### Key Clinical Reasoning Concepts

### Processing:

- Translates a patient's story (signs/symptoms) into precise medical terms
   Days becomes 'acute'; shortness of breath becomes 'dyspnea'
- Uses 'semantic qualifiers' that add specificity and allow compare/contrast
   Acute vs. chronic; monoarticular vs. polyarticular; dull vs. pleuritic
- Allows us to effectively communicate with other clinicians
- Allows us to map a patient's problem onto stored medical knowledge

### Problem Representation (PR):

- Succinct, processed summary of a patient's story (a 'tweet'); aids in building a differential diagnosis
  - Starts *during the patient encounter* as an internal, *mental model* for the patient's main problem; *refined* throughout the encounter
  - Guides history-taking & the exam (by defining the problem & sparking ideas about the ddx or possible categories of disease, helps ID important questions to ask or exam maneuvers to do)
  - When we sit down to write our note or give an oral presentation, we use the PR we've built in our minds as a starting point to craft the sentence that starts the A/P (AKA the 'one-liner,' summary statement, assessment, or 'final problem representation')
    - The PR is also linked w/ the ID/CC statement at the beginning of the note or presentation (same core problem); the ID/CC statement is *much* more succinct/shorter than the sentence at the beginning of the A/P—i.e. ID/CC doesn't include details about the exam or test results and is focused on **briefly** describing the presenting symptom
- Includes:
  - Who: *Relevant* Epidemiology/Risk Factors for disease
  - **What**: Key/differentiating features of the clinical syndrome (signs/symptoms)
  - **When**: Time course/pattern/tempo (acute/progressive)
- Excludes:
  - Non-specific information
    - Fatigue rarely helps to narrow our differential diagnosis
  - Irrelevant information
    - A patient's inguinal hernia is likely irrelevant to their exertional chest pain
- Allows experienced clinicians to use pattern recognition to quickly develop a ddx
- Allows learners to develop their reasoning skills:
  - What is most relevant to a given clinical problem?
  - How do we specifically define a clinical problem in order to begin to solve it?



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### Key Clinical Reasoning Concepts

### Illness Scripts:

- Mental representations of diseases (3x5 cards)
- Dynamic, change/develop with experience
- Unique to individual clinicians
- Include (same 3 categories in Problem Representation, plus add'l info):
  - Who: Who gets it?
    - Epidemiology, risk factors
  - What: Clinical syndrome (Signs/Symptoms)
    - Prioritize those that are most helpful in distinguishing related diseases
  - When: Time course/pattern/tempo
  - Why: Pathophysiology
    - Connecting pathophysiology with the Who/What/When in a script helps us truly 'understand' it
  - As scripts develop, additional categories are added: e.g. diagnostic and treatment approach

### Schema:

- A systematic approach to thinking through a given clinical problem
  - Can be used to help clinicians build a ddx
    - Can also use schema to systematically approach how to manage a particular clinical problem, approach a procedure, etc.
  - Often based on mechanistic thinking/pathophysiology
    - i.e. diagnostic schema for acute kidney injury = pre-renal, intrinsic, vs. post-renal
  - May be unique to an individual clinician based on their experience



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### Case 1: Mid-Year Intern on inpatient medicine service

You are on a busy inpatient medicine wards service half-way through the academic year. The intern presents a new patient that he just admitted from the Emergency Department (ED). You've looked through the patient's chart and are concerned about a possible pulmonary embolus (PE) given the combination of sinus tachycardia, dyspnea, pleuritic chest pain, and low-grade temperature without a change in the patient's cough/sputum production, or clear triggers for a COPD exacerbation. Since PE is a 'can't miss' diagnosis (with high morbidity/mortality), you want to be sure it has been considered.

After presenting the H&P, the intern's assessment and plan (A&P) is as follows:

"Ms. Goldman is a 64yo woman with DM and COPD on 2L home O2 with acute on chronic shortness of breath, tachycardia, low grade fevers, pleuritic chest pain, and a leukocytosis. I'm most concerned for community acquired pneumonia and think we should continue the antibiotics they started in the ED. A COPD flair is also possible given her history, so we should consider starting some prednisone as well, especially if she's not improving by tomorrow on her antibiotics. I always like to keep new onset heart failure in the back of my mind in folks with risk factors for CAD and silent ischemia, but I think that's probably less likely at this point given her fevers and leukocytosis."

**1. What's working well with the reasoning here?** What reasoning skills is this intern demonstrating, what can you reinforce? In other words, what should he 'keep doing?'

**2. Identify potential challenges.** What's on the differential for this intern's problem(s) in thinking through this case?

**3. Pin down the problem/Explore your differential for this learner's challenges.** What questions could you ask the intern to reveal where he struggled in his reasoning?

4. **Coach.** Consider several possible reasoning issues that could be revealed when you pin down the problem (step above). Brainstorm 2-3 different strategies for coaching this intern to target different potential reasoning deficits.

### Case 2: Third year medical student on GI consult service

You have been working with an MS3 for the past week on an inpatient GI consult service. You ask him to see a new consult patient whom you believe may have gallstone pancreatitis given the information you have heard so far, which includes a prior history of symptomatic gallstones, LFT (liver function test) abnormalities, and acute symptoms including severe abdominal pain radiating to the back, nausea and vomiting, and hypotension. As this diagnosis can be life threatening and requires rapid, aggressive care, and would necessitate an urgent intervention if he were found to have on-going retained stones, you want to be sure to consider this diagnosis early. After presenting his History and Physical (H&P), the student closes his oral presentation with the following assessment and plan (A/P):

"In summary, Mr. Smith is a 62yo man with multiple medical problems including COPD, hypertension, hypercholesterolemia, prostate cancer, diabetes, coronary artery disease, plus some depression, and a history of gallstones. He has had some abdominal pain, fatigue, and generalized weakness, nausea and vomiting, low grade fevers, tachycardia, and hypotension.

Really, he could have a lot of different things. I'm worried that given his lack of follow-up, his prostate cancer may have advanced and could now be causing systemic problems due to metastatic disease. But, with abdominal pain in someone with diabetes, we should also be thinking about an MI. We should get a CT of his chest and abdomen to look for metastatic disease, check an EKG and send some cardiac enzymes. Plus, I think he's a bit dry, so I wrote him for a liter of normal saline."

**1. What's working well with the reasoning here?** What reasoning skills is this student demonstrating; what can you reinforce? In other words, what should he 'keep doing?'

**2. Identify potential challenges.** What's on the differential for this student's problem(s) in thinking through this case?

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**4. Coach.** Consider several possible reasoning issues that could be revealed when you pin down the problem (step above). Brainstorm 2-3 different strategies for coaching this student to target different potential reasoning deficits.

### Case 3: End-of-the-year intern on inpatient medicine service

You have been working with an end-of-the year intern for the past two weeks on inpatient medicine. You have noted that she has a good fund of knowledge. Today, she is presenting a new patient, and after giving you her H&P, her Assessment and Plan (A&P) is as follows:

"In summary, Mr. Gabriel is a 72yo man with stage IV lung adenocarcinoma, chronic obstructive urinary retention with an indwelling foley catheter complicated by multiple ICU admissions for urosepsis presenting again with subacute fevers, abdominal pain, hypotension and acute kidney injury. With his chronic foley and prior history, his presentation fits with another episode of urosepsis. I've started empiric antibiotics based on prior urine culture sensitivities as well as early goal directed therapy with aggressive IVF. We'll await culture results and tailor his antibiotics as needed. He is still hypotensive despite two liters of IV fluids, so we're admitting him to the ICU and starting a central line for monitoring."

On your own review of the patient's labs before rounds, you noticed that Mr. Gabriel has significant hyponatremia, hyperkalemia and hypoglycemia—in fact, these abnormalities have also been present on his labs in the past. His temperature has actually been in the 99 range, rather than a true fever as reported. Given these findings, you are concerned about adrenal insufficiency as a potential cause for his presentation, or at least a complicating factor (and potentially an underlying factor in his multiple prior ICU admissions).

**1.** What's working well with the reasoning here? What reasoning skills is this intern demonstrating; what can you reinforce? In other words, what should she 'keep doing?'

**2. Identify potential challenges.** What's on the differential for this intern's problem(s) in thinking through this case?

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### Case 4: Reinforcing Reasoning in the Classroom

You are working with faculty in your pre-clerkship curriculum to reinforce reasoning concepts longitudinally for first and second year medical students. The lecturers are already feeling squeezed with time during their large group sessions, and are resistant to adding any additional objectives to their sessions. The course director shares a slide-set for a talk on Acute Coronary Syndrome with you, and asks for your suggestions for low impact ways to highlight reasoning concepts during this talk.

1. Review the slides for Case 4 and brainstorm some 'low-hanging-fruit' opportunities to weave reasoning concepts into this medical knowledge-heavy large group session?

2. What are ways we might motivate/excite colleagues to incorporate reasoning into their teaching?

3. Return to the large group to share your thoughts.

### **Take-Homes & Commitments:**

Something useful I learned during today's workshop:

Something I will do differently in my teaching as a result of this workshop (consider creating a SMART goal – specific, measurable, attainable, realistic, time-bound – and plan how you will hold yourself **accountable** for this goal):



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# Excerpted Large Group Slides for Case #4

Developing Medical Educators of the 21st Century 2019

# The patient with coronary artery disease (CAD)

### Krishan Soni, MD, MBA, FACC

Asst. Clinical Professor Division of Cardiology University of California, San Francisco <u>Krishan.soni@ucsf.edu</u>







Atherosclerosis: A Systemic Process Atherosclerosis can affect many vascular territories		
System	Manifestation	
Cardiac	Myocardial infarction, angina pectoris, heart failure, and coronary death	
Cerebral	Stroke, transient ischemic attack, dementia	
Peripheral	Intermittent claudication, non-healing ulcers, limb loss	
Aortic	Thoracic or abdominal aortic aneurysm, dissection, rupture, and death	





























## Part 3: Epidemiology

Objectives:

- 1. Understand who gets the disease
- 2. List the risk factors for atherosclerosis
- 3. Describe novel markers of CAD
- 4. Calculate ASCVD Risk

ASCVD = Atherosclerotic Cardiovascular Disease



Risk Factors for Atherosclerosis				
Non-modifiable risk factors	Prevalence	Independent increase in risk		
Age	<ul> <li>13% of people 65 or older</li> <li>80% of CAD deaths occur ≥ 65 years old</li> </ul>	5% per year increase in risk after age 30		
Male sex	50%	Develop CAD 10 years earlier than women		
Family history of premature CAD‡				

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Modifiable risk factors	Prevalence	Independent increase in risk	
Dyslipidemia • High total chol • High LDL • Low HDL • High TG	100 million people: total > 200 40-50% have LDL over 130	2x	
Smoking	26 million men (27%) 23 million women (22%)	1.5-2x	
Hypertension	58-65 million people (~ 30%) Only 27% adequately treated	1.5-2x	
Diabetes mellitus	Increasing; about 5%	1.5x 2/3 die of CV disease	

<b>Risk Factors</b>	for Atherosc	lerosis

Modifiable risk factors	Prevalence	Reduction in CAD with treatment
Obesity	Varies	Via BP, chol, ?Inflammation?
Dietary factors	Varies	Via cholesterol
Thrombogenic factors	Multiple	Proven (Aspirin)
Sedentary lifestyle	Varies	Likely

# Part 4: Diagnosis Objectives: 1. Describe the pre-test likelihood of CAD based on: a. presentation b. risk factors c. physical exam d. electrocardiogram 2. Describe non-invasive tests : "functional" studies a. stress types of stress b. types of imaging 3. Describe the anatomic diagnosis based on: a. coronary angiogram b. pathology

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