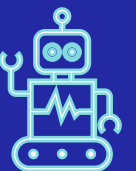


# Foundations of AI in Clinical Education

Allen Chang, MD and Philip Day, PhD



Teaching of Tomorrow 2025



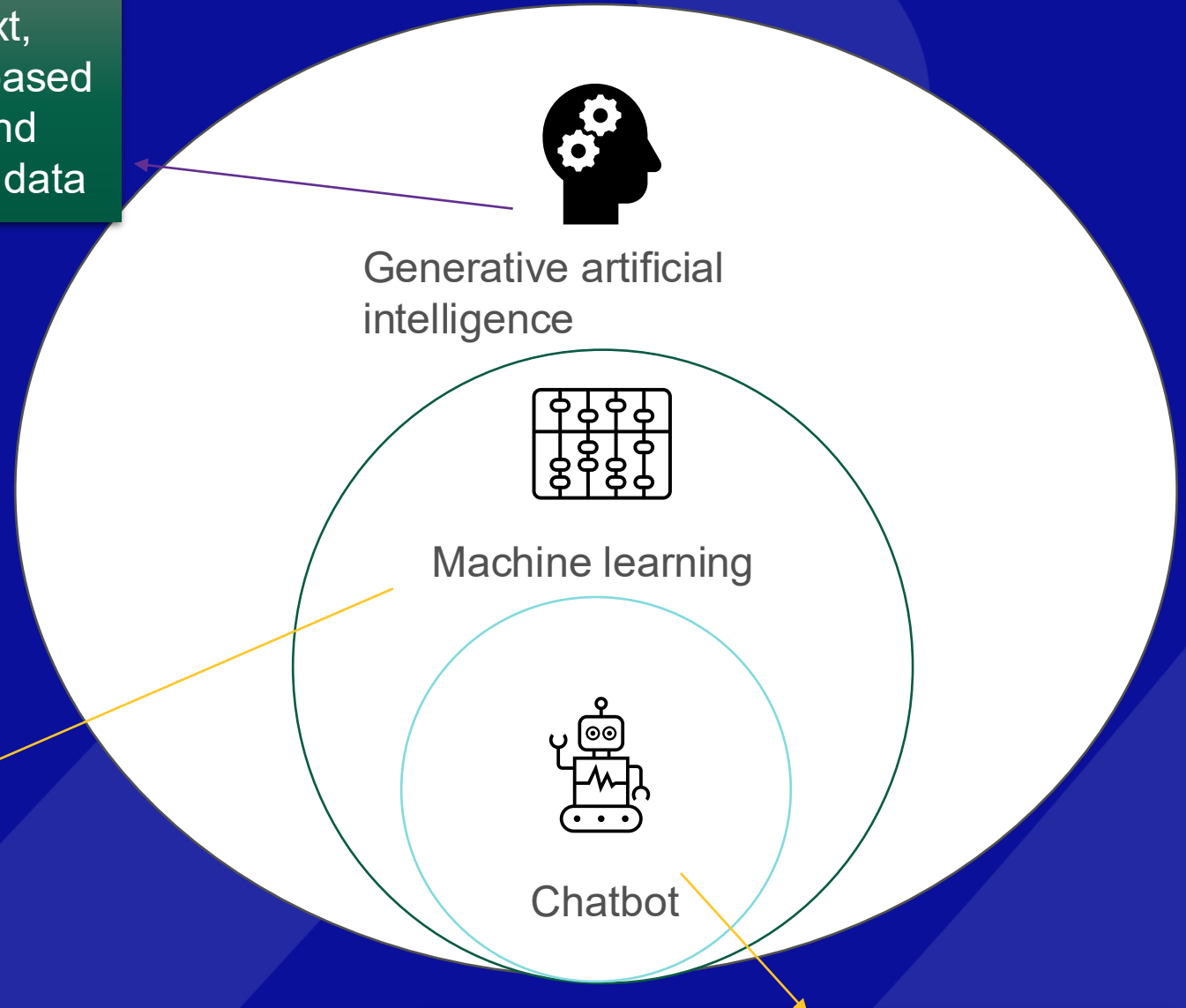
# Objectives

- Define the core concepts of artificial intelligence (AI) and describe common applications relevant to clinical education and precepting.
- Interpret the opportunities and limitations of AI tools in supporting clinical reasoning, feedback, and learner assessment.
- Apply principles of effective prompting for common clinical education scenarios.
- Evaluate common ethical and practical considerations of using AI in clinical teaching.
- Develop a plan to incorporate one AI strategy into your own precepting practice within the next 3 months.

# Introduction: Terms and Concepts

Models used to generate text, images, data, videos, etc., based on “studying” the patterns and structures of their “learning” data

Utilize large sets of data to form predictive algorithms that generate the AI output; improve over time and with more data



The interface that you use to generate answers, solutions, or whatever based on your query

# Discussion



- When it comes to artificial intelligence (AI) in healthcare education:
  - What are your main hopes for it?
  - What about worries?
  - Do you currently incorporate AI in your work?
  - Have you encountered any (ethical) issues related to using AI?

# Using AI in clinical teaching



Teaching Need	AI Example
Case design	Generate sample scenarios
Feedback	Draft empathetic, constructive phrasing
Documentation	Summarize SOAP notes
Debriefing	Create reflective prompts

# But first: Prompting

“Prompting” is how and what you write into the box below

**Welcome Philip, how can I help?**

Message Copilot

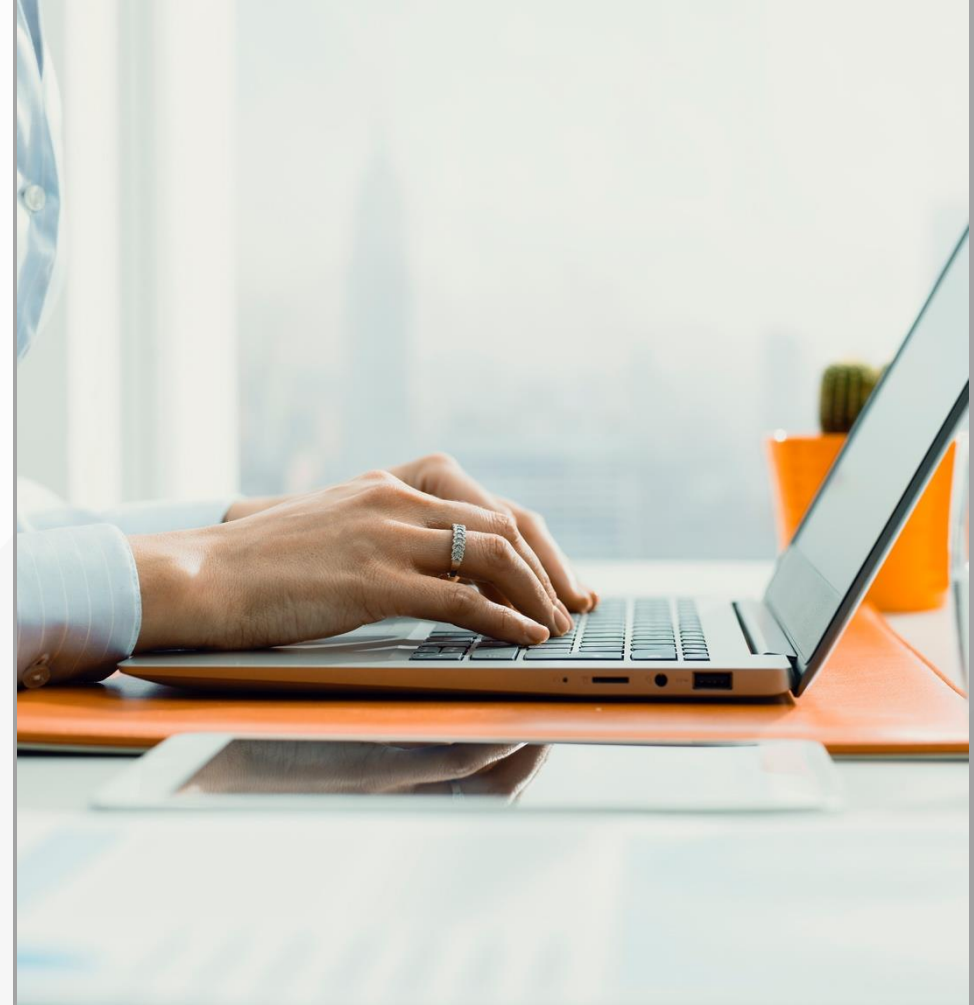


Tools



# Why and How of Effective Prompting

- Effective prompting saves time, reduces energy costs of generative AI, and gives you the best outputs
- How do you normally interact with the chatbot?
- Does anyone have a technique for writing prompts?
- Generic prompts like, “give me a case about DKA” or “give me a nursing case about sepsis in the hospital” lack necessary specifics



# Prompting Tips

## Guiding the chatbot before and during the prompt

- “Before you start, ask me questions to make sure the response is more helpful”
- “Show each step of your process”
- “I want to create X [be specific!], so ask me questions to get the information you need to create it.”

## Upload a template of the type of output you want

## Provide it with data or examples of the output you want



# Two Prompting Mnemonics

## CURE

- Context – Who/What is involved?
- User Goal – What do you want from the AI?
- Request – Be specific about the task.
- Expectation – What sort of output do you want?

## GNOME

- Goal – What do you need help with?
- Needs – What specific information or support is required from the AI?
- Objectives – What should the AI output achieve?
- Methods – How should the AI respond?
- Evaluation – How will you judge if the response is useful?



# **Generic prompt: “Give me a nursing case about sepsis”**

## **Case**

A 68-year-old female patient is admitted to the medical-surgical unit following a urinary tract infection. Over the next 24 hours, she becomes increasingly confused, febrile (temperature 39.2°C), and hypotensive (BP 88/54 mmHg). Her heart rate is 112 bpm, and respiratory rate is 24. The nurse notes decreased urine output and mottled skin on her extremities.

## **Nursing Actions**

- Notify the physician immediately
- Initiate sepsis protocol per hospital guidelines
- Administer IV fluids as ordered
- Monitor vital signs and urine output closely
- Prepare for possible transfer to ICU

# Prompt Using Gnome

## Prompt Breakdown

Goal: Support nurse educators teaching early recognition and response to sepsis

Need: A realistic, concise case scenario for bedside nurses

Objective: Enable nurses to identify sepsis signs and initiate appropriate actions

Methods: Present the case with at 2-3 discussion questions

Evaluation: Output should be accurate, relevant to acute care, usable in short teaching sessions



## Prompt to AI:

- “I’m working with nurse educators to prepare a 10-minute huddle for bedside nurses in an acute care unit.
- Create a realistic case scenario that helps nurses recognize early signs of sepsis and initiate appropriate actions.
- Present the case in a short narrative format and include 3 discussion questions.
- The output should be clinically accurate and relevant to acute care.”



# Prompt Using Gnome

## Case Narrative

Mrs. L, a 78-year-old patient recovering from hip surgery, begins to show signs of confusion and has a temperature of 38.5°C. Her heart rate is 110 bpm, and her blood pressure has dropped to 90/60 mmHg. She reports feeling “off” and is less responsive than earlier in the day. The nurse notes decreased urine output and cool extremities.



## Discussion Questions

- What early signs of sepsis are present in this case?
- What immediate nursing actions should be taken?
- How would you communicate these concerns to the healthcare team?

# How was the guided prompt more effective?

“Give me a nursing case about sepsis”

vs

“I’m working with nurse educators to prepare a 10-minute huddle for bedside nurses in an acute care unit.

Create a realistic case scenario that helps nurses recognize early signs of sepsis and initiate appropriate actions.

Present the case in a short narrative format and include 3 discussion questions.

The output should be clinically accurate and relevant to acute care.”





# Effective Prompting Takeaways

- Generic prompts will give generic results
- Provide context, guidance and as much relevant information (including examples and templates) when writing your prompt
- Remember: AI chatbots don't know anything about you, who or what you teach, or what you hope to achieve in your teaching unless you tell it



# **Drawbacks of AI in Clinical Education**

# Ethical Issues with AI Use

## Trust

Zack T, Lehman E, Suzgun M, Rodriguez JA, Celi LA, Gichoya J, Jurafsky D, Szolovits P, Bates DW, Abdulnour RE, Butte AJ, Alsentzer E. **Assessing the potential of GPT-4 to perpetuate racial and gender biases in health care: a model evaluation study.** Lancet Digit Health. 2024 Jan;6(1):e12-e22. doi: 10.1016/S2589-7500(23)00225-X.

**Findings:** We found that GPT-4 did not appropriately model the demographic diversity of medical conditions, consistently producing clinical vignettes that stereotype demographic presentations. The differential diagnoses created by GPT-4 for standardised clinical vignettes were more likely to include diagnoses that stereotype certain races, ethnicities, and genders. Assessment and plans created by the model showed significant association between demographic attributes and recommendations for more expensive procedures as well as differences in patient perception.

## and

## Transparency

- How did the AI get from A to B?
  - Black box issue
  - References and sources
- Overreliance and indiscriminate use
  - As with all of our teaching, we should be deliberate with AI use, disclose its use, and scrutinize its outputs



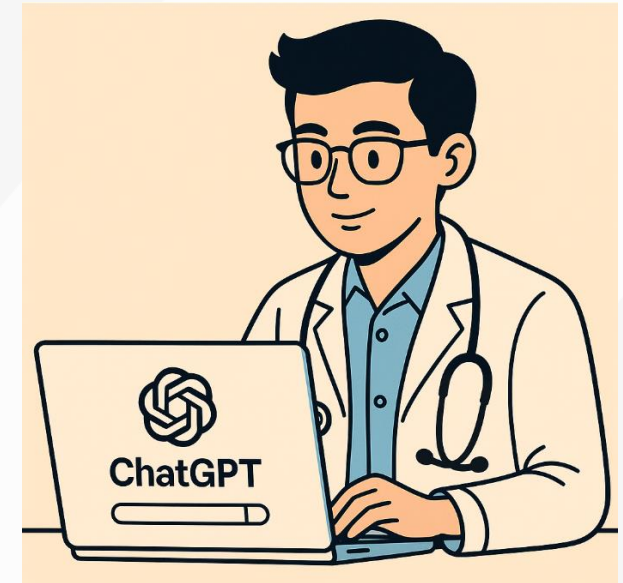
# Supervision of Clinical AI Use

Abdulnour R-EE et al. N Engl J Med 2025;393:786-797

# Clinical Scenario...

**You are supervising a learner who sees a complicated patient...**

- You overhear him talking to other residents about how “good” AI
- Before he comes to present the case, you see him engaging with his iPhone
- You personally don’t have much comfort with AI and worry it “knows” more than you do!



# Benefits of AI Use in Medical Education

Despite downsides, significant utility has been demonstrated

## Increases Efficiency

- Reduces time needed for “rote” tasks

## Enhances Simulation

- AI “standardized” patients

## Improves Knowledge Recall

- Question generators from curriculum

## Immediate Feedback

- Can provide immediate assessment of student output

## Facilitates Understanding

- Can be used to explain complex concepts

# Issues with AI Use

However, may reduce independent problem-solving and critical evaluation

What if off-loading doesn't only occur for "rote" tasks

- Clinical decision making
- Clinical reasoning

Automation bias

- GPS: Driving into lake

De-skilling

- GPS: Forgetting surrounding roads

Never-skilling

- GPS: Never learning surrounding roads

Mis-skilling:

- Development of the “wrong” types of skills

# Benefits/Risks of AI Use in Clinical Care

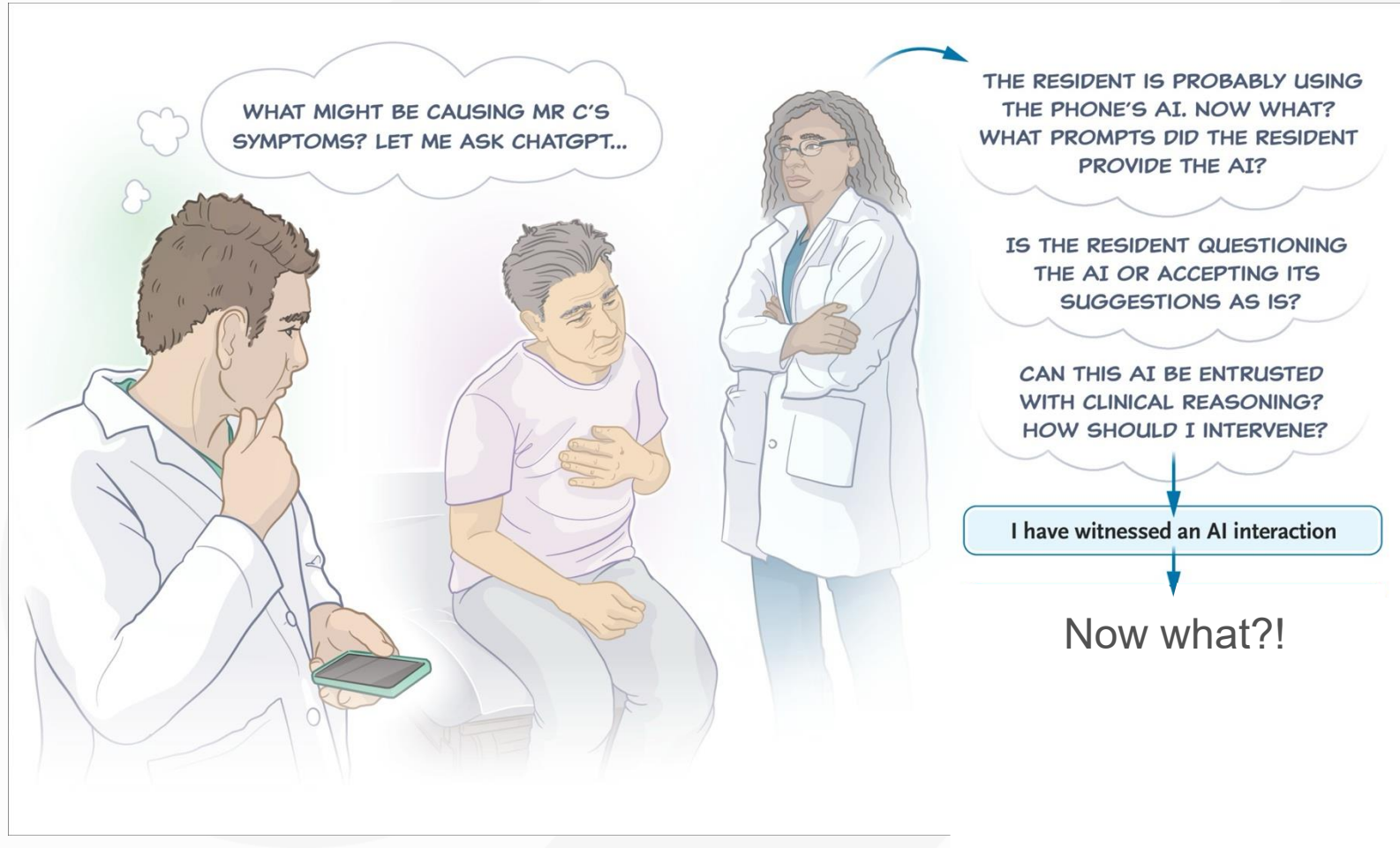
## Clinical Strengths of AI

- Recall
- Ability to seemingly reason
- Lack of human biases
- Empathic communication
- Never-ending patience

## Clinical Weaknesses of AI

- No true human experience of world
- Lack of “metacognition”
- Inability to fully explain itself
- Training data bias
- Ability to “hallucinate”

# Feared Clinical Scenario...



Modified from Abdulnour R-EE et al. N Engl J Med 2025;393:786-797

# Promote Critical Thinking!

## What is an “AI Interaction” in medical education?

- When output from AI impacts learner judgement and decision-making, yet the learner doesn't (yet) have the experience, skills, or knowledge to evaluate the output
  - Presents opportunity to develop **critical thinking**



# New Model of Learning

No longer is this a traditional learning model

- As educators, we are used to being the experts
- AI seemingly injects a new “member” into the dynamic
- ...
- Need to engage in a new model!

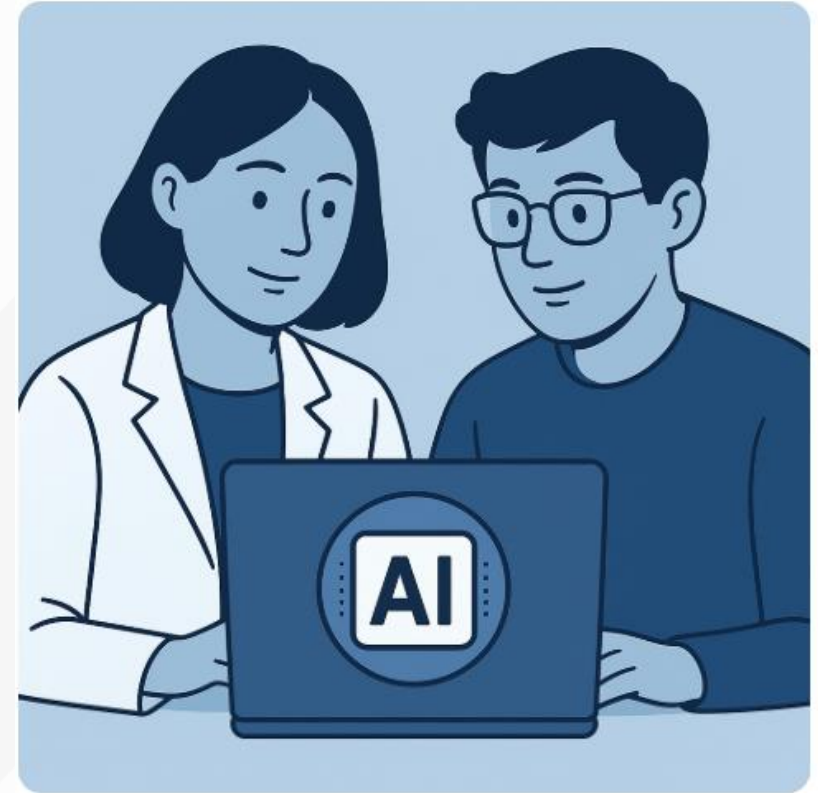




# New Model of Learning

## Can we... teach while we learn?

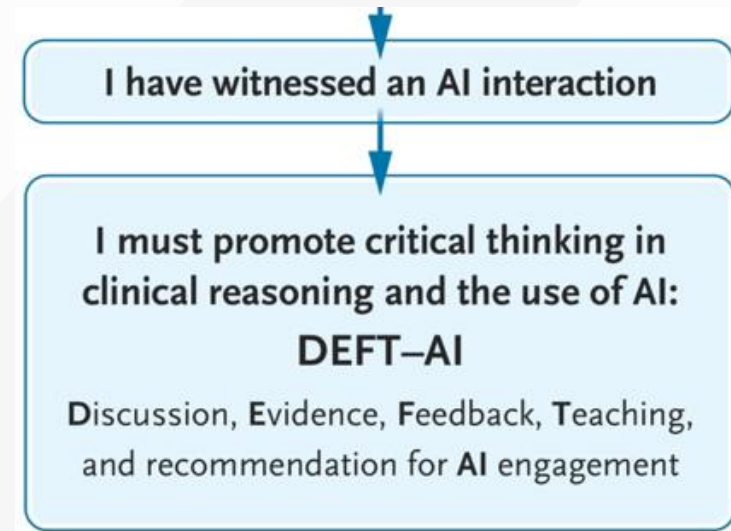
- Create a shared learning model
  - All members of the team can be educators and learners
- Acknowledge that you may not be an expert...
  - Because nobody really is!



# Approach to Supervision of AI Use

## Framework

- DEFT-AI
  - **D**iagnose, **D**iscussion, **D**iscourse
  - **E**vidence
  - **F**eedback
  - **T**eaching



# DEFT-AI

D is for...

Diagnosis, Discussion, and Discourse	The educator asks for a description of the learner's specific use of AI.
What specific AI did you use?	I used the free version of ChatGPT on my phone.
How did you use AI in this process?	I just typed in, "What is the <i>differential diagnosis for wheezing?</i> "
What prompts did you enter in the app?	I asked it for the best diagnostic test and treatment strategy.

# DEFT-AI

E is for...

## Evidence

The educator asks for an evaluation of the learner's evidence-based use of AI

How did you verify the AI-generated outputs?

Hmm. I didn't. The answers seemed reasonable to me.

Is the AI that you used shown to be accurate and safe?

Yes. I keep seeing social media posts about how great it is at making diagnoses.

# DEFT-AI

F is for...

## Feedback

The educator asks the learner to reflect on growth opportunities in the use of AI.

How do you evaluate your own use of AI in this case?

I think I've become quite familiar at using ChatGPT. I use it all the time now.

How can you improve your use of AI?

I can't wait for an AI that can interpret ECGs and chest radiographs. I should verify the AI outputs next time.

# DEFT-AI

## T is for...

### Teaching

The educator provides focused teaching points based on findings from the conversation and recommends whether, when, and how to use AI safely moving forward.

Use AI tools that are known to be effective. Look for peer-reviewed evidence of their accuracy and safety. Our institution may have adapted and validated a similar model on the basis of high-quality data.

# Recommendations

## Next steps for the learner...

- Should they continue to use AI in these clinical scenarios?
- How should they modify/improve their interactions?
- Do they require ongoing supervision of AI use?
  - Direct?
  - Indirect?

# Recommendations

## Next steps for the educator...

- What is YOUR level of comfort with AI use in clinical care?
- How can YOU modify/improve your AI interactions?
- Do you need more AI literacy or competency?



# Set a goal!

## Be SMART...

- S: Specific
- M: Measurable
- A: Achievable
- R: Relevant
- T: Time-bound

# Questions/Discussion?