HOW TO TEACH

CLINICAL REASONING
CLINICAL REASONING

GOALS FOR THIS SESSION

- Add value to the feedback you are giving to resident and student physicians—especially for learners at the extremes (both early or advanced).

- Learn rapid ways to embed training on clinical reasoning as part of work rounds or while precepting in ambulatory clinic.

- Improve use of the core skill used by internal medicine physicians.
ERRORS? WE DON’T HAVE ERRORS.

- Diagnostic failure occurs most often in the three disciplines where uncertainty is highest (10-15%)
  - Internal medicine
  - Family Medicine
  - Emergency Medicine

- Antemortem misdiagnosis rate = 40% (autopsy)

• **ACGME requirements** to teach it as a core skill

The Internal Medicine Milestone Project

A Joint Initiative of
The Accreditation Council for Graduate Medical Education
and
The American Board of Internal Medicine

[ACGME logo] [ABIM logo]
### Medical Knowledge 1: Clinical Reasoning

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<td>Uses educational resources to answer clinical questions and to recognize gaps in personal medical knowledge</td>
<td>Integrates basic science knowledge, interpretation of test results, and social and behavioral determinants of health into clinical decision making</td>
<td>Incorporates preferences from patients, family, and interprofessional teams into clinical decision making</td>
<td>Develops a rational treatment approach in ambiguous medical and/or social situations</td>
<td>Consistently serves as a role model and educator in the navigation of complex and ambiguous clinical decision making</td>
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**Comments:**

Not Yet Completed Level 1

Not Yet Assessable
Clinical reasoning is arguably the core skill of internal medicine: there is considerable new knowledge about it.

Resident learners must construct their own approach and receive little specific feedback to know how to do this for themselves.

Understanding mental errors in reasoning can improve our patient care.

WHY IS DISCUSSING CLINICAL REASONING SO DIFFICULT?

- Our problem as teachers is that we use an intuitive approach for simple cases, but we may use an analytic (stepwise) process that is not apparent to learners.
- Good news: Not all teachers have this problem.

“Let me stop you right there. Go back three slides and tell me what you were thinking.”
CLINICAL REASONING

WHAT WE LEARNED ABOUT CLINICAL REASONING

• You gather all the information (history, exam, labs)

• You generate a differential diagnosis

• You order tests to confirm your top choices

but actually...

New Data About Reasoning

• You start making decisions about the diagnosis within seconds after meeting the patient or hearing any history using illness scripts you have stored

• Your reasoning is subject to multiple errors based on hidden biases

• Just seeing more patients will not improve your reasoning skills.

“Read more, see more cases.”
CLINICAL REASONING MODES

INTUITIVE VS. ANALYTIC REASONING

Intuitive Reasoning

• conducts a rapid mental comparison of the current case with an abstract prototypical picture (illness script)

• knowledge and experience trigger a unifying diagnosis

• can use relatively few data points

• largely an unconscious process

Analytic Reasoning

• must comb through memory and knowledge stores, or use external information sources to find a clinical solution

• deliberate and time consuming

• may use decision support tools and apps

• may need consultation and reflection

CLINICAL REASONING MODES

INTUITIVE AND ANALYTIC REASONING

Intuitive               Analytic

Part of a continuum
Each is subject to the other.
Advanced reasoners learn how to blend them.

“I will admit this patient with chest pain despite the low TIMI score.”

FOUR COMPONENTS OF DIAGNOSTIC REASONING

1. Data collection
2. Problem representation
3. Illness scripts
4. Script Selection
ANATOMY OF CLINICAL REASONING

Data Collection  →  Problem representation  ←  Illness scripts

Script selection  ←  Diagnosis

Gurpreet Dhaliwal MD, concepts and content
TEACHING STRATEGIES TO PROMOTE CLINICAL REASONING

Data Collection

Problem representation

Illness scripts

Script selection

DATA COLLECTION: ASSESS THE LEARNER’S SKILLS

Is this a change from prior headaches?

Does it last 4-72 hours?

Are there visual symptoms, such as bright, zig-zag lines before the headaches begins?

Is the pain unilateral or bilateral?

Is the pain constant or throbbing?

Is there a family history of migraine?

“The patient’s chief complaint is a headache. They have it about once a week. It involves the front of the head. They also complain of nausea.”

What else do you need to know to make a diagnosis?

What feedback could you give the new clinical reasoner to improve?
DATA COLLECTION: TIPS TO IMPROVE

- When reading, build your **illness scripts** to enhance your questions in the HPI

- **Use guidelines** to sharpen your HPI question set next time by adding features important for diagnoses

- **Include HPI questions** that will help you **distinguish** closely related or confounding diagnoses (pay attention to similar illness scripts)
**DATA COLLECTION: TIPS TO IMPROVE**

- **specific diseases** (illness scripts) to enhance your HPI
- **guidelines or reviews** (MKSAP)
- **HPI questions** that will help you **distinguish** between confounding diagnoses
CLINICAL REASONING

TEACHING STRATEGIES TO PROMOTE CLINICAL REASONING

PROBLEM REPRESENTATION: DEFINED

- The transformation of patient-specific details into abstract terms that are useful medically
- Patient's narrative is placed in a form that allows the selection of illness scripts
"The next patient is a 54 year old white man with knee pain. It started last night. He does not report any trauma. On examination, his vital signs are normal. His knee is swollen, red and tender to touch. It hurts him a lot when I test his range of motion. He's had this problem twice before. He is pain free between episodes."

"My next patient is a 54 year old white male with a sudden onset of pain in his right knee that awakened him from sleep. He does not report any trauma and was essentially asymptomatic when he went to bed. His history is remarkable for two episodes of similar, severe pain 9 months and 2 years ago. He is pain free between episodes. He is afebrile today. His knee is swollen, tender to touch and erythematous."

"My next patient is a 54 year old white male with a sudden onset of pain in his right knee that awakened him from sleep. He does not report any trauma and was essentially *asymptomatic* when he went to bed. His history is remarkable for two episodes of similar, severe pain 9 months and 2 years ago. He is *pain free between episodes*. He is *afebrile* today. His knee is swollen, tender to touch and *erythematous*."

Problem representation
the transformation of patient specific details into abstract terms that are useful medically

Patient history

• “Last night”
• “I’ve had problems like this before”
• “Same knee”
• age, sex and medical Hx

An accomplished reasoner translates to

• “Acute onset”
• “recurrent”
• “monoarticular”
• “otherwise healthy, middle aged man”

Medical learners should solve problems by carefully defining them first.

This is the entry point to script selection and comparison.

- Practice using good descriptive terms that would be good Google search words or phrases.
Useful problem representations generally contain:

- Defining and discriminating features of the illness
- Translation of key clinical details
- Medical terms
- Temporal, qualitative, contextual
  - Acute versus chronic
  - Rest versus exertional
  - Healthy versus chronically ill

“OK, somebody give us a one sentence problem representation so we can select illness scripts.”
A proficient resident uses paired semantic qualifiers when considering the diagnosis. The use of semantic qualifiers is associated with strong clinical reasoning.

TEACHING STRATEGIES TO PROMOTE CLINICAL REASONING

Data Collection

Problem representation

Illness scripts

Script selection

Expert clinicians store and recall knowledge as diseases, conditions or syndromes (illness scripts) that are connected to a problem representation.

Each illness script includes predisposing conditions (risks), symptoms, signs and initial tests needed to confirm.

- Memory of a particular patient may trigger a representative illness script; experiential learning is useful
- When reading, trainees should look for features that discriminate and distinguish between two conditions
- Board question study can include distinguishing features of the correct diagnosis

ILLNESS SCRIPTS: BUILD YOUR OWN, LIKE OSLER DID

Include:

- Risk Factors/ Predisposing Illness
- Presentation
- Diagnostic features/tests
- Distinguish from

Cryoglobulinemic vasculitis

**Risks**
- Hepatitis C-associated vasculitis
- Waldenstrom macroglobulinemia
- Malignancy, HCV

**Present**
- Palpable purpura

**Diagnosis**
- Cryoglobulins
  - Low serum C^4^, RF
  - Skin biopsy (leukocytoclastic vasculitis)

**Versus**
- HSP: cutaneous small vessel vasculitis
  - Follows Stop
  - Necrotic acral erythema
  - Periophthalmic rash
  - Vascular, bullae, sun 50% have HCV
Parkinson Disease

At Risk

Diagnostic Essentials

☑ The four cardinal signs of Parkinson disease are resting tremor, bradykinesia, cogwheel rigidity, and gait/postural impairment.

☑ Early prominent postural instability with frequent falls should raise concern for a Parkinson-plus condition.

Distinguish From

☑ The distinction between dementia with Lewy bodies and Parkinson disease dementia depends on the onset of cognitive impairment relative to motor impairment.

☑ If dementia precedes, occurs concurrently with, or develops within 1 year of onset of parkinsonian motor symptoms, the diagnosis is dementia.
TEACHING STRATEGIES TO PROMOTE CLINICAL REASONING

1. Compare and contrast two diseases rather than teaching about one disease in isolation.

- Encourages discriminating between the leading diagnoses
- Enhances understanding of relevant information
- Forms connections between diseases
- Points out gaps in illness scripts

“So what key distinguishing features will help you choose between a diagnosis of heart failure or pneumonia?”
2. **Probe for reasoning when a diagnosis is suggested.**

- Activate what learners already know by asking them to describe the prototypical case (verbalize their illness scripts)

- Then ask how they compared and contrasted among possible diagnoses and the problem representation

“So when you think about heart failure, what presenting complaints and physical signs would be **typical findings?**”

How does that **compare** with this patient?
3. Teach by example: model by talking through your illness script

- Provide your own problem representation
- Show the process of comparing and contrasting by revealing your illness scripts

“So when I think about heart failure, I look for associated risk factors like smoking, male gender; signs like increasing dyspnea, orthopnea, weight. On exam I look for crackles on lung exam, JVD and ankle edema.”
4. Encourage the use of pattern recognition in addition to analytical reasoning in making diagnoses.

- This allows students and residents to start adapting the same highly effective problem solving approach as practicing physicians.
- Research supports the use of pattern recognition (not dangerous for novices to do so).

"Is there a useful pattern here?"
GO FROM NOVICE TO EXPERT REASONER.

Have clinical experience with similar patients

Store and recall knowledge as diseases, conditions or syndromes: “illness scripts”

Connect illness scripts to problem representations

Use reflection to recognize your own tendency to bias

CLINICAL REASONING: EVIDENCE FOR IMPROVEMENT

TEACHING STRATEGIES TO PROMOTE CLINICAL REASONING


Data Collection
Problem representation
Illness scripts
Script selection
5. Detect Bias
HEURISTIC BIAS: AVOIDING PITFALLS IN REASONING

Heuristics are mental shortcuts we use to assess the probability of diagnoses

▸ epidemiology
▸ similarity to previous cases
▸ use of risk factors

Useful, but can lead to errors

Heuristic Biases

Avoiding Pitfalls in Reasoning
CLINICAL REASONING

COMMON HEURISTIC BIAS ERRORS

Representative heuristic

• When we judge probability of a diagnosis based on comparison to prototypical case without considering prevalence

Patient with HTN, HA, diaphoresis and palpitations must have a pheochromocytoma.

But this is very rare and the likelihood of this disease is very low.

Consideration of other more prevalent diagnoses first is a better strategy.
Availability heuristic

- When we judge the probability of disease based on how easily the disease is recalled
- Skewed by recent and memorable cases

Physician recently saw a patient with edema from constrictive pericarditis.

Tend to over-diagnose pericarditis in new cases seen with edema.

Effect can last: “Once in fellowship I saw...”
ANCORING HEURISTIC BIAS ERRORS

 initialization heuristic

- leads clinicians to cling to their initial diagnosis even in the face of accumulating contradictory evidence for a different diagnosis.

Initial stroke team suggested a CVA (left arm weakness is the anchor) but ultimately diagnosis is cervical degenerative disk disease.

Continue to hold to the stroke diagnosis even when imaging shows clear evidence for disk disease and absence of ischemic infarct on head imaging.
COMMON HEURISTIC BIAS ERRORS

Premature closure

- settling on a diagnosis without seeking or carefully considering contradictory information

A 59 year old woman presents with a history of migraine and associated visual complaints and is treated with analgesic. Visual loss several days later leads to additional studies showing PMR with temporal arteritis.
COMMON HEURISTIC BIAS ERRORS

**Confirmation bias**

- a tendency to look for evidence supporting a working hypothesis (while)
- ignoring contradictory evidence
- misinterpreting ambiguous evidence

A patient with no tobacco history visits the ED with a sudden onset asthma at 65. She has a poor therapeutic response to short acting and long acting BDs and is placed on prednisone, again with little response.

After 4 months, a bronchoscopy reveals a peanut in the right main-stem bronchus which is removed—along with her “asthma”.

Gurpreet Dhaliwal MD, concepts and content
Think about your own, or your team’s approach to a recent difficult case.

Which mistake in clinical reasoning might have played a role? What strategies could address this error in future cases?

- Representative heuristic
- Availability heuristic
- Anchoring heuristic
- Premature closure
- Confirmation bias
TEACHING STRATEGIES TO PROMOTE CLINICAL REASONING

CLINICAL REASONING

READING ON YOUR OWN

Bowen, Diagnostic Reasoning

Dhaliwal, Improving Reasoning

Kahneman, Understanding Reasoning

Groopman, Heuristic Bias
RECOMMENDED PODCASTS FOR YOU AND YOUR LEARNERS

Clinical Problem Solvers

The Curbsiders: Internal Medicine
EDUCATIONAL STRATEGIES TO PROMOTE REASONING

Find additional resources to download from the Department of Medicine Web site at summalearner.com

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