



University of California
San Francisco

Promoting Diagnostic Reasoning in Learners

Denise M. Connor MD

Associate Professor of Clinical Medicine

Jeff Kohlwes MD, MPH

Professor of Clinical Medicine

<http://www.ucsfcmecme.com/MedEd21c/>



#UCSFMedEd21

Disclosures

- No conflicts of interest to report

Learning Objectives

At the end of this workshop, you will be able to...

- Describe key components of a framework for teaching diagnostic reasoning
- Apply concrete strategies for coaching learners on their reasoning
- Name at least 1 opportunity for incorporating explicit reasoning teaching into your current clinical or classroom-based teaching

Workshop Agenda

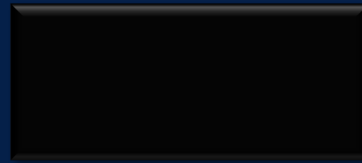
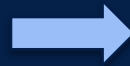
- Introductions
- Didactic: Reasoning Framework
- Break Out Groups
- Report Back & Role Play
- *Challenges & Opportunities*
- Commitments



University of California
San Francisco

Welcome & Introductions

How do you teach your learners to reason through a case & arrive at a diagnosis?

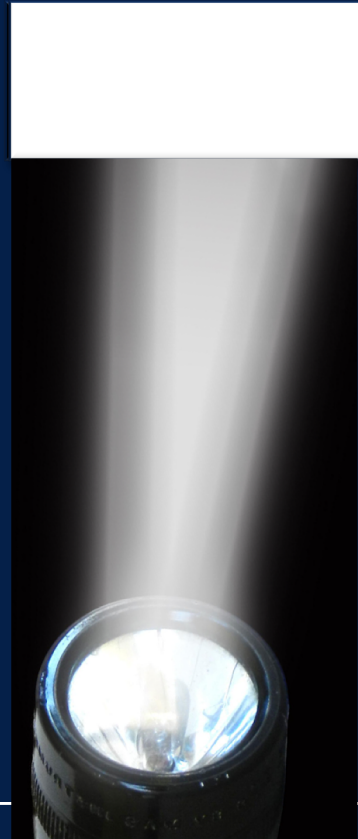


→ Lasix



MAGIC

Lasix



→ Lasix



IMPROVING DIAGNOSIS IN HEALTH CARE

QUALITY CHASM SERIES

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

Script Theory—Origins

■ Psychology Literature

- Describes how we organize info
- Predicts performance, memory, info processing/speed
- 1983: Clancey brings to medical literature
- 1984: Barrows & Feltovich: CR model

'Real Life Scripts' to Illness Scripts

- “Precompiled knowledge structures”
 - Use knowledge network to understand current situation
- Connects reasoning w/ pattern recognition
 - Enabling Conditions*; The Fault; Consequences
- Experts vs. Novices
- Impact of activating scripts
 - Differential memory & processing speed of typical vs. atypical findings
 - “Default Values”

Data Gathering

*Test possible **scripts**
Explore **schema***

***Process** the hx
See the forest
for the trees*

**Search/Select
Illness Scripts**

**Problem
Representation**

*Identify candidate
scripts
Activate **Schema***

Goals

- Make the process **EXPLICIT**
- **SLOW** things down
- **TARGET** coaching/feedback

Processing & Early Problem Representation

“I’m having this weird feeling when I pee – it’s hard to describe, but it hurts, so much that I really dread going, and it seems like I have to go all the time. It started a couple of days ago. I’m afraid to even go out of my house because I know I’ll need to go to the bathroom at any minute.”

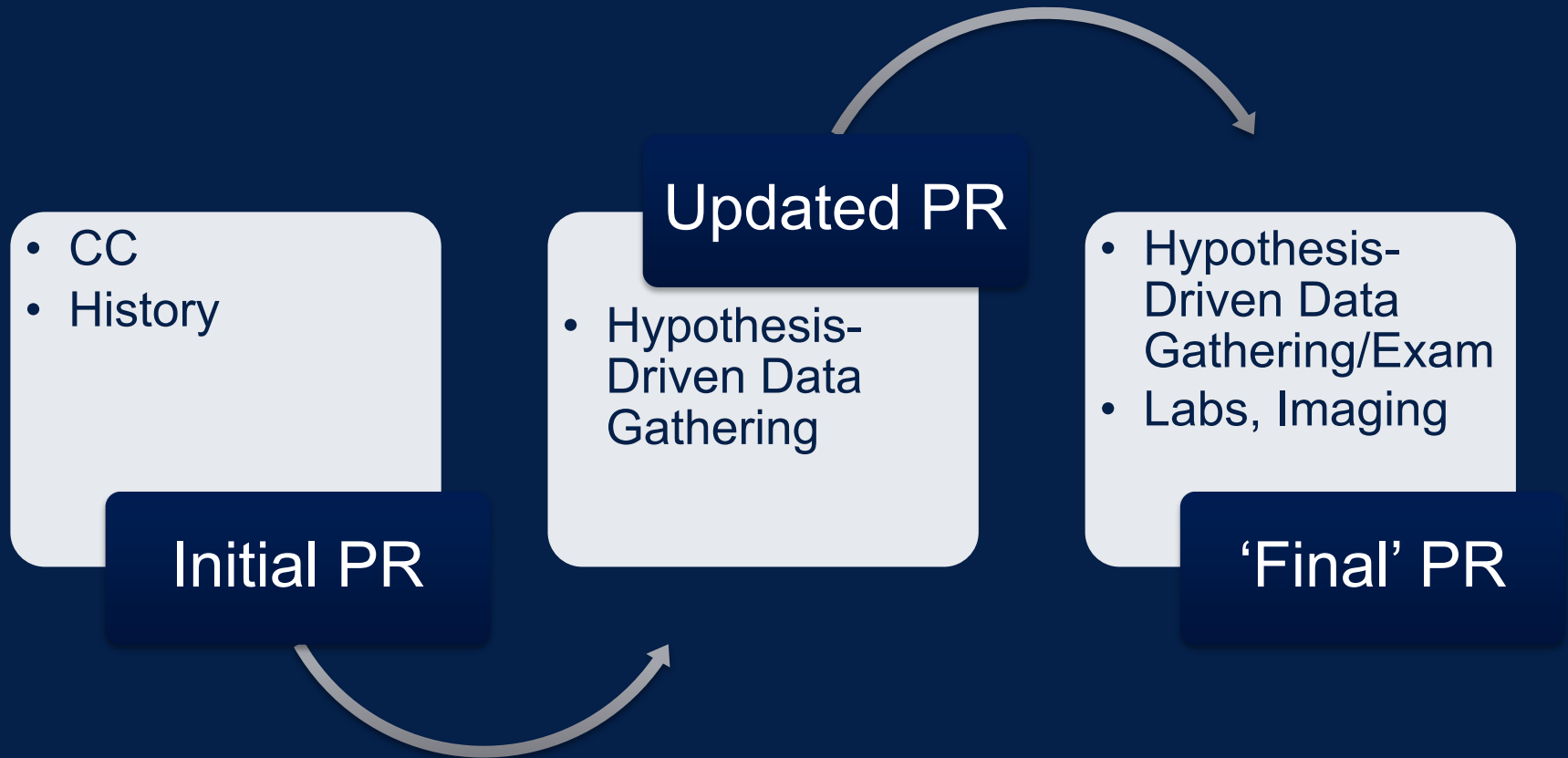


Acute dysuria and frequency

PR Ingredients

- **Who** is this patient?
 - *Relevant* predisposing factors
 - **What:** clinical syndrome?
 - Signs/Symptoms (*Key & Differentiating*)
 - **When:** time course/tempo?
-

PR Evolves & Feeds Forward



Updating the PR

Vaginal Bleeding

Vaginal Bleeding 7
wks after the LMP

Cough

Chronic, productive
cough in a smoker

Why is a Good Problem Representation Crucial?

Illness Scripts



WHO? WHAT?

WHEN? WHY?

Community Acquired Pneumonia

WHO Risk incr w/ age, recent viral URI, structural lung dx, immunodeficiency

WHAT Fever, productive cough, shortness of breath, tachycardia, hypoxemia

WHEN Acute, progressive if untreated

WHY Infection of lower respiratory tract; Strep Pneumo most common bug

Dx Infiltrate on CXR, can be fooled if dry; Leukocytosis w/ left shift

Rx Depends on host & severity; ceftriaxone/doxy first line

Can encode errors; Increasingly elaborated...

Teaching & Learning Vertically: C/C

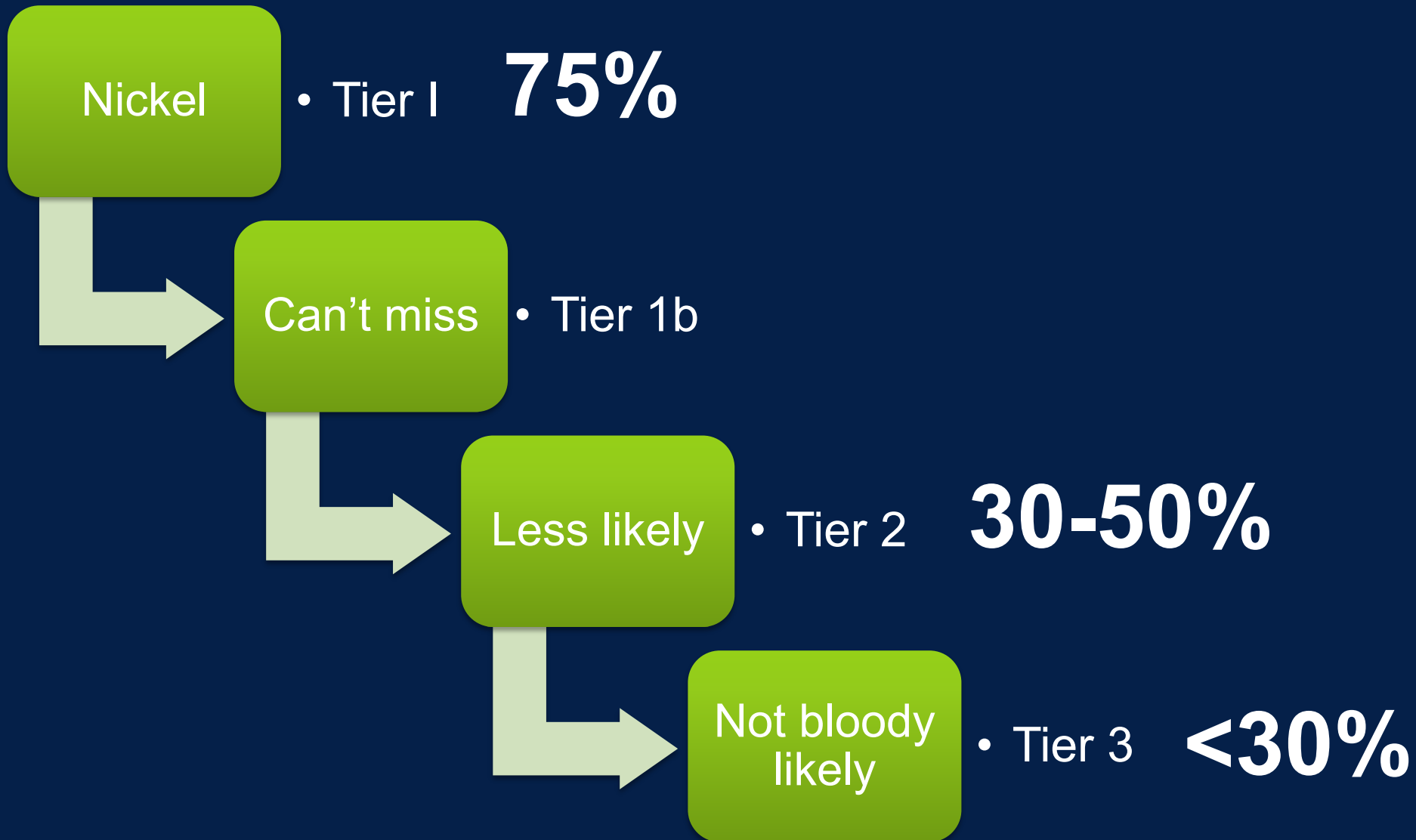
	Pre-disposing Factors	Clinical Consequences	Time course	Pathophys
CAP				
Acute Interstitial PNA				
Granulomatosis w/ Polyangiitis (GPA)				

Oral Presentation/ Note



“The differential is broad and includes pheochromocytoma, sepsis, hyperthyroidism, alcohol withdrawal, anxiety disorder or pulmonary embolism.”

Prioritized Ddx + *Think Aloud*



How Do We Coach Learners to Build or Expand a Differential?

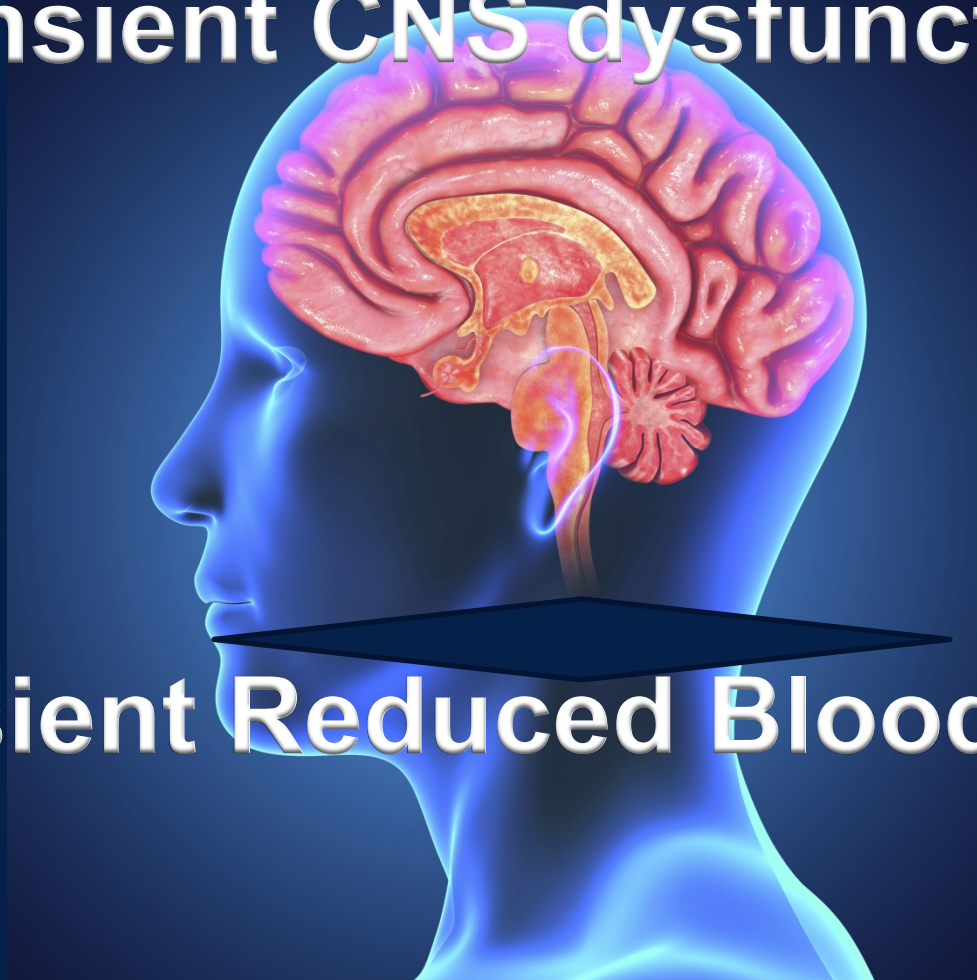
Diagnostic Schema



*What's your
approach to...*

Transient Loss of Consciousness

Transient CNS dysfunction



Transient Reduced Blood Flow

Transient Reduced Blood Flow

Transient CNS Dysfunction



Pump problem <i>(Cardiac)</i>	Wiring problem <i>(Reflex-mediated)</i>	Blood volume problem <i>(Orthostatic)</i>	Primary brain problem <i>(Neurologic)</i>	Other
---	---	---	---	--------------

Key Concepts

- Problem Representation → Summary Statement
- Illness Script
- Diagnostic Schema
- Prioritized Differential Diagnosis
- ‘Think Aloud’

Questions/Comments?

Coaching Reasoning: Example

- <https://vimeo.com/227340104/17b1a37e2f>

Break Out Groups

- Read case aloud (*A/P only*); Discuss prompts
- Pending time, repeat with additional cases
- Select group member to report back
- We'll try out your strategies with role-plays in the large group

Report Back, Role Plays & Discussion

PR / Summary Statement Coaching

- Core PR clear? Specific? Accurate?
- PR sufficiently elaborated?
- Ingredients?
- Distractors?
 - Rule of 7
- Key/differentiating features?
- Abstract/Medical language?
 - Medical terms & “Semantic qualifiers”

Illness Script Coaching

- Use compare/contrast
 - How does X differ from Y?
 - Use prioritization
 - Why would X be more likely than Y here?
 - Cluster related diagnoses
 - When you think about X, what other 1-2 dx do you always consider?
 - Call out mimickers
 - What less common dx can mimic X? How do they differ?
-

Schema Coaching

- Build from where learner is
 - Start with their big buckets, add 1-2 add'l features
 - Avoid the download
- Connect to pathophys/mechanistic thinking
 - Let's go back to first principles...
- Use analogy
 - If MK limited, is there a real-world example you can draw on?

Bias

Heuristics

Implicit Bias

Fatigue

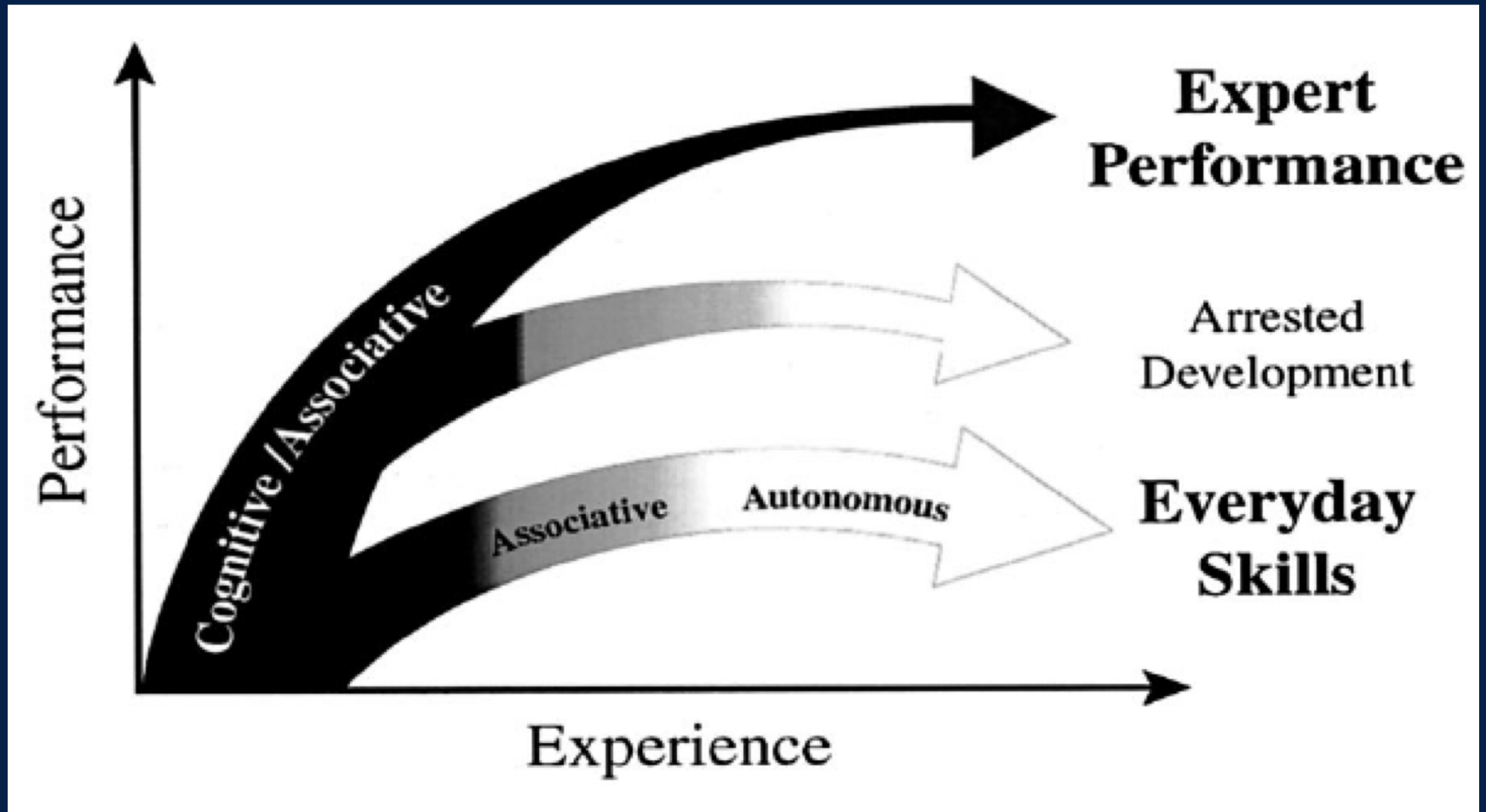
Humility

Reflection

Experience

Using Risk of Dx Error in Teaching

- Continuously improve/expand illness scripts
- Reflective Practice
- ‘Combined Reasoning’
- Think out loud
- Noting high-risk situations → the ‘diagnostic time-out’



Topics for another day...

- Implicit/Unconscious Social Bias

- Self-awareness, Purposeful individuation of patients, Empathy, Stereotype Replacement, Counting

- Bayesian Reasoning

Take Homes

- Reasoning framework/language
- Using the framework to identify weaknesses
- Opportunities for reasoning coaching

Make a Commitment

Works Cited

- National Academies of Sciences, Engineering, and Medicine. 2015. *Improving diagnosis in health care*. Washington, DC: The National Academies Press.
- Barrows, H. S., & Feltovich, P. J. (1987). The clinical reasoning process. *Medical education*, 21(2), 86-91.
- Custers, E. J. (2015). Thirty years of illness scripts: Theoretical origins and practical applications. *Medical teacher*, 37(5), 457-462.
- Charlin, B., Tardif, J., & Boshuizen, H. P. (2000). Scripts and medical diagnostic knowledge: theory and applications for clinical reasoning instruction and research. *Academic Medicine*, 75(2), 182-190.
- Custers, E. J., Regehr, G., & Norman, G. R. (1996). Mental representations of medical diagnostic knowledge: a review. *Academic Medicine*, 71(10), S55-61.
- Ericsson, K. A. (2004). Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Academic medicine*, 79(10), S70-S81.

Other References

- Bowen, J. L. (2006). Educational strategies to promote clinical diagnostic reasoning. *New England Journal of Medicine*, 355(21), 2217-2225.
- Rencic, J., Trowbridge, R. L., Fagan, M., Szauter, K., & Durning, S. (2017). Clinical reasoning education at US medical schools: results from a national survey of internal medicine clerkship directors. *Journal of General Internal Medicine*, 32(11), 1242-1246.

Resources

- *Journal of General Internal Medicine* Exercises in Clinical Reasoning Series: <http://www.sgim.org/web-only/clinical-reasoning-exercises> and <https://clinicalreasoning.org>
- Society to Improve Diagnosis in Medicine: <http://www.improvediagnosis.org>
- Podcasts: <https://clinicalproblemsolving.com>, <http://imreasoning.com>, <https://thecurbsiders.com>
- Catherine Lucey's Coursera Course – “Clinical Problem Solving”
- Clinical Reasoning Framework Videos made for Bridges students:
<https://www.youtube.com/watch?v=acJspBatjJE&t=362s>,
<https://www.youtube.com/watch?v=ApSNehBFQak&t=4s>,
<https://www.youtube.com/watch?v=cbbj8eo6niQ&t=2s>

Questions/Feedback?

Denise.Connor@ucsf.edu

Creative Commons License

Attribution-NonCommercial-Share Alike 4.0 International License



You are free:

- to Share — to copy, distribute and transmit the work
- to Remix — to adapt the work

Under the following conditions:

- **Attribution.** You must give the original authors credit (but not in any way that suggests that they endorse you or your use of the work).
- **Noncommercial.** You may not use this work for commercial purposes.
- **Share Alike.** If you alter, transform, or build upon this work, you may distribute the resulting work only under a license identical to this one.

See <http://creativecommons.org/licenses/by-nc-sa/3.0/> for full license.

This work by Denise M. Connor is licensed under a [Creative Commons Attribution-NonCommercial-Share Alike 4.0 International License](http://creativecommons.org/licenses/by-nc-sa/4.0/)