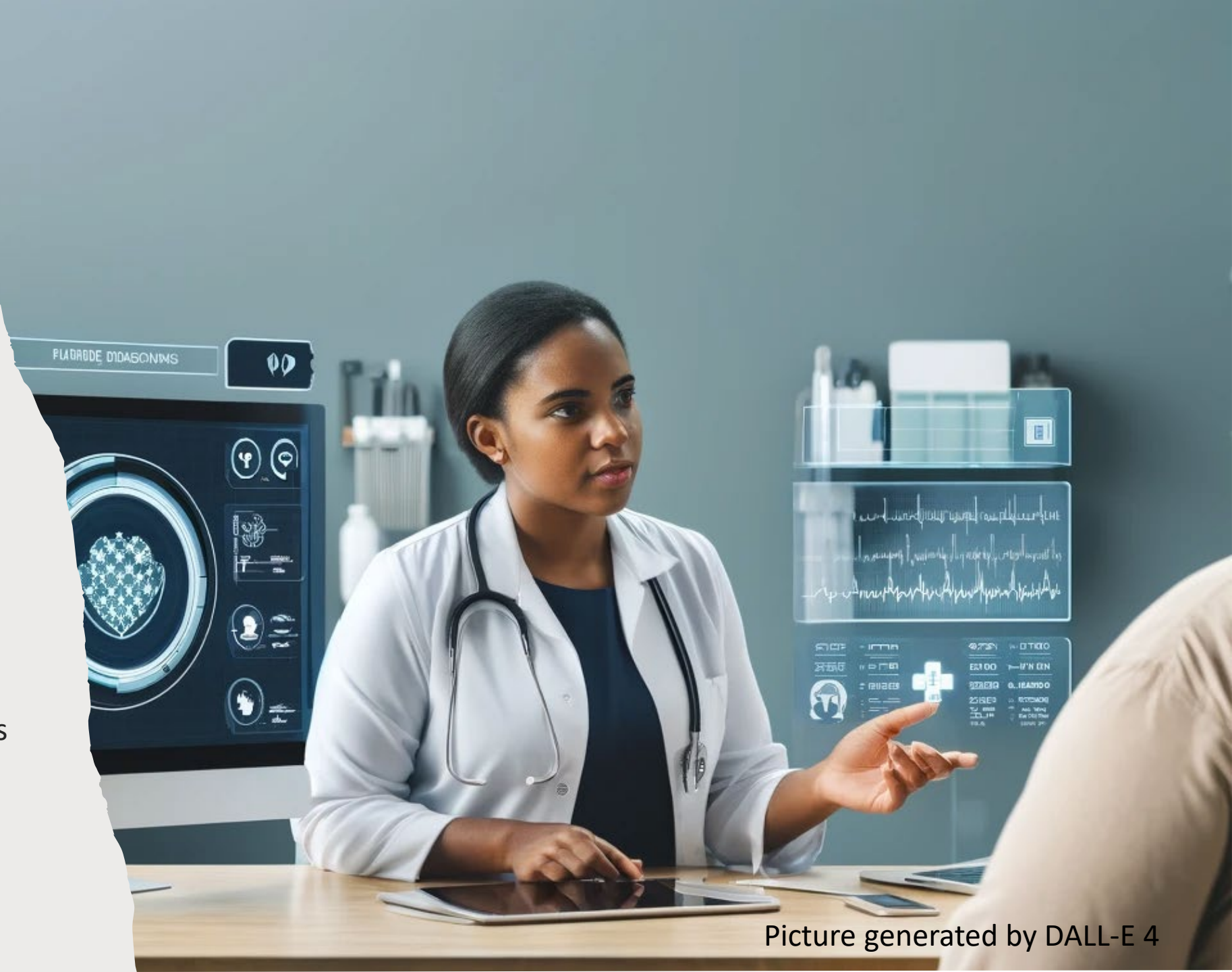


AI in Action for Healthcare Providers

Daisy Dulay, MD FRCPC

April 12, 2024

UBC Virtual Health Grand Rounds



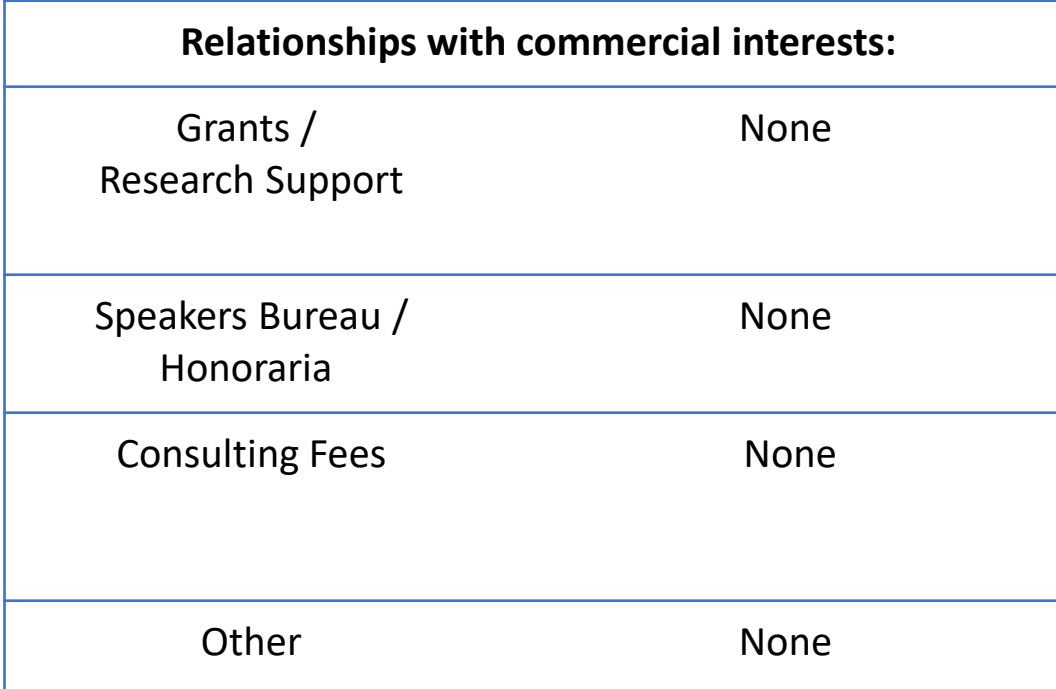
Picture generated by DALL-E 4



Land Acknowledgement



Disclosures

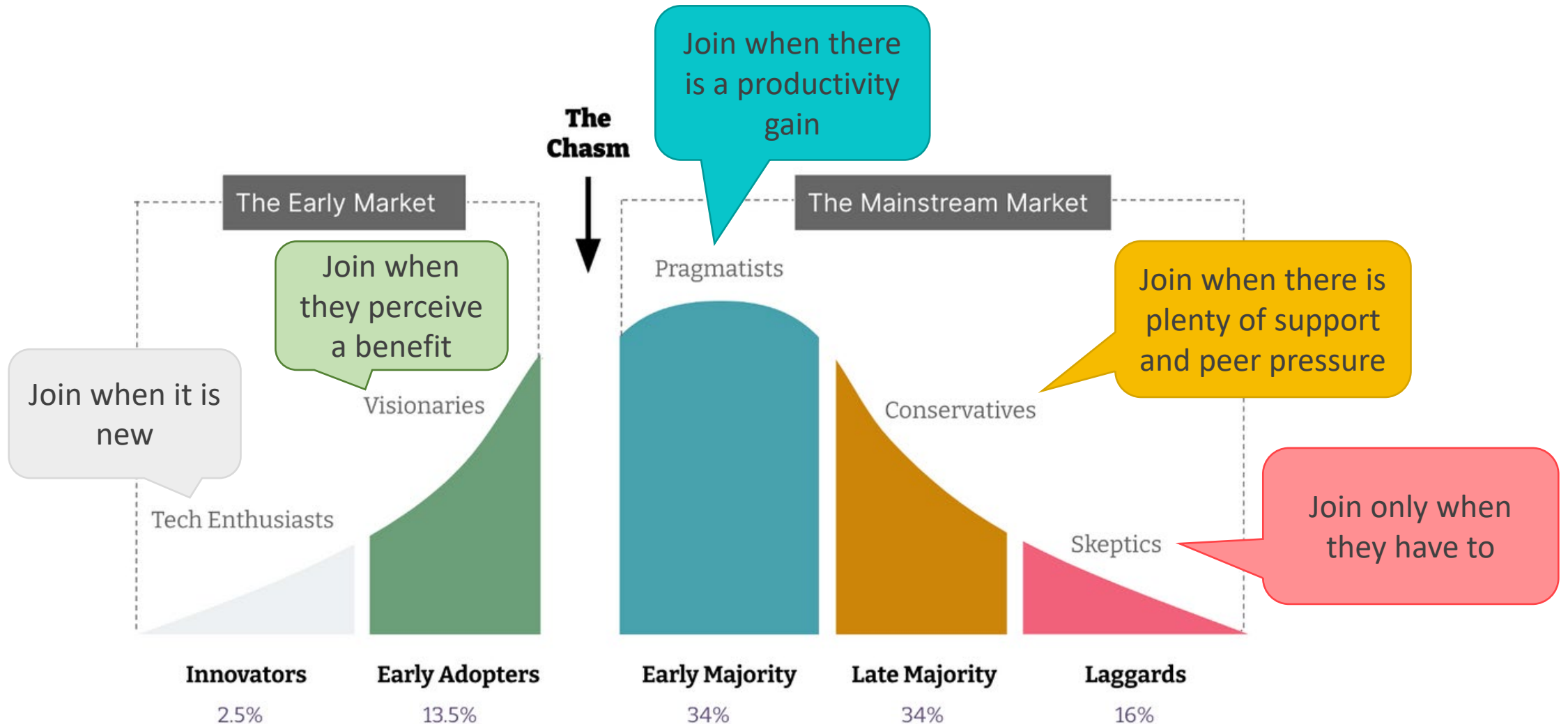


| Relationships with commercial interests: | |
|---|------|
| Grants / Research Support | None |
| Speakers Bureau / Honoraria | None |
| Consulting Fees | None |
| Other | None |

****This presentation was created with assistance of ChatGPT***

**** I have a subscription to Scribeberry and ChatGPT***

Roger's Innovation Adoption Curve



Objectives



Demonstrate the need for AI in healthcare



Illustrate how AI can be used currently



Analyze the challenges with AI in healthcare

A dark gray arrow pointing to the right, with the text "Zoom Poll" centered inside it.

Zoom Poll

3 Million years ago
First tool used by our
ancestors of our species

2 Million years ago
First use of control use of
fire and cooking

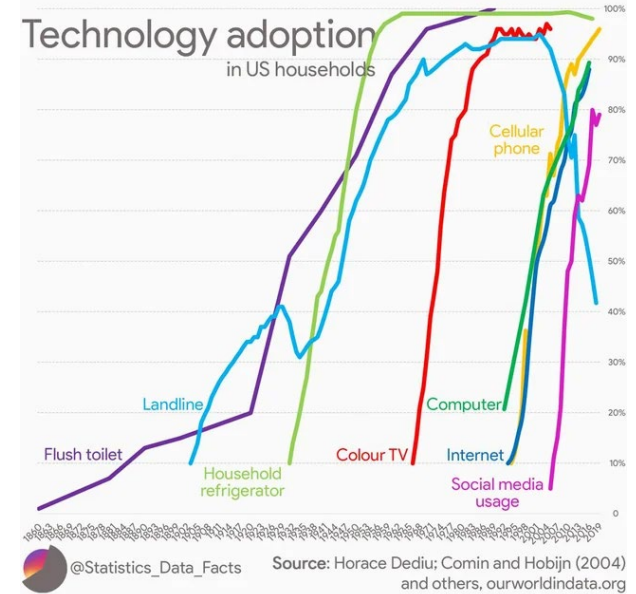
1 Million years ago

- Agriculture
- Writing
- The wheel
- Windmills
- Printing press
- Steam engine
- Vaccines
- Electricity
- Antibiotics
- Airplane
- Computer
- Moon landing
- Internet
- AI systems
- CRISPR gene editing

NOW

Adapted from Max Roser, our worldindata.org

Consumption Spreads Faster Today



ai healthcare
Search term

+ Compare

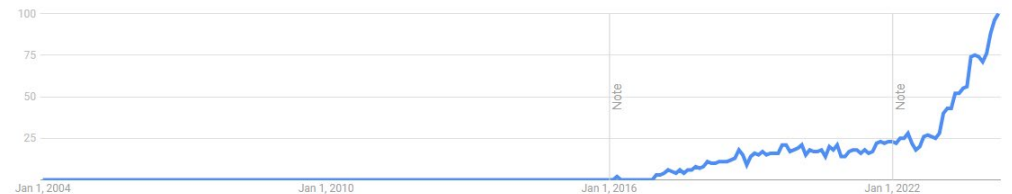
Worldwide

2004 - present

Health

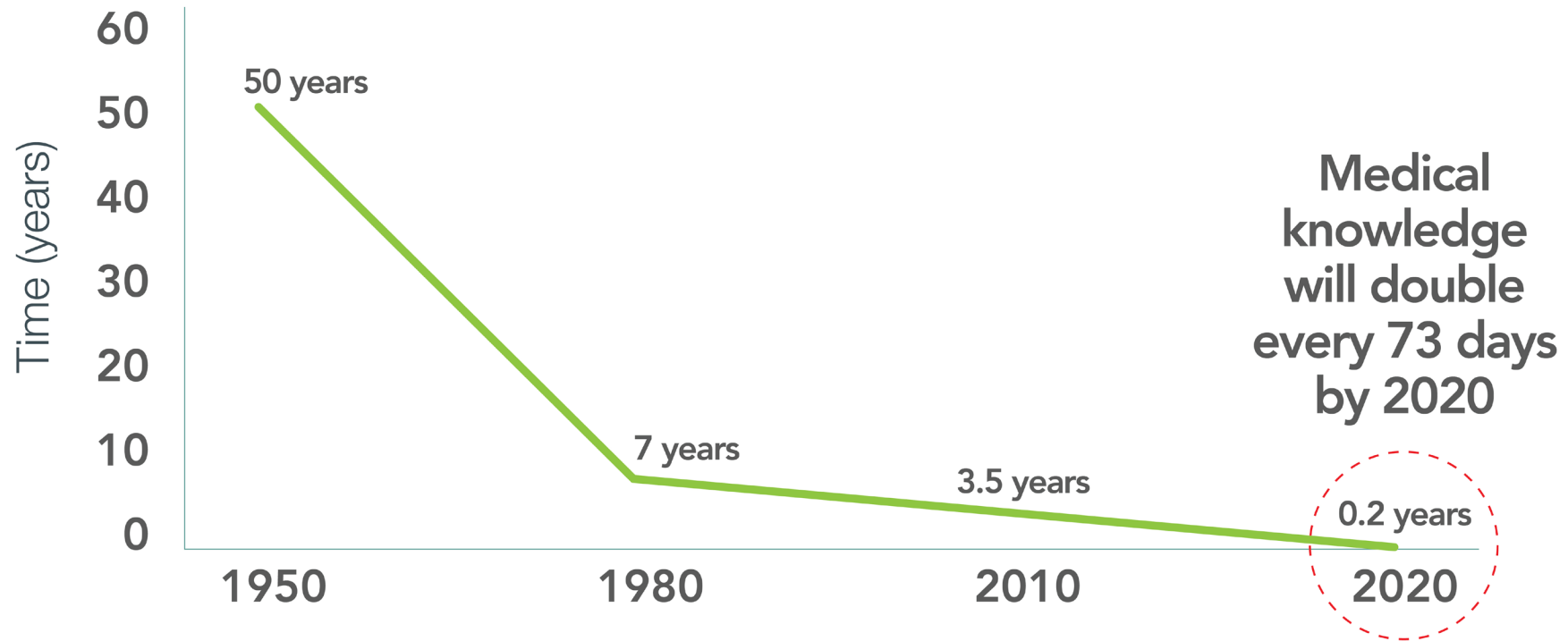
WebSearch

Interest over time



Google Trends, Accessed Apr 11, 2024

Medical Knowledge Explosion



Graphic source, NCBI, "CHALLENGES AND OPPORTUNITIES FACING MEDICAL EDUCATION"
Peter Densen, MD, 2011



**COGNITIVE
OVERLOAD**

Limited analytic thinking
More biased decision making
More prone to errors*

Administrative
Burden

Personal and/or
family stress

Medical Staff and
Staff shortages

Discrimination
and Racism

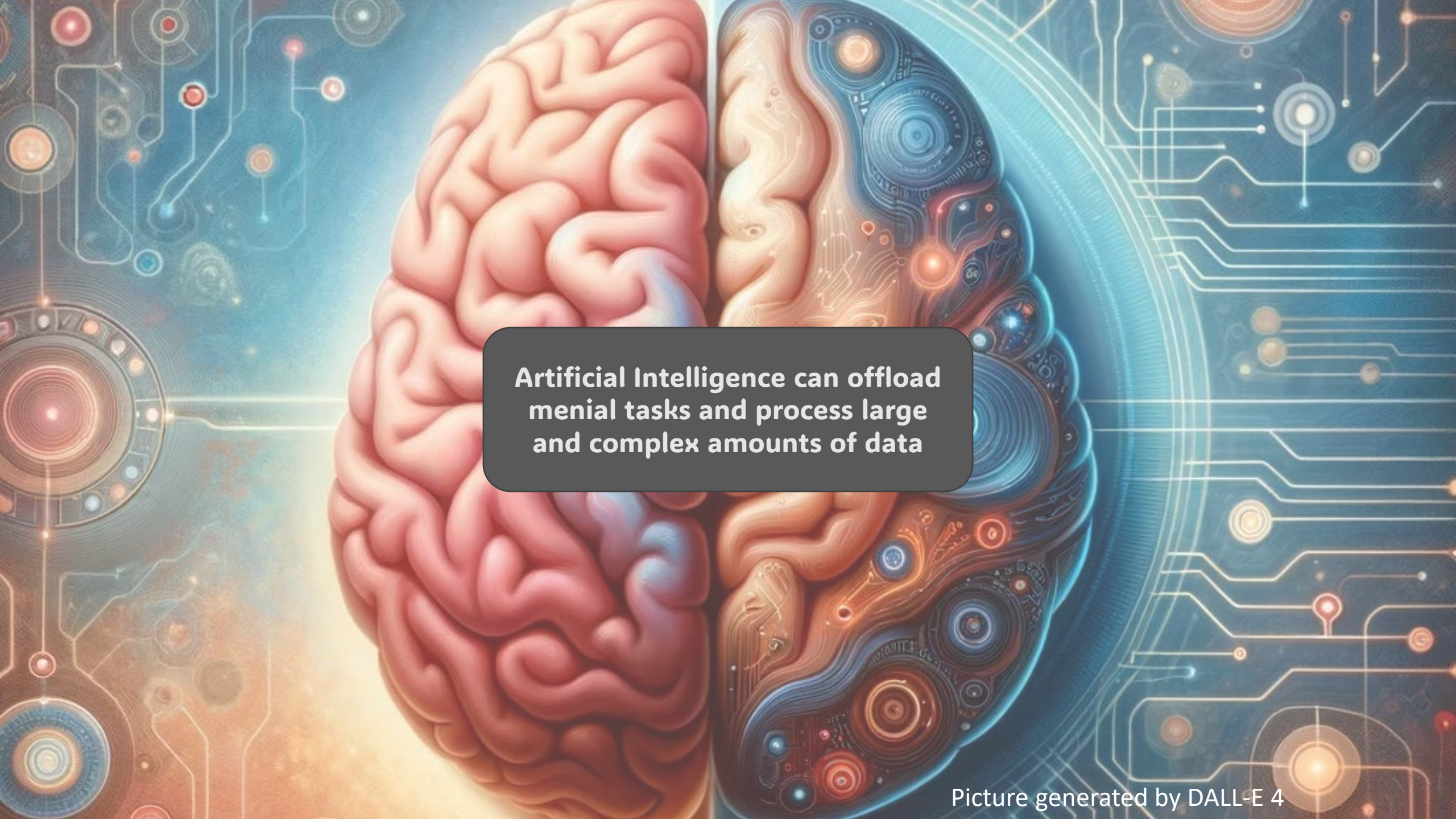
Patients with
complex health
issues

World Events

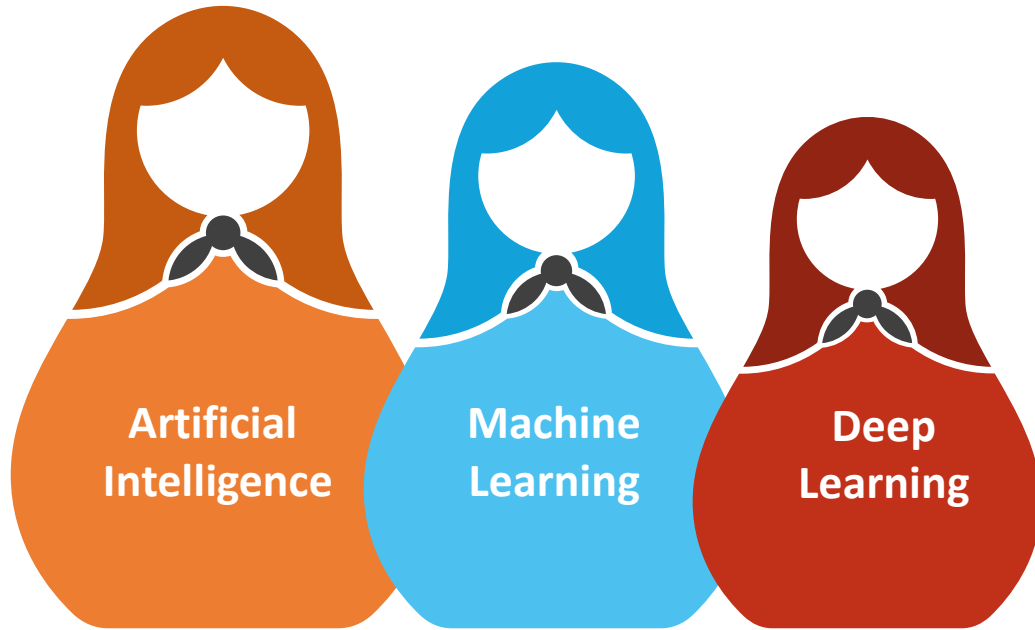
Trauma

Climate Change

Incivility



**Artificial Intelligence can offload
menial tasks and process large
and complex amounts of data**



Dr. Muhammad Mamdani, U of T defines AI:
“Computers learn complex relationships in data”

Me: Hi again, I just wanted to ask you if you can give me a simplified explanation of artificial intelligence, machine learning, and deep learning.

Chat GPT4:Of course! Think of artificial intelligence, machine learning, and deep learning as a set of nesting dolls, where each one fits inside the other.

Artificial intelligence (AI) is the broadest concept. It's about making machines smart, enabling them to perform tasks that typically require human intelligence. This includes things like understanding language, recognizing pictures, solving problems, and making decisions.

Machine learning (ML) is a subset of AI. It's a way of achieving AI where machines learn from data. Instead of being explicitly programmed to do something, they use data and algorithms to learn how to perform tasks.

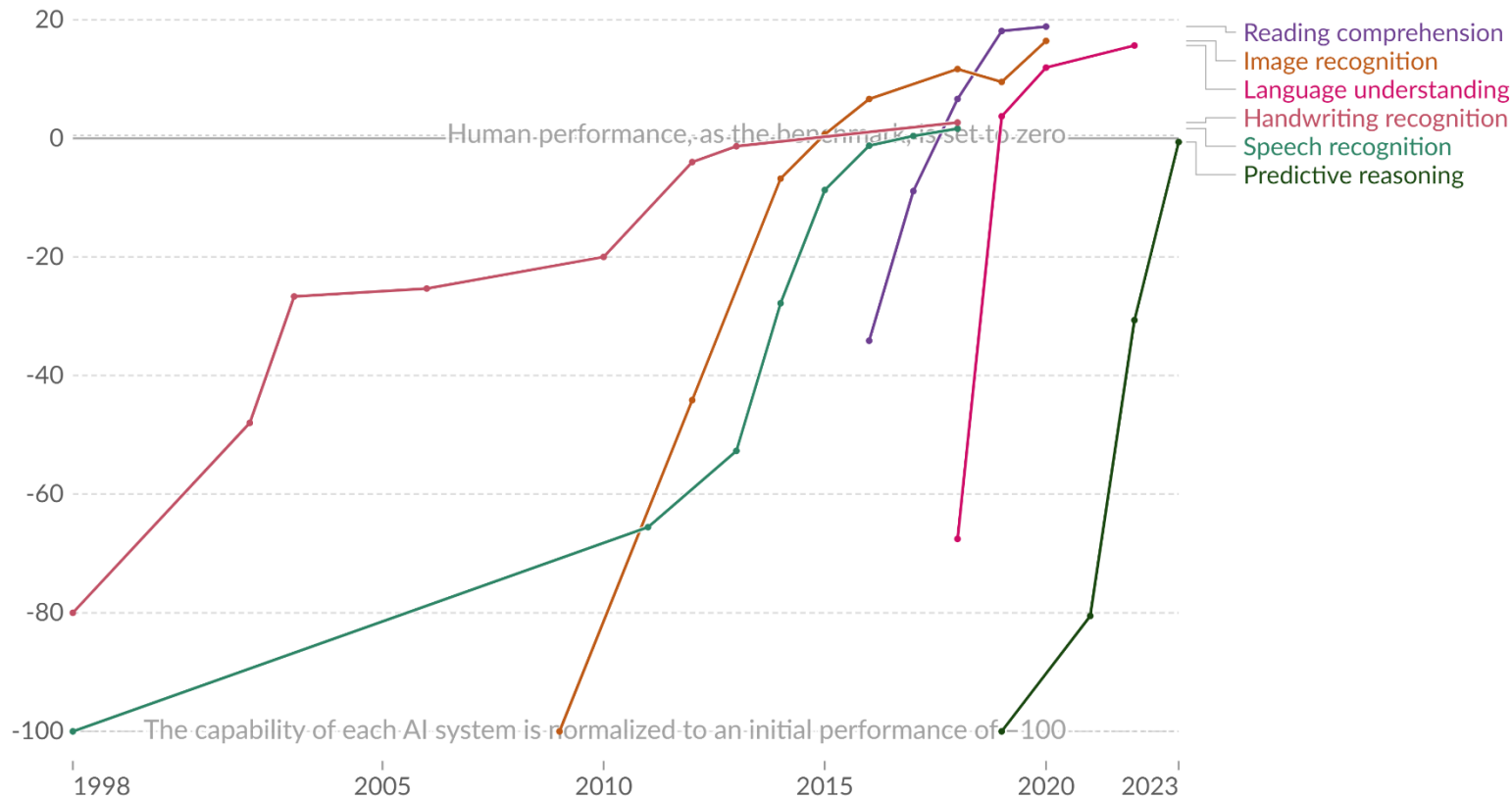
Deep learning is a subset of machine learning. It uses structures called neural networks to learn from data in ways that are inspired by how our brain works. These networks can learn from large amounts of data and make complex decisions.

So, AI is the big idea, machine learning is one way to achieve AI, and deep learning is a specific, advanced method of machine learning. Does that help clear things up?

Me: Yes, thanks.

Test scores of AI systems on various capabilities relative to human performance

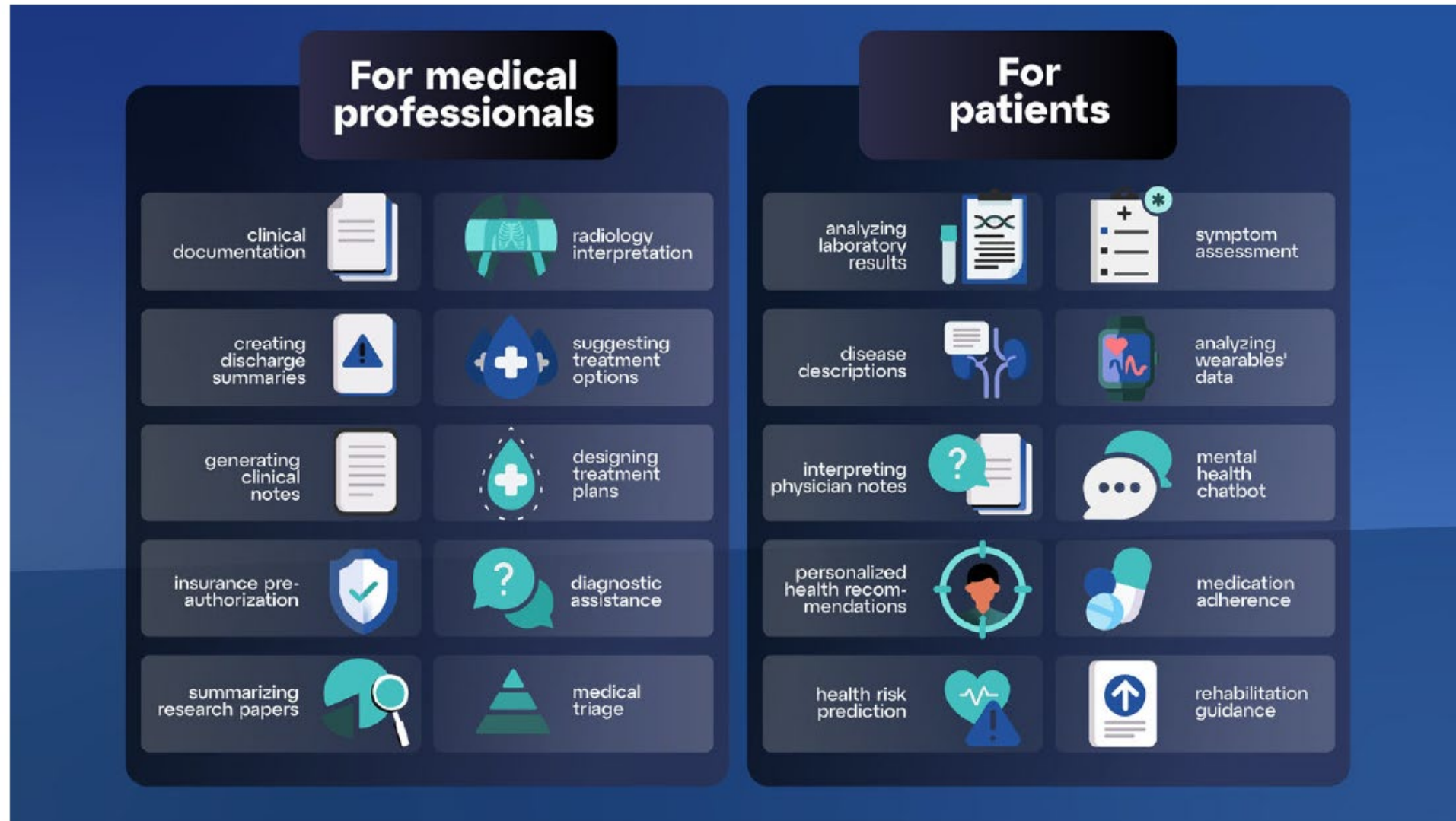
Within each domain, the initial performance of the AI is set to -100. Human performance is used as a baseline, set to zero. When the AI's performance crosses the zero line, it scored more points than humans.



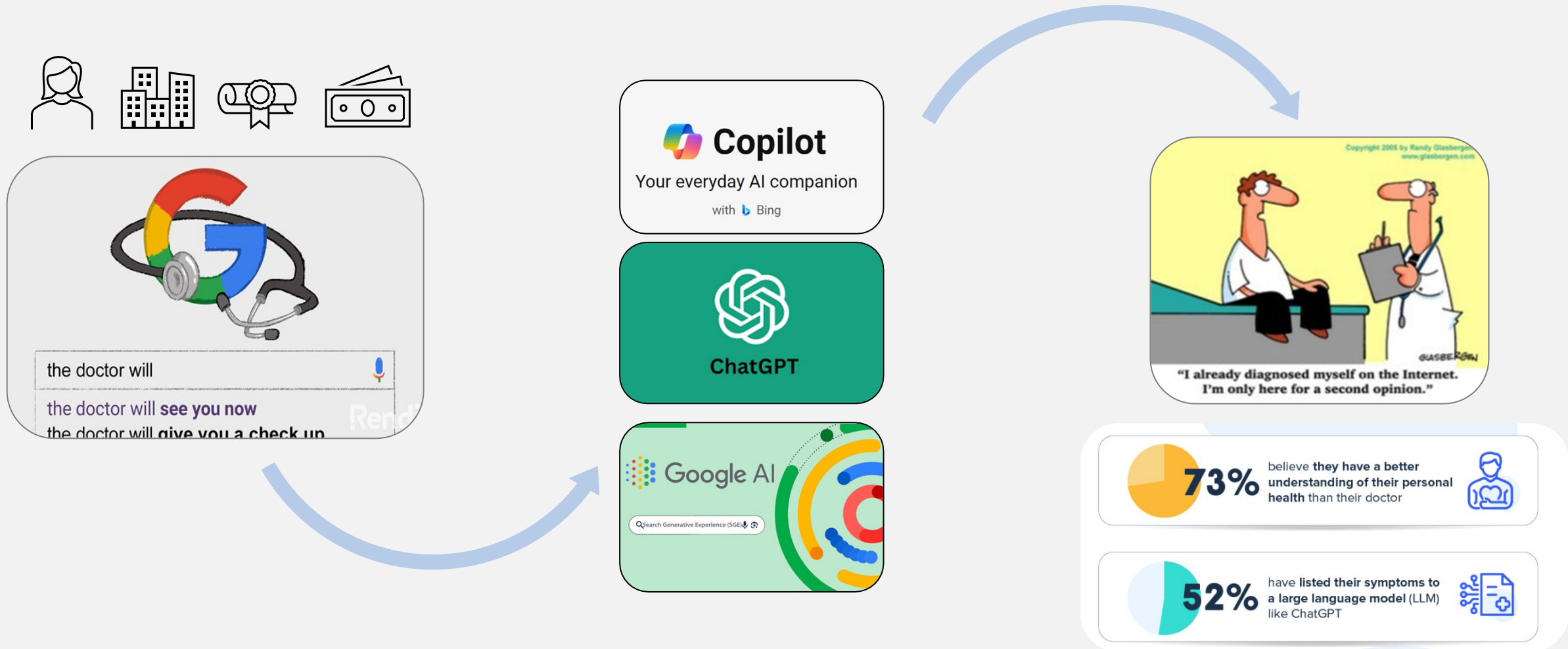
Data source: Kiela et al. (2023)

OurWorldInData.org/artificial-intelligence | CC BY

Example of how AI can be used in Healthcare



Evolution of Online Health Information Seeking



JAMA Internal Medicine | Original Investigation

Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

John W. Ayers, PhD, MA; Adam Poliak, PhD; Mark Dredze, PhD; Eric C. Leas, PhD, MPH; Zechariah Zhu, BS; Jessica B. Kelley, MSN; Dennis J. Faix, MD; Aaron M. Goodman, MD; Christopher A. Longhurst, MD, MS; Michael Hogarth, MD; Davey M. Smith, MD, MAS

CONCLUSIONS In this cross-sectional study, a chatbot generated quality and empathetic responses to patient questions posed in an online forum. Further exploration of this technology is warranted in clinical settings, such as using chatbot to draft responses that physicians could then edit. Randomized trials could assess further if using AI assistants might improve responses, lower clinician burnout, and improve patient outcomes.

The New York Times

When Doctors Use a Chatbot to Improve Their Bedside Manner

Despite the drawbacks of turning to artificial intelligence in medicine, some physicians find that ChatGPT improves their ability to communicate empathetically with patients.

If you think you drink too much alcohol, you're not alone. Many people have this problem, but there are medicines that can help you feel better and have a healthier, happier life.



AI Medical Scribing

AI Medical Scribing Applications
PIPEDA Compliant
(not exhaustive list)



SCRIBEBERRY

autoSCRIBE

Tali+

heidi

NUANCE

EMR with AI scribing
built in

ARYAHealth

1 CONSENT



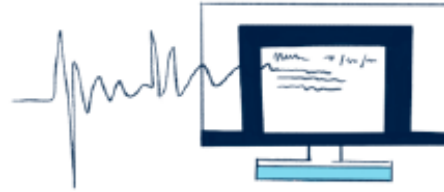
The provider obtains consent.

2 CLINIC VISIT



The patient and the provider have their clinic visit and conversation.

3 AUDIO PROCESSING



The digital scribe software processes the audio from a microphone.

4 CLINICAL NOTES



The software generates a clinical note.

5 REVIEW AND EDIT NOTES



The provider ensures accuracy of the note.

Read the Terms of Service - the liability falls on the physician to ensure the patient has provided consent and that the note is accurate.

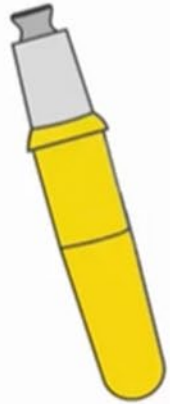
@UBC CPD TMP

MedCity

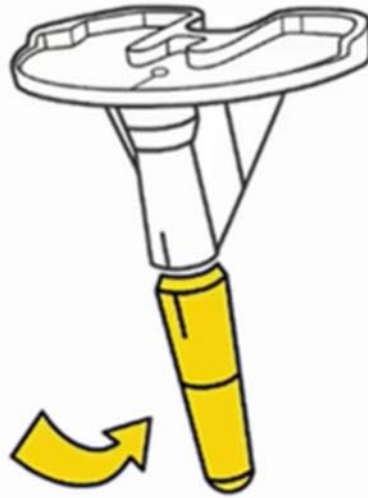
<https://thischangedmypractice.com/conversational-ai-streamlines-clinical-practice/> , Accessed Apr 8, 2024

AI assisted POCUS





canturio™te



canturio™te
with Persona® IQ



canturio™te
collecting data

Examples of AI Solution Deployment

Optimization and Automation



ED RN Assignment Solution

↓ Human Effort

↓ Error Rate

Natural Language Processing



MuScRAT

> 90% accuracy

↑ Clinician Efficiency

Clinical Prediction

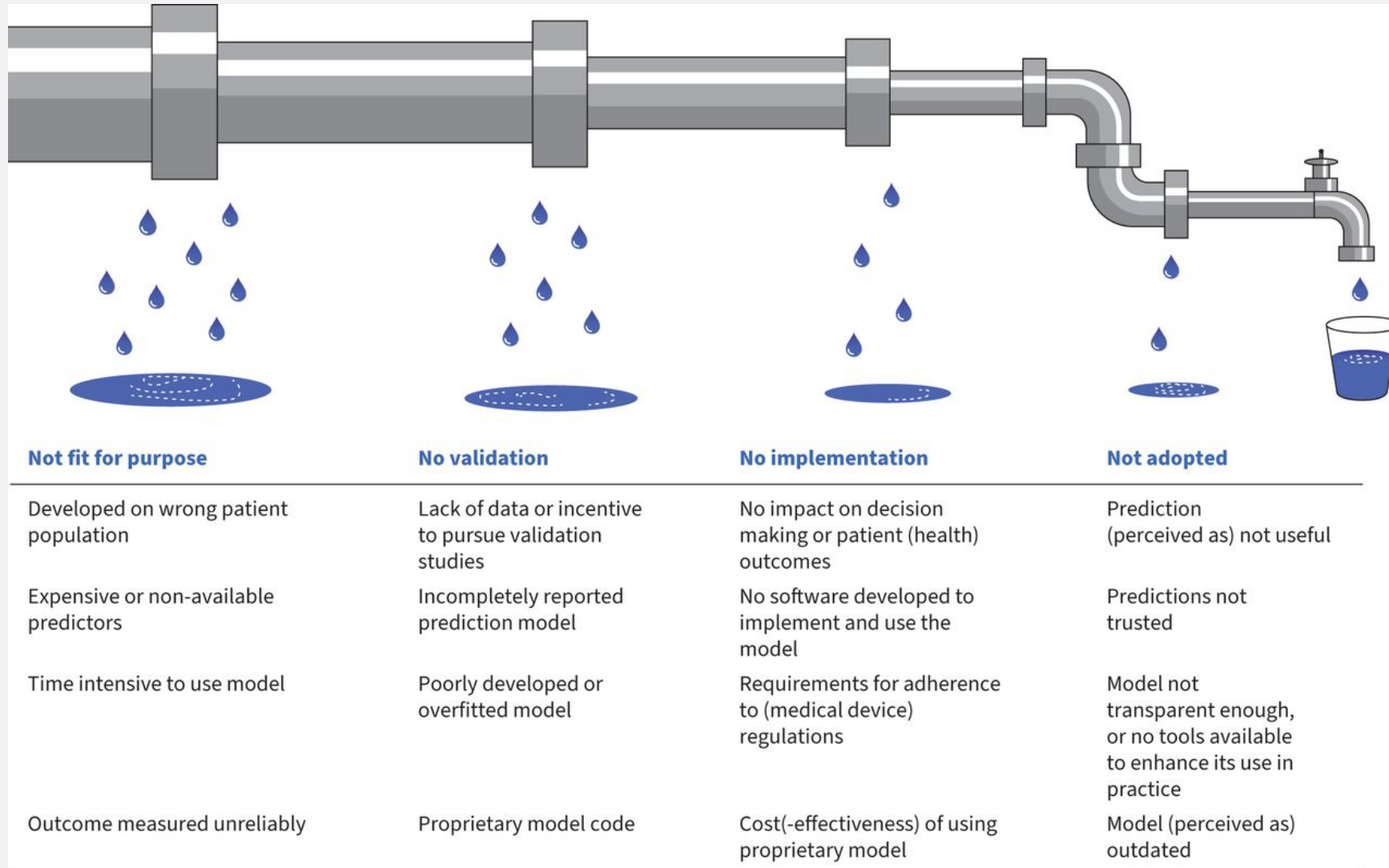


EWS Solution

↓ Mortality

↑ Staffing Allocation

AI paradox in Health: Researched AI tools aren't implemented and Implemented AI tools aren't researched



Original Investigation

FREE

June 21, 2021

External Validation of a Widely Implemented Proprietary Sepsis Prediction Model in Hospitalized Patients

Andrew Wong, MD¹; Erkin Otles, MEng^{2,3}; John P. Donnelly, PhD⁴; et al

» Author Affiliations | Article Information

JAMA Intern Med. 2021;181(8):1065-1070. doi:10.1001/jamainternmed.2021.2626

| | AUC |
|--|-----------|
| EPIC internally validated | 0.76-0.83 |
| Externally validated | 0.63 |
| Externally validated after 6h of onset of sepsis | 0.8 |

Research Letter

FREE

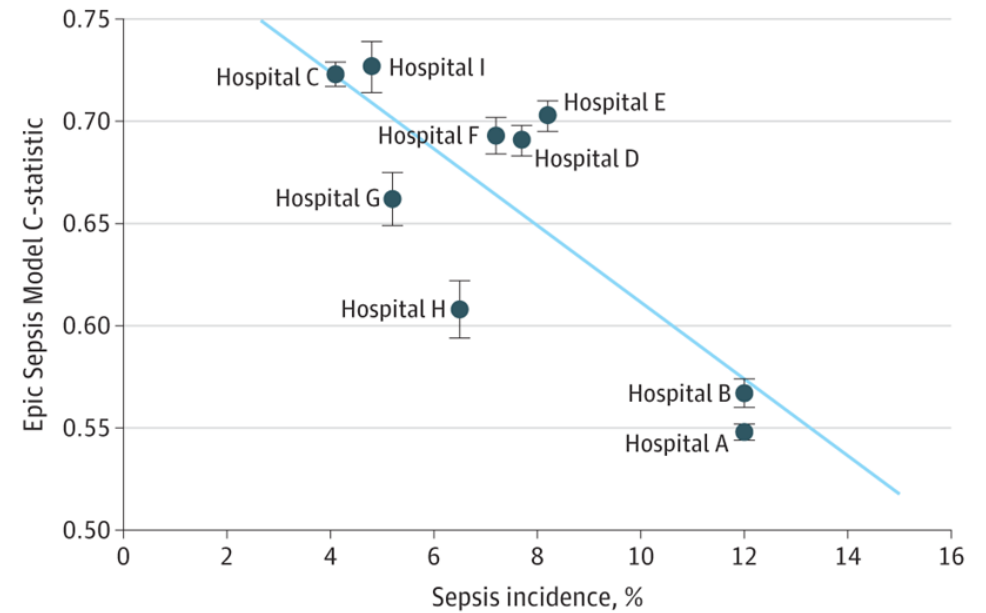
April 3, 2023

Factors Associated With Variability in the Performance of a Proprietary Sepsis Prediction Model Across 9 Networked Hospitals in the US

Patrick G. Lyons, MD, MSc^{1,2}; Mackenzie R. Hofford, MD³; Sean C. Yu, PhD³; et al

» Author Affiliations | Article Information

JAMA Intern Med. 2023;183(6):611-612. doi:10.1001/jamainternmed.2022.7182



Caution: Using AI in Clinical Care:



**PATIENT PRIVACY,
CONFIDENTIALITY, AND
CONSENT**



**CLINICIANS ARE RESPONSIBLE
FOR THE ACCURACY AND
RELIABILITY**



**TRANSPARENCY TO PATIENT
ABOUT THE USE OF AI
DECISION MAKING TOOLS
AND THEIR LIMITATIONS**



**INTERPRETING THE CLINICAL
APPROPRIATE OF AI
GENERATED RESULTS AND
USING CLINICAL JUDGEMENT**



**RECOGNIZING THE
POSSIBILITY OF BIAS OF AI
GENERATED RESULTS**



**MONITORING AND OVERSIGHT
OF THE APPROPRIATE AND
INTENDED USE OF AI**



Conditions external to the healthcare system

- Addressing liability issues and legal information sharing
- Complying with standards and quality requirements
- Integrating AI-relevant learning in higher education for healthcare staff



Capacity for strategic change management

- Developing a systematic approach to AI implementation
- Ascertaining resources for AI implementation
- Involving staff throughout the implementation process of AI systems
- Developing new strategies for internal and external collaboration



Transformation of healthcare professions and healthcare practices

- Managing new roles in care processes
- Building trust for AI systems acceptance in clinical practice

The logo features the letters 'AI' in a large, bold, sans-serif font. Below the 'AI' are two thick, horizontal black bars. To the right of this graphic, the words 'Responsible', 'Artificial Intelligence', and 'Institute' are stacked vertically in a bold, sans-serif font.

AI Responsible Artificial Intelligence Institute

- **Educate**

The Responsible AI Consortium will serve as a hub for knowledge sharing and resource pooling, allowing individuals and organizations to learn from one another. Activities will include hosting workshops, conferences, webinars, as well as developing educational resources. It will also facilitate cutting-edge research, sharing of case studies and executive education programs in responsible adoption of generative AI.

- **Innovate**

By providing a live and open generative AI testbed with independent and standards aligned Generative AI Safety Ratings for organizations and individuals, the consortium will encourage a more robust and diverse testing ground for new ideas and experiments in the field of generative AI. The consortium will enable corporations, researchers, policy makers, investors and individuals to work together on novel generative AI use cases and facilitate access to data sets, computational resources, open-source communities and testing platforms.

- **Advocate**

The consortium will provide expert insights to policymakers, regulators and investors, helping them make informed decisions about laws and shape regulations that both promote ethical use of AI and are conducive to sustainable AI innovation. It will raise awareness about responsible generative AI at various levels, from grassroots community organizations to national and international policy forums and create informational campaigns, engage media and policymakers, and act as a unified voice for its members, amplifying their concerns and suggestions for policymakers and sustainability focused investors in public debates.

Resources

T-CAIREM:

<https://tcairem.utoronto.ca/t-cairem-network>

Video:

- 2023 IHI National Forum Keynote by President of Microsoft Research:
<https://www.youtube.com/watch?v=nSk8iE0hDHO>

Canadian Medical Protection Agency:

- <https://www.cmpa-acpm.ca/en/advice-publications/browse-articles/2019/the-emergence-of-ai-in-healthcare>
- <https://www.cmpa-acpm.ca/en/advice-publications/browse-articles/2023/ai-scribes-answers-to-frequently-asked-questions#ref>

Colleges related:

British Columbia:

- <https://www.cpsbc.ca/files/pdf/IG-Artificial-Intelligence-in-Medicine.pdf>

Alberta:

- https://cpsa.ca/wp-content/uploads/2023/08/AP_Artificial-Intelligence.pdf

Ontario:

<https://dialogue.cpsa.on.ca/2023/09/can-ai-boost-safety-and-quality-in-patient-care/>