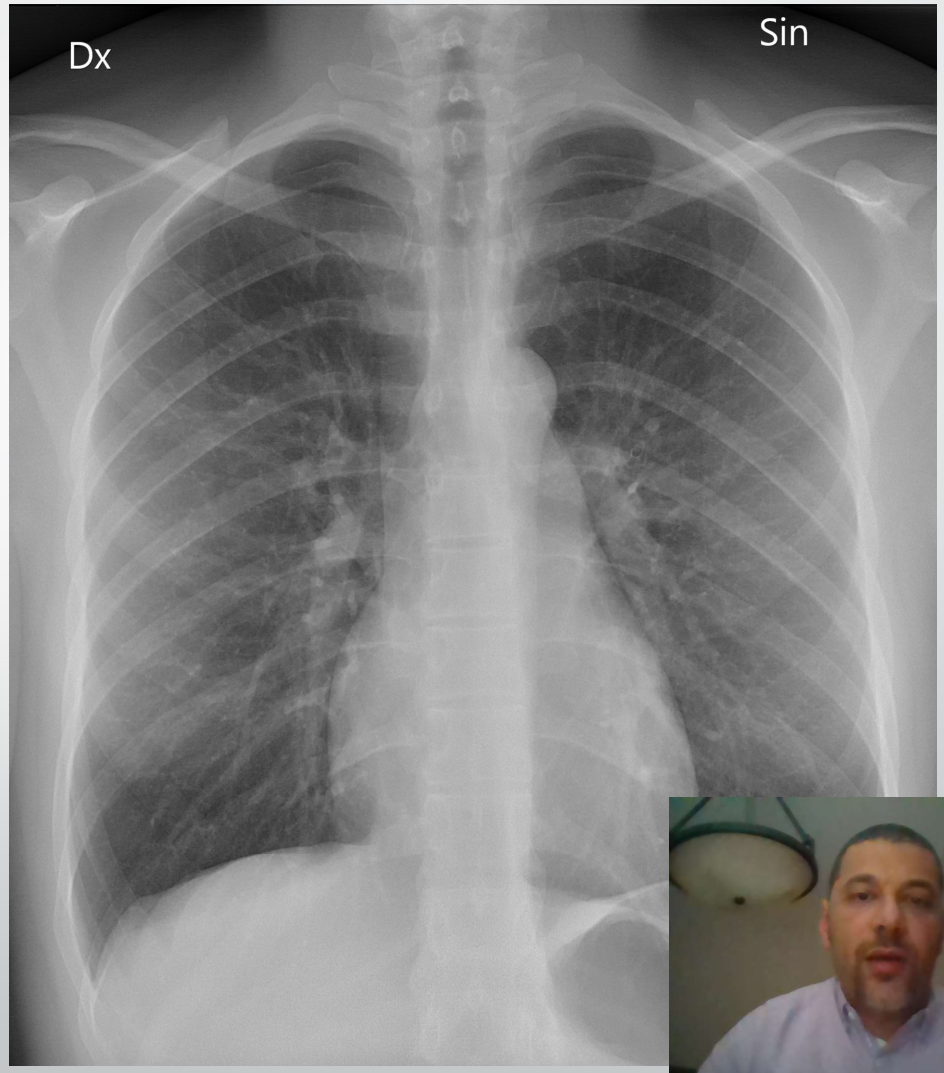
ECG:

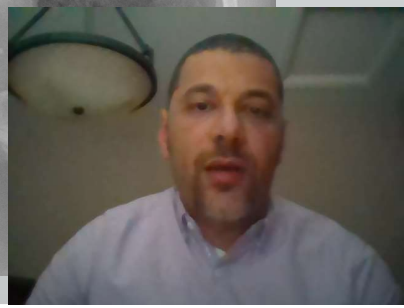




Labs/Orders Results:

CXR:





HEART Score-MDCalc

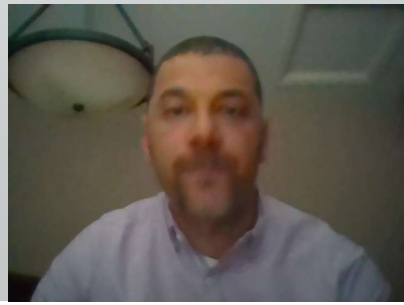
History	Slightly suspicious	0
	Moderately suspicious	+1
	Highly suspicious	**+2**
EKG 1 point: No ST deviation but LBBB, LVH, repolarization changes (e.g. digoxin); 2 points: ST deviation not due to LBBB, LVH, or digoxin	Normal	0
	Non-specific repolarization disturbance	**+1**
	Significant ST deviation	+2
Age	<45 0	**45-64 +1**	≥65 +2
Risk factors Risk factors: HTN, hypercholesterolemia, DM, obesity (BMI >30 kg/m^2), smoking (current, or smoking cessation ≤3 mo), positive family history (parent or sibling with CVD before age 65); atherosclerotic disease: prior MI, PCI/CABG, CVA/TIA, or peripheral arterial disease	No known risk factors	0
	1-2 risk factors	+1
	≥3 risk factors or history of atherosclerotic disease	**+2**
Initial troponin Use local, regular sensitivity troponin assays and corresponding cutoffs	**≤normal limit**	**0**
	1–3× normal limit	+1
	>3× normal limit	+2

6 points

Moderate Score (4-6 points)

Risk of MACE of 12-16.6%.

Copy Results | Next Steps



HEART Score-MDCalc

MANAGEMENT

Scores 0-3: 0.9-1.7% risk of adverse cardiac event. In the HEART Score study, these patients were discharged (0.99% in the retrospective study, 1.7% in the prospective study)

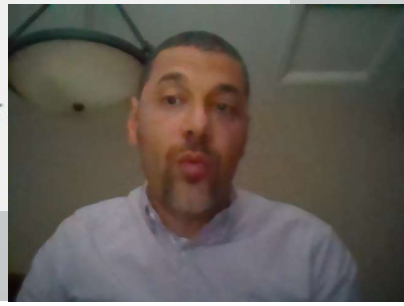
Scores 4-6: 12-16.6% risk of adverse cardiac event. In the HEART Score study, these patients were admitted to the hospital. (11.6% retrospective, 16.6% prospective)

Scores ≥7: 50-65% risk of adverse cardiac event. In the HEART Score study, these patients were candidates for early invasive measures. (65.2% retrospective, 50.1% prospective)

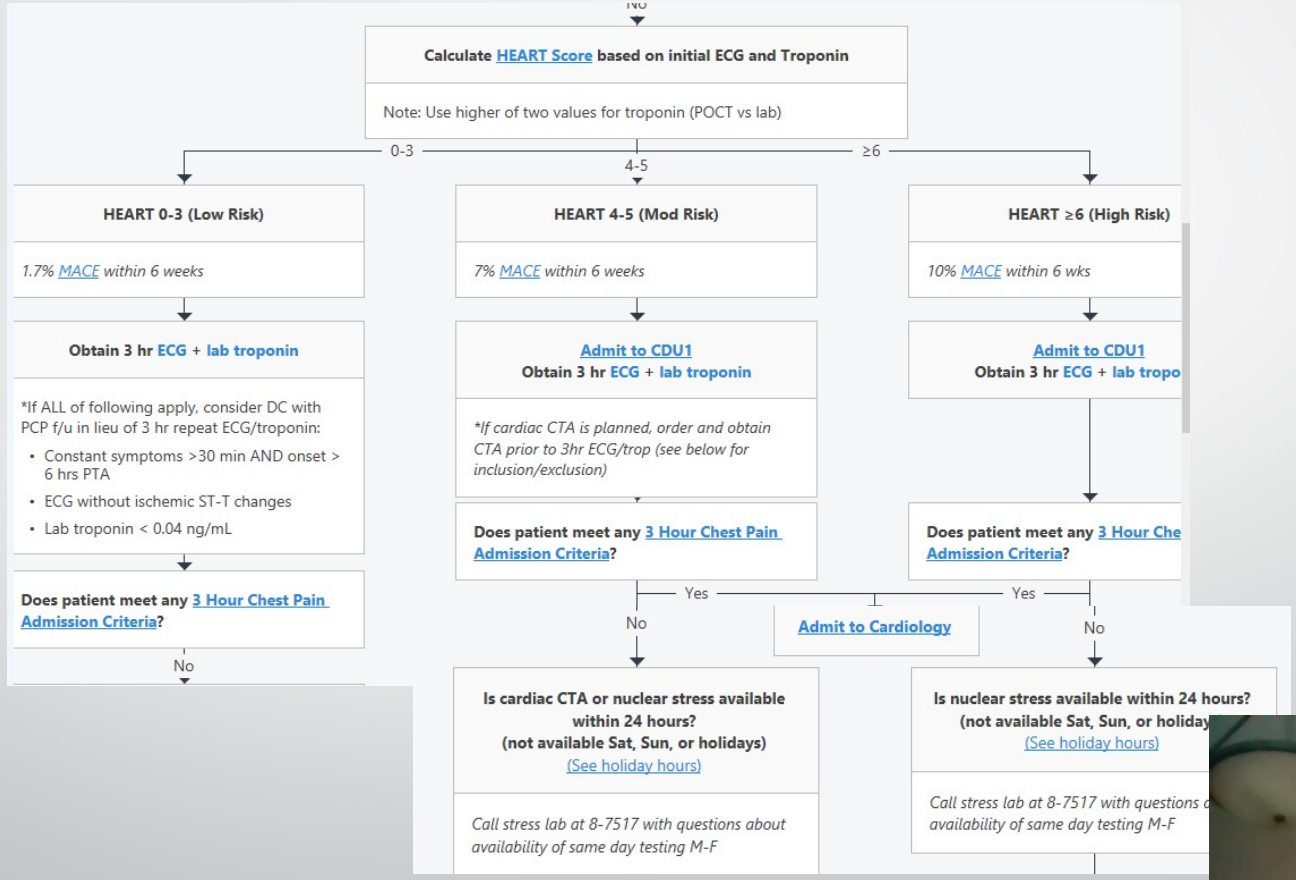
A MACE (Major Adverse Cardiac Event) was defined as all-cause mortality, myocardial infarction, or coronary revascularization.

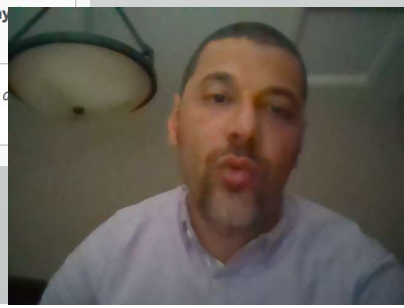
CRITICAL ACTIONS

Do not use if new ST-segment elevation requiring immediate intervention or unstable patients.



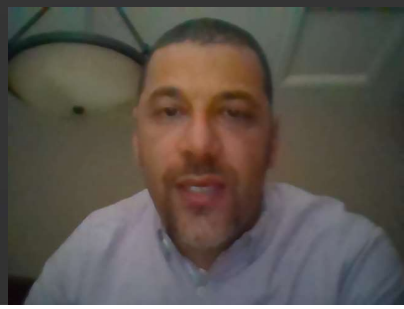
UCHealth ACS Algorithm:





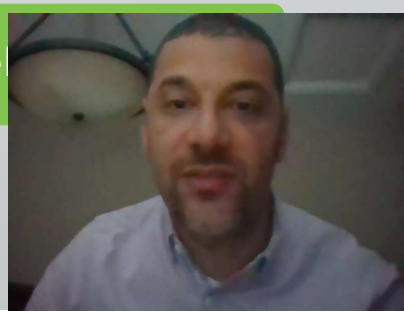
Case #3

- HPi: A 28 y/o female presents to the E.D. today with onset of substernal chest "tightness" 6h prior to arrival. Pt denies radiation of symptoms, denies aggravating or alleviating factors, and currently rates the pain as 7/10. Pt does admit to associated diaphoresis and shortness of breath, but denies dyspnea on exertion, n/v. Pt also denies recent travel, recent surgery, unilateral leg swelling, or prior PE/DVT.



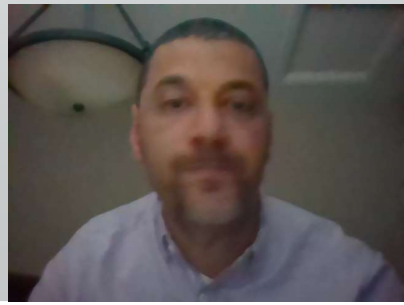
Case #3

- PMHx: Anxiety
- PSgHx: Tonsillectomy at age 12
- Meds: Hydroxyzine, 25mg PRN
- Allergies: NKDA
- PFamHx: Mother has history of depression, Father is healthy
- PSocHx: Denies smoking or recent travel



Case #3

- ROS:
  - GEN: Denies malaise, weight loss, fever
  - HEENT: N/C
  - NECK: N/C
  - PULM: + for SOB, - for DOE & cough
  - CARDIO: + for CP & palpitations
  - GI: - for N/V/D
  - LYMPH/HEME: N/C
  - MSK: - for LE edema
  - NEURO: N/C

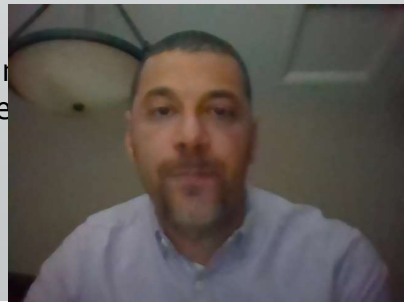


Case #2

- **VS: BP- 131/78, HR-88, SpO2: 98%, RR: 28**

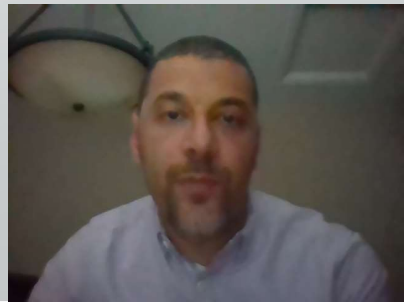
Physical Exam:

- **General:** Awake, alert and oriented. Appears stated age.
- **Skin:** Skin in warm and intact without rashes or lesions. Mild diaphoresis noted to palms. Nailbeds pink with no cyanosis or clubbing.
- **HEENT:** Normocephalic, atraumatic. EOM are intact, PERRLA.
- **Neck:** Supple, trachea midline, no JVD
- **Cardiac:** RRR without murmurs, rubs, or gallops. Normal intensity of S1 and S2.
- **Pulmonary:** CTAB without wheezes, rales, or rhonchi. Tachypnea @ 28 rpm noted.
- **Abdominal:** Abdomen is soft, NT/ND
- **Extremities:** No lower extremity edema noted
- **Neurological:** The patient is awake, alert and or
  normal speech. No gait abnormalities are appre
- **Psychiatric:** Mildly anxious.



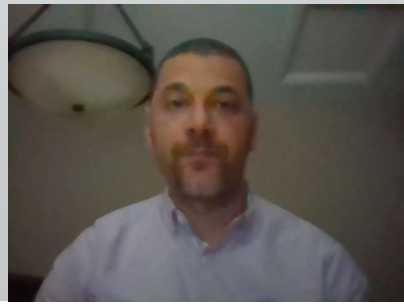
Case #3

- Labs/Orders:
  - CBC?
  - BMP?
  - Troponin?
  - PT/INR?
  - D-Dimer???
  - U-Preg?
  - CXR?
  - ECG?



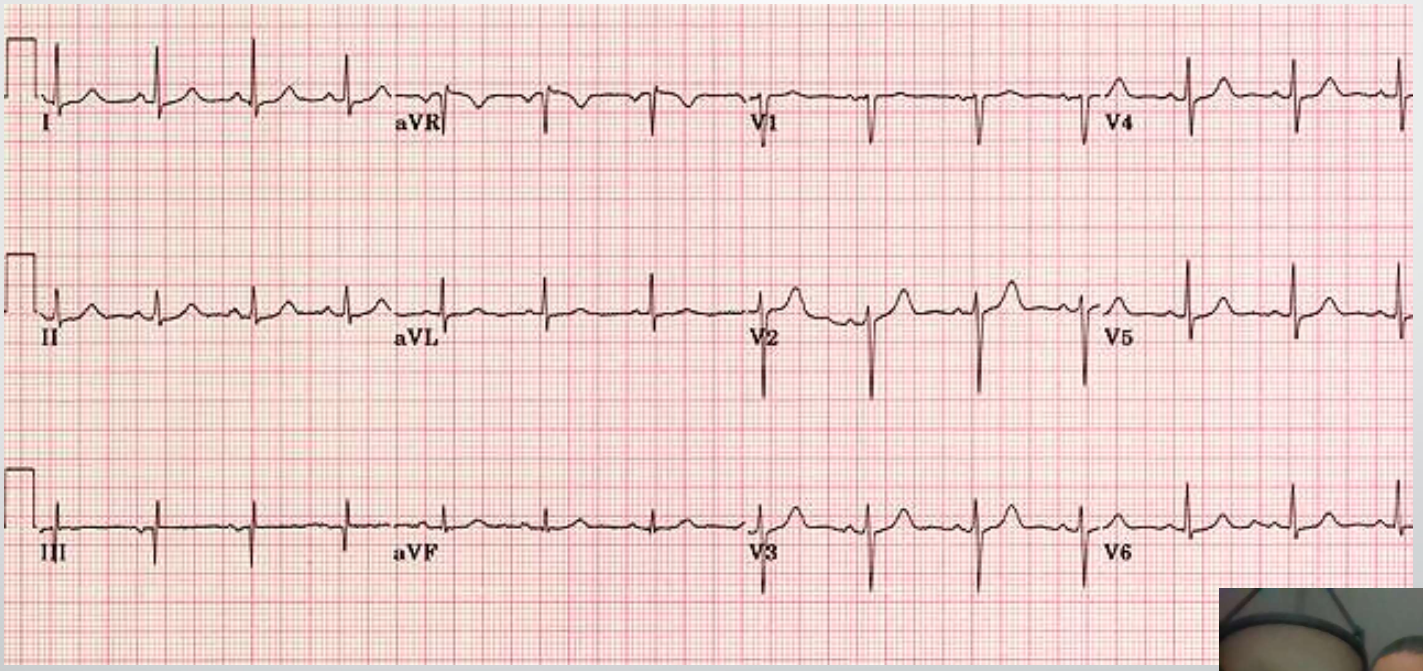
Labs/Orders Results:

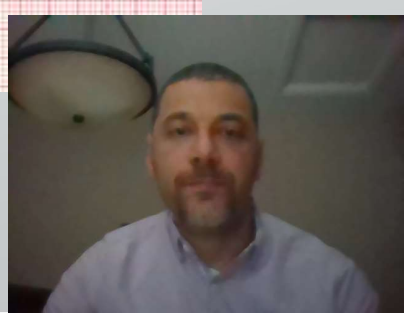
- CBC:
  - WBC: 6.1
  - HGb: 11.8
  - HCt: 35
  - Plt: 291
- Troponin: 0.00
- D-dimer: 220
- U-preg: Negative
- BMP:
  - NA^{++} : 134
  - K^{+}: 5.5
  - Cl^{-} : 102
  - CO_2: 28
  - BUN: 18
  - Cr: 0.9
  - Gluc: 94



Case #3

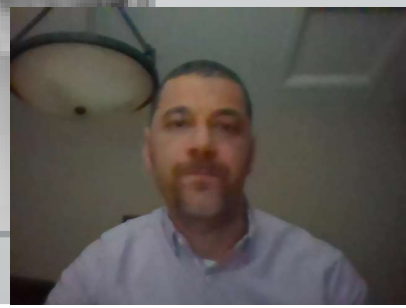
- Labs/Orders Results:
  - ECG:





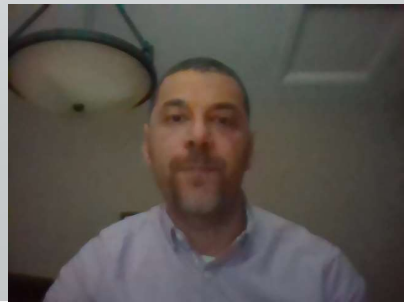
Case #3

- **Labs/Orders Results:**
  - **CXR:**



PE – Pretest Probability (PTP)

- Using vital signs, history, and physical exam, and chest X-ray: Determine your pretest probability (PTP) of PE
  - 1. High PTP: Patients in whom PE can be reliably excluded only by imaging
  - 2. Low-Moderate PTP: Patients safe for exclusion via negative D-dimer
  - 3. Patients with such low pretest probability that no testing is indicated



PERC Score- MDCalc

Age ≥50	**No** 0	Yes +1
HR ≥100	**No** 0	Yes +1
O_2 sat on room air <95%	**No** 0	Yes +1
Unilateral leg swelling	**No** 0	Yes +1
Hemoptysis	**No** 0	Yes +1
Recent surgery or trauma Surgery or trauma ≤4 weeks ago requiring treatment with general anesthesia	**No** 0	Yes +1
Prior PE or DVT	**No** 0	Yes +1
Hormone use Oral contraceptives, hormone replacement or estrogenic hormones use in males or female patients	**No** 0	Yes +1

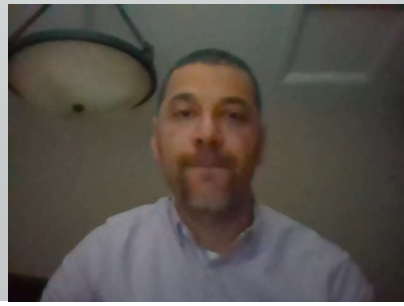
0 criteria

No need for further workup, as <2% chance of PE.

If no criteria are positive and clinician's pre-test probability is <15%, PERC Rule criteria are satisfied.

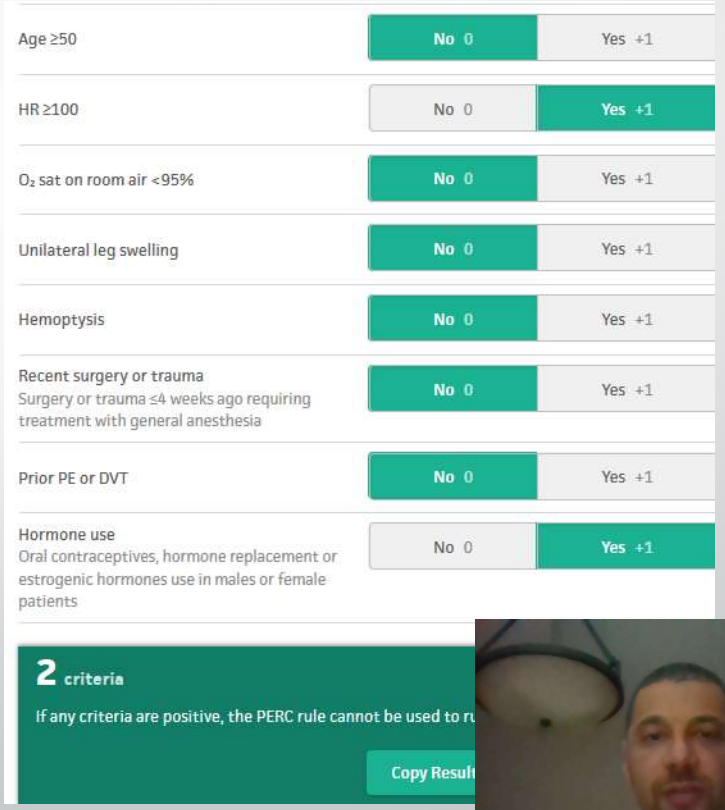
Copy Results | Next Steps

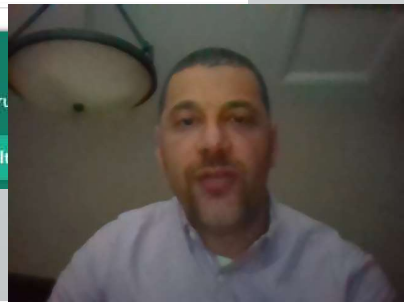
- Why use this?
  - It's highly specific and does not necessitate any further workup if you get a score of 0!
- According to the authors, you can use the PERC rule for patients in whom you are considering the diagnosis of PE, but the patient has low PTP. A low PTP patient can be safely ruled out with a PERC of 0 and does not require any further testing!



PERC Score- MDCalc

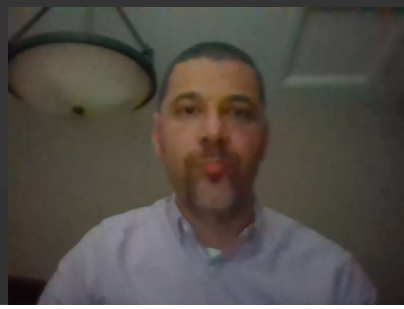
- What if she was tachycardic, what would you do now?
  - Order CT-PE protocol or D-dimer?
  - What is their pre-test probability (PTP)?
    - She would still be considered low to moderate PTP, so d-dimer would be appropriate.





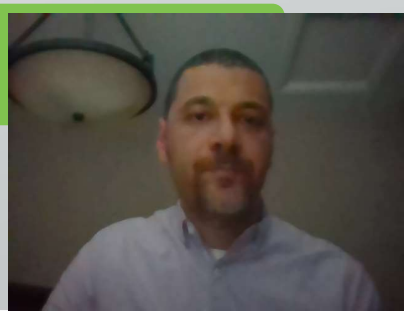
Case #4

- HPi: A 74 y/o male patient with a PMHx of HTN, COPD and hypothyroidism presents to your office today with a 2-week history of productive cough. Patient reports that his symptoms were preceded by URI-type symptoms, including rhinorrhea, sore throat, sneezing and a dry cough initially, that later became a productive cough of yellow sputum. Patient reports taking Mucinex-D OTC with mild cough relief, but not total improvement. Patient denies any exacerbating factors. Pertinent negatives include: denies chest pain, SOB, n/v/d, or syncope. Pertinent positives include: DOE, subjective fevers, chills at night and "rib pain" due to his coughing.



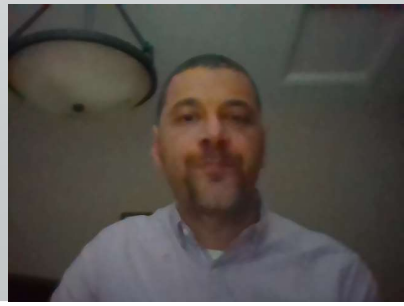
Case #4

- PMHx: HTN, COPD, Hypothyroidism
- PSgHx: Total knee, 7 years ago
- Meds: Losaartan 50mg QAM, Albuterol 90 mcg MDI, Advair diskus, Synthroid 75mcg QD
- Allergies: NKDA
- PFamHx: Mother had "heart failure." Father died of prostate cancer.
- PSocHx: 45 pack-year tobacco smoker.



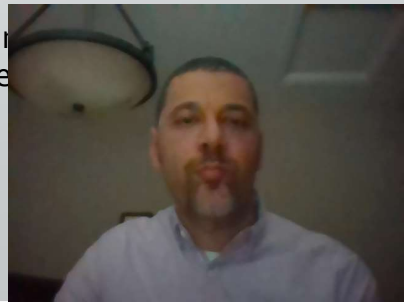
Case #4

- ROS:
  - GEN: Denies malaise, weight loss. + fever/chills
  - HEENT: +Sore throat, rhinorrhea
  - NECK: - for rigidity
  - PULM: + for SOB, cough, rib pain
  - CARDIO: - for CP & palpitations
  - GI: - for N/V/D
  - LYMPH/HEME: N/C
  - MSK: - for LE edema
  - NEURO: N/C



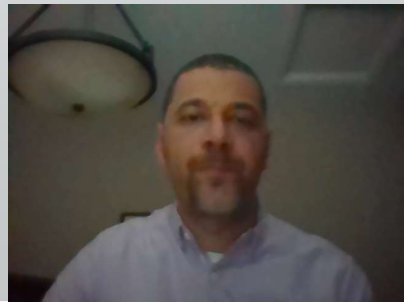
Case #4

- **VS: BP- 124/58, HR-82, SpO2: 94%, RR: 20**
- **Physical Exam:**
  - **General:** Awake, alert and oriented. No acute distress. Appears stated age
  - **Skin:** Skin in warm and intact without rashes or lesions. No diaphoresis noted. Nailbeds pink with no cyanosis. Mild clubbing.
  - **HEENT:** Normocephalic, atraumatic. EOM are intact, PERRLA. No scleral icterus
  - **Neck:** Supple, trachea midline, no JVD
  - **Cardiac:** RRR without murmurs, rubs, or gallops. Normal intensity of S1 and S2
  - **Pulmonary:** CTAB without wheezes, rales, or rhonchi
  - **Abdominal:** Abdomen is soft, NT/ND
  - **Extremities:** No lower extremity edema noted
  - **Neurological:** The patient is awake, alert and or
    normal speech. No gait abnormalities are appre
  - **Psychiatric:** Appropriate mood and affect



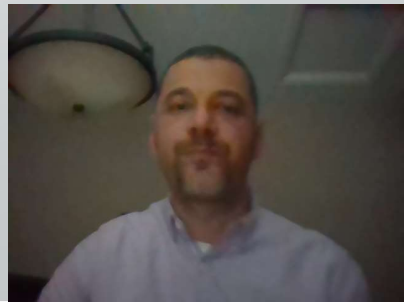
Case #4

- Labs/Orders:
  - CBC
  - BMP
  - BNP
  - Troponin?
  - UA?
  - CXR
  - ECG?



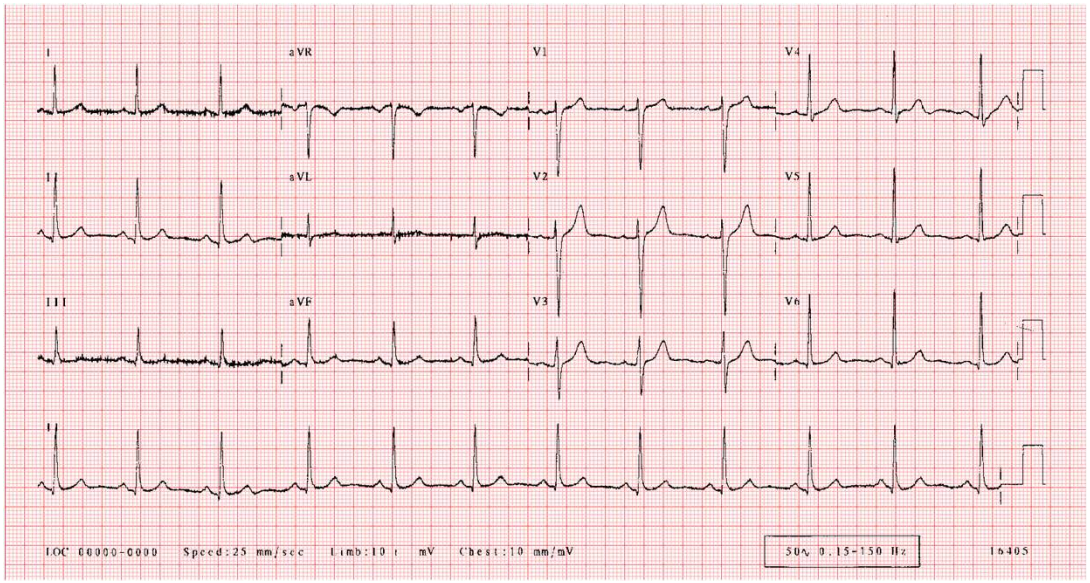
Labs/Orders Results:

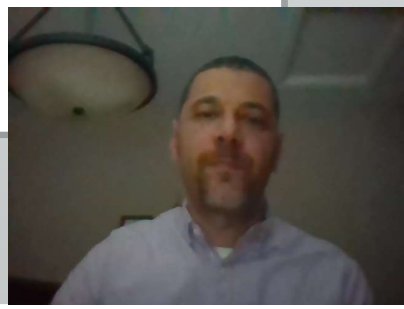
- CBC:
  - WBC: 18.2
  - HGb: 11.9
  - HCt: 35
  - Plt: 295
- BNP: 120
- Troponin: 0.04
- BMP:
  - NA^{++} : 129
  - K^{+}: 5.2
  - Cl^{-} : 101
  - CO_2: 28
  - BUN: 22
  - Cr: 1.4
  - Gluc: 111



Case #4

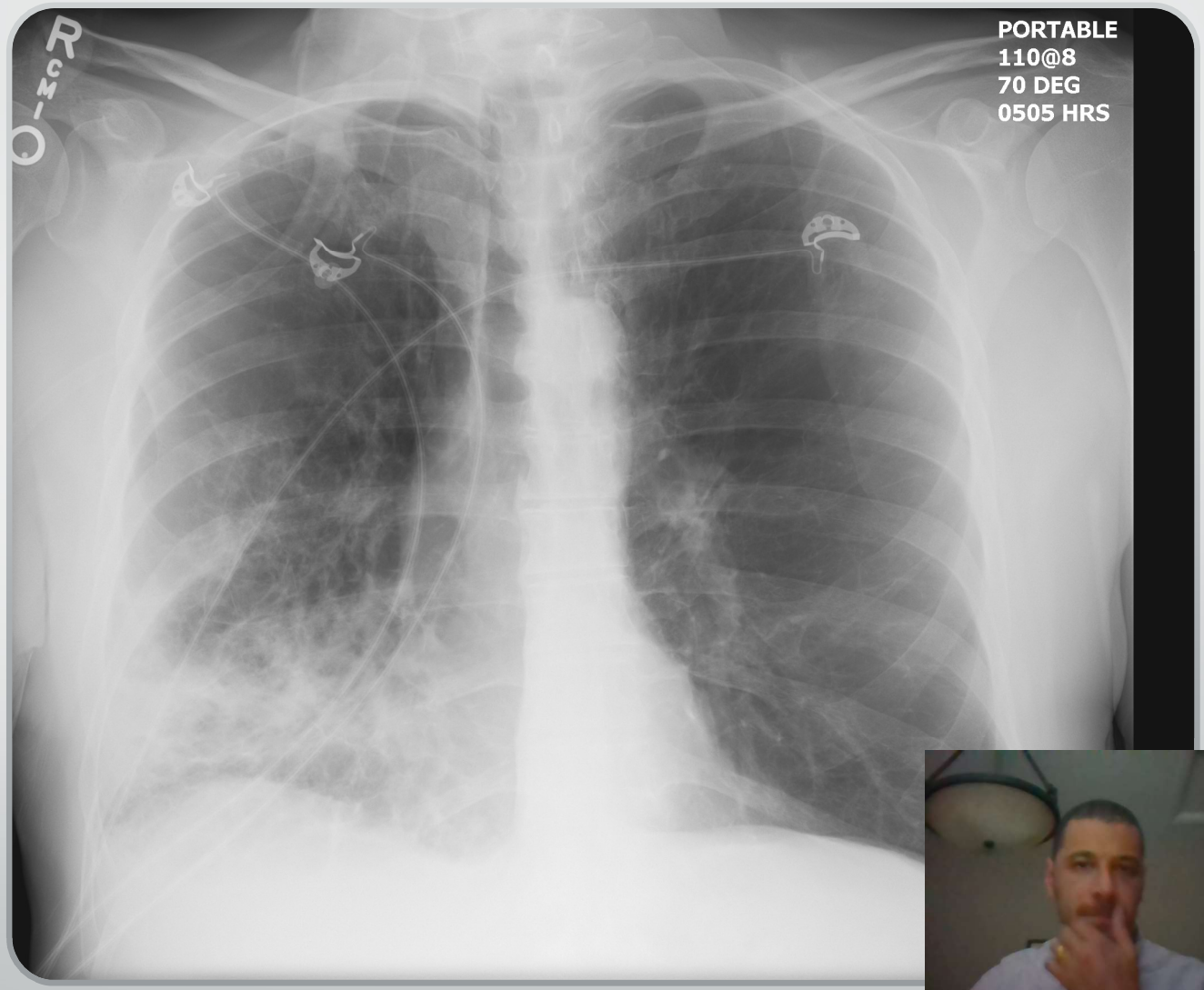
- Labs/Orders Results:
  - ECG

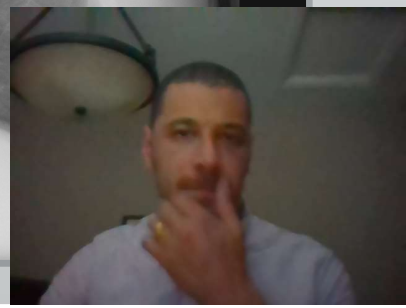




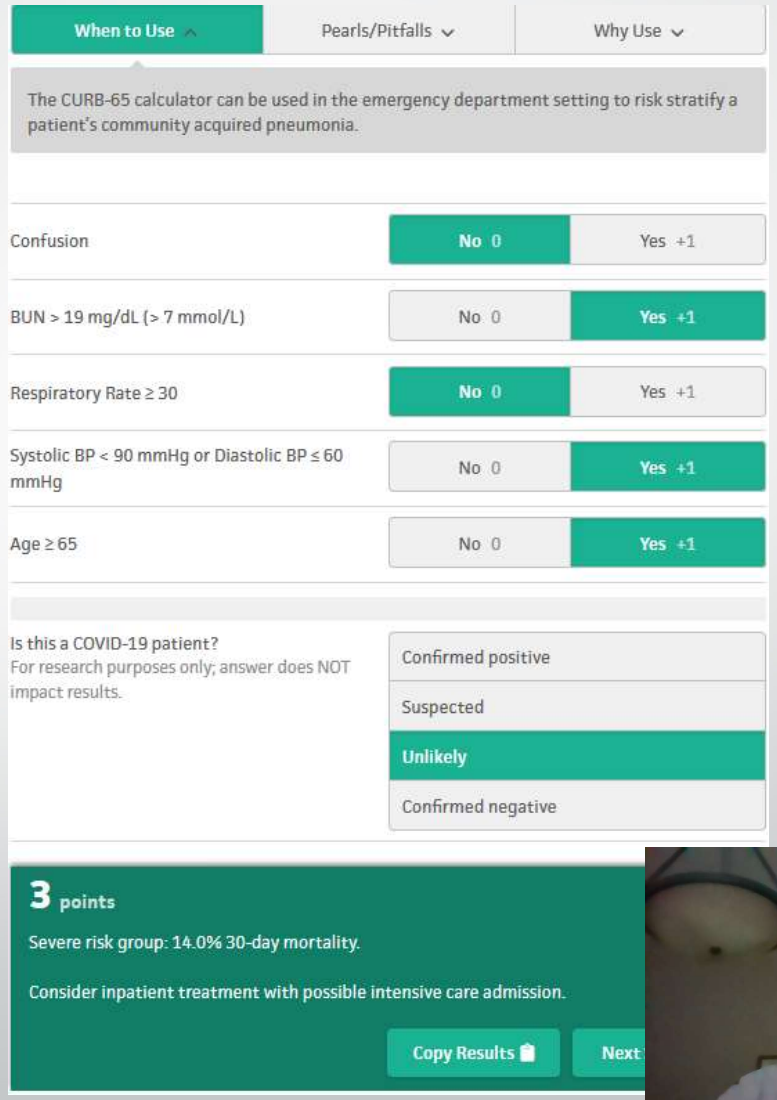
Case #4

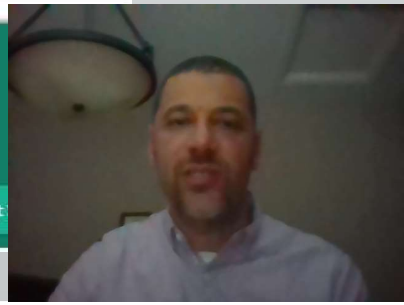
- Labs/Orders Results:
  - CXR





CURB-65: MDCalc





Disposition
CURB-65: MDCalc

ADVICE

While many pneumonias are actually viral in nature, typical practice is to provide a course of antibiotics given the pneumonia may be bacterial.

Disposition (inpatient vs. outpatient) often dictates further care and management -- including lab testing, blood cultures, etc.

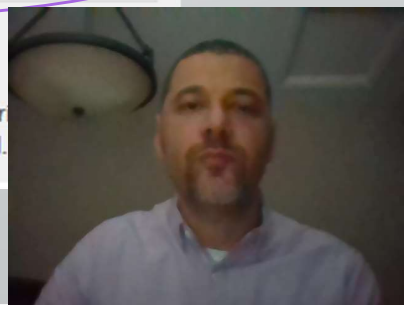
MANAGEMENT

The CURB-65 scores range from 0 to 5. Assign points as in the table based on confusion status, urea level, respiratory rate, blood pressure, and age. Clinical management decisions can be made based on the score, as described in the validation study below:

Score	Risk	Disposition
0 or 1	1.5% mortality	Outpatient care
2	9.2% mortality	Inpatient vs. observation admission
≥ 3	22% mortality	Inpatient admission with consideration for ICU admission with score of 4 or 5

CRITICAL ACTIONS

For patients scoring high on CURB-65, it would be prudent to ensure initial tr
missed the presence of sepsis. Evaluation of SIRS criteria would be beneficial.

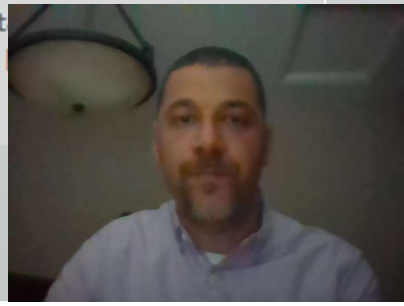


Pearls/Pitfalls of CURB-65 (Per CURB-65 authors):

- The CURB-65 Score includes points for confusion and blood urea nitrogen, which in the acutely ill elderly patient, could be due to a variety of factors. An alternative scoring system, SOAR, circumvents those two parameters. It uses low systolic BP (S) and poor oxygenation (PaO2: FIO2) (O), advancing age (A), high respiratory rate (R).
- CURB-65 does not assign points for co-morbid illness and nursing home residence, as the original study did account for many of these conditions.
- CURB-65 may not identify patients requiring ICU admission as well as the PSI.

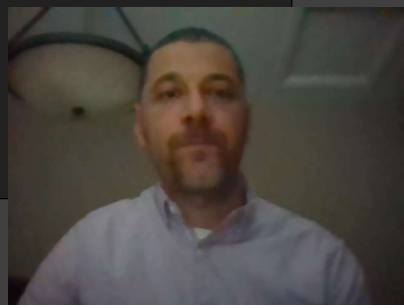
Why use CURB-65 (Per CURB-65 authors):

- CURB-65 is fast to compute, requires likely already-available patient information, and provides an excellent risk stratification of community acquired pneumonia. It can facilitate better utilization of resources and treatment initiation.
- In comparison to the PSI, CURB-65 offers equal sensitivity of mort
  community acquired pneumonia. Notably, CURB-65 (74.6%) has a
  PSI (52.2%).



References

- MDCalc.com



THANK YOU FOR YOUR VIRTUAL ATTENTION!

- Please email me with any questions: david.indarawis@cuanschutz.edu