Artificial Intelligence in Health:

Real-World Deployments and Challenges

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Clinical Lead (AI) – Ontario Health

Faculty Affiliate – Vector Institute

Affiliate Scientist – IC/ES

Professor – University of Toronto

PROGRAM DISCLOSURE OF COMMERCIAL SUPPORT

I have relationships with for-profit and not-for-profit organizations over the past two years:

NATURE OF RELATIONSHIP	NAME OF THE FOR-PROFIT OR NOT-FOR-PROFIT ORGANIZATION	DESCRIPTION OF RELATIONSHIP
Any direct financial payments including receipt of honoraria	Lily, Takeda, Apobiologix	Talks and one-time advisory board meetings
Membership on advisory boards or speakers' bureaus	See above	See above
Funded grants of clinical trials	None	None
Patents on a drug, product or device	None	None
All other investments/relationship that could be seen as having the potential to influence the content of the educational activity	Mutuo Health Signal 1	Advisor

Objectives

01

Review the ‘current state’ of AI in healthcare

02

Review a model for adopting AI in healthcare

03

Discuss the opportunities and challenges of adopting AI in healthcare

AI in Medicine: The Biggest Challenges

Cognitive Reasoning

Empathy

AI in Medicine: The Cognitive Load Problem

Clinical

Evidence

Millers Law (Humans):

7 +/- 2 Parameters

Signs and Symptoms

Vitals

Medical Imaging

Social History

Labs

Complex Medical Decisions:

Hundreds of Parameters

Family History

Diet

Sleep

Exercise

U.S. Department of Health and Human Services
Office of Inspector General

1 in 4 hospitalized patients experience harm

> 40% of harm is preventable

Cognitive Reasoning: How Does AI Compare?

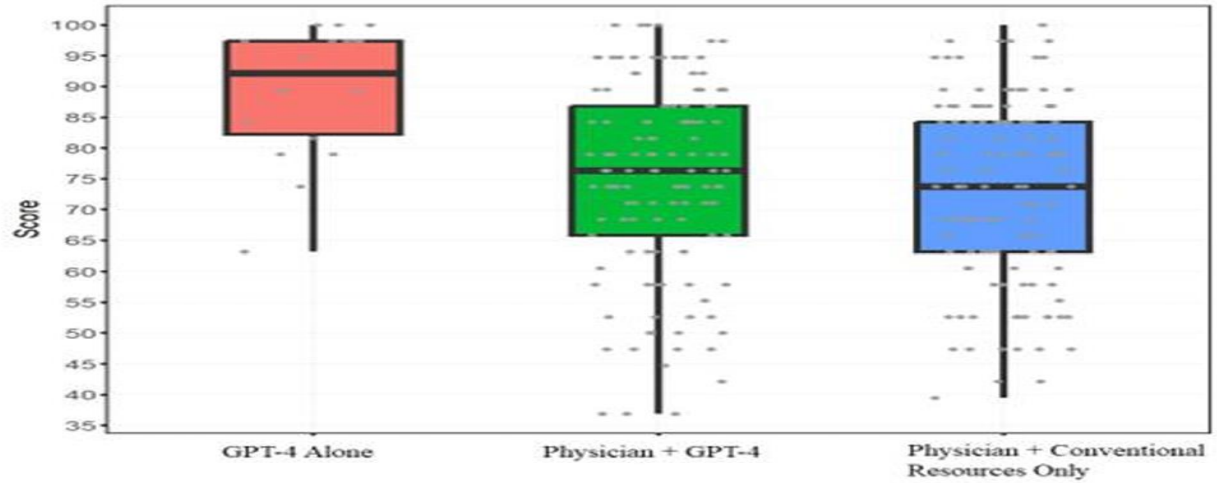
JAMA Network Open

Original Investigation | Health Informatics

Large Language Model Influence on Diagnostic Reasoning
A Randomized Clinical Trial

Ethan Goh, MBBS, MS; Robert Gallo, MD; Jason Hom, MD; Eric Strong, MD; Yingjie Weng, MHS; Hannah Kerman, MD; Joséphine A. Cool, MD; Zahir Kanjee, MD, MPH; Andrew S. Parsons, MD, MPH; Neera Ahuja, MD; Eric Horvitz, MD, PhD; Daniel Yang, MD; Arnold Milstein, MD; Andrew P. J. Olson, MD; Adam Rodman, MD, MPH; Jonathan H. Chen, MD, PhD

eFigure 1. Distribution of Diagnostic Performance Scores of Physician + GPT-4 vs. Physician + Conventional Resources Only



Caption: Participants were randomized to access GPT-4 in addition to conventional diagnostic resources or to just conventional resources. GPT-4 alone scored 15.5 percentage points (95% CI 1.5 to 29, p=0.03) higher than the conventional resources group.

Orsini Way Study (2019)

- 71%: experienced lack of compassion when speaking with a physician
- 73%: always or often feel rushed by their doctor

https://www.medicaleconomics.com/view/patients-dont-feel-their-doctors-are-compassionate-survey-finds

npj | digital medicine

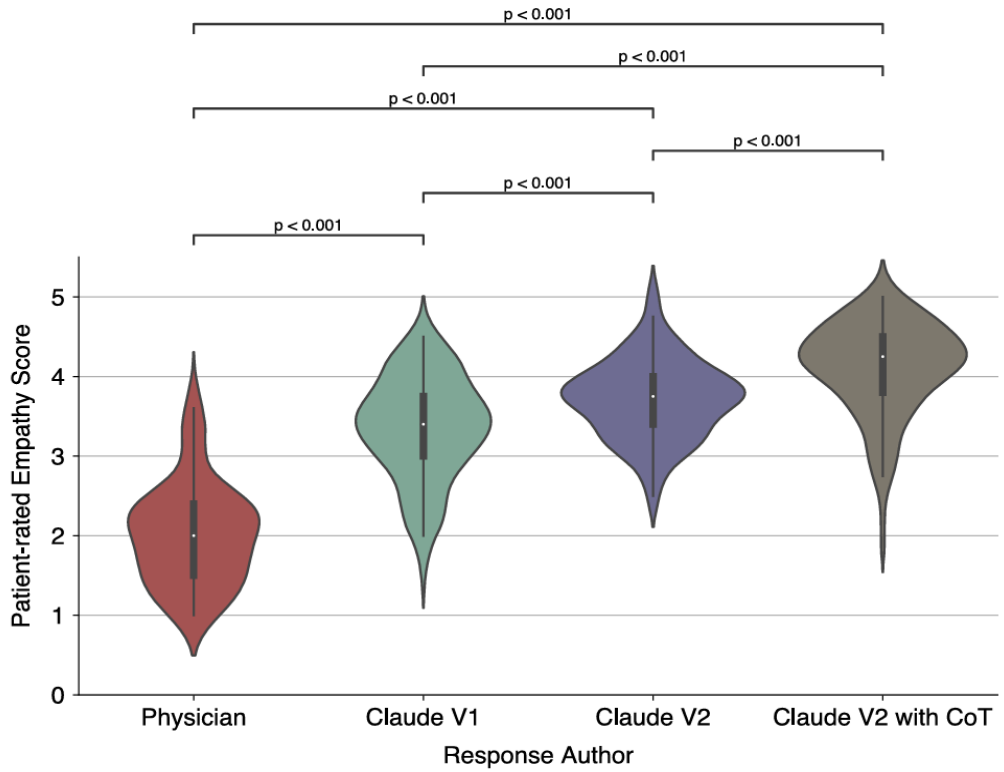
Brief communication

Published in partnership with Seoul National University Bundang Hospital

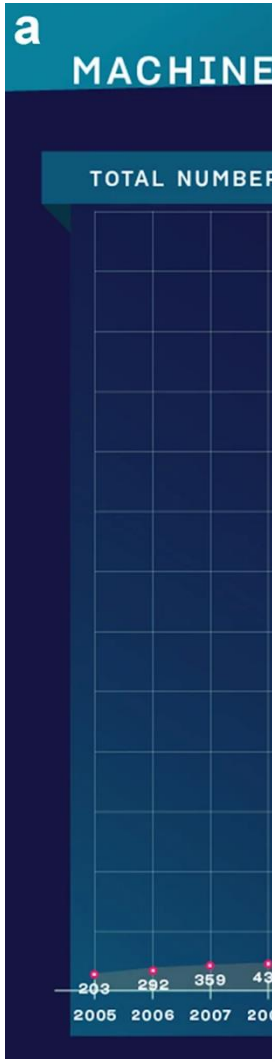
https://doi.org/10.1038/s41746-025-01671-6

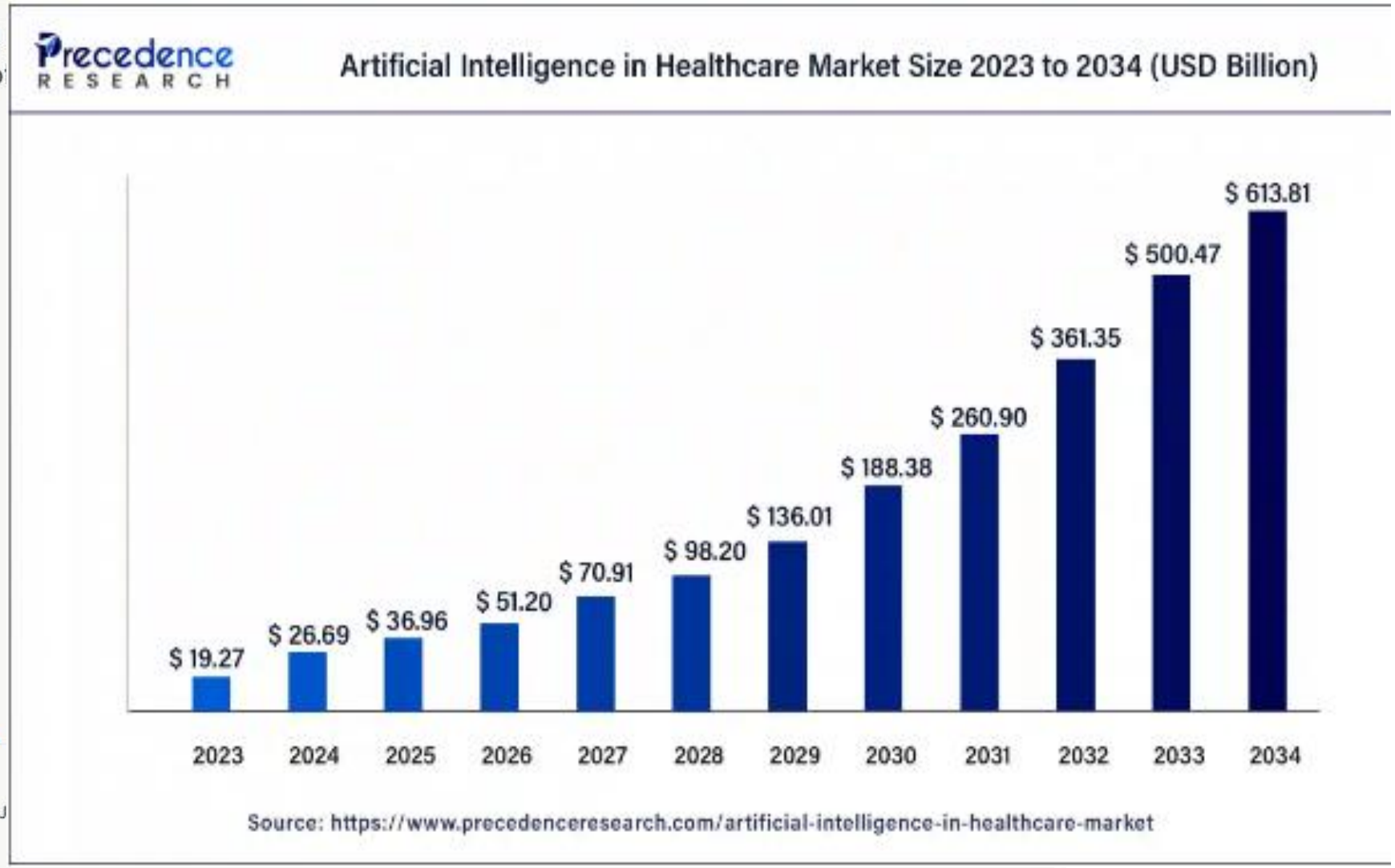
Patient perceptions of empathy in physician and artificial intelligence chatbot responses to patient questions about cancer

David Chen[1,2], Kabir Chauhan[1], Rod Parsa[3], Zhihui Amy Liu[4,5], Fei-Fei Liu[1,6], Ernie Mak[7,8], Lawson Eng[9,10], Breffni Louise Hannon[7,11], Jennifer Croke[1,6], Andrew Hope[1,6], Nazanin Fallah-Rad[9], Phillip Wong[1,6] & Srinivas Raman[1,6]



AI in Healthcare: Where Are We Now?





AI in Healthcare: Where Are We Now?

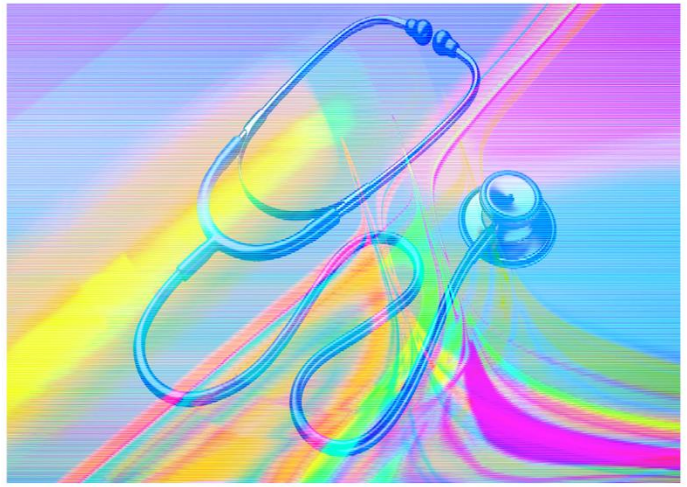
HARVARD BUSINESS REVIEW

Latest Magazine Topics Podcasts Store The Big Idea Data & Visuals Case Selections

AI Adoption in U.S. Health Care Won't Be Easy

by James B. Rebitzer and Robert S. Rebitzer

September 14, 2023



HBR Staff/Ics813/Aleksandra Konoplia/Getty Images

American Medical Association | Center for Digital Health and AI

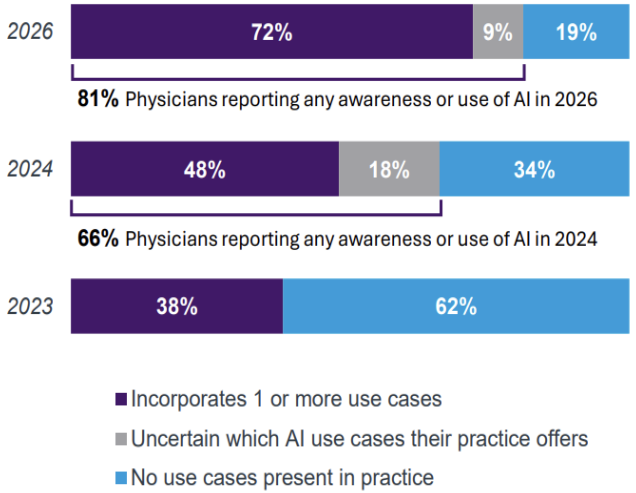
2026 Physician Survey on Augmented Intelligence

March 2026

Reported AI use in practice increases

Q: Which, if any, of these AI use cases do you currently incorporate into your practice? (choice of 17 use cases)

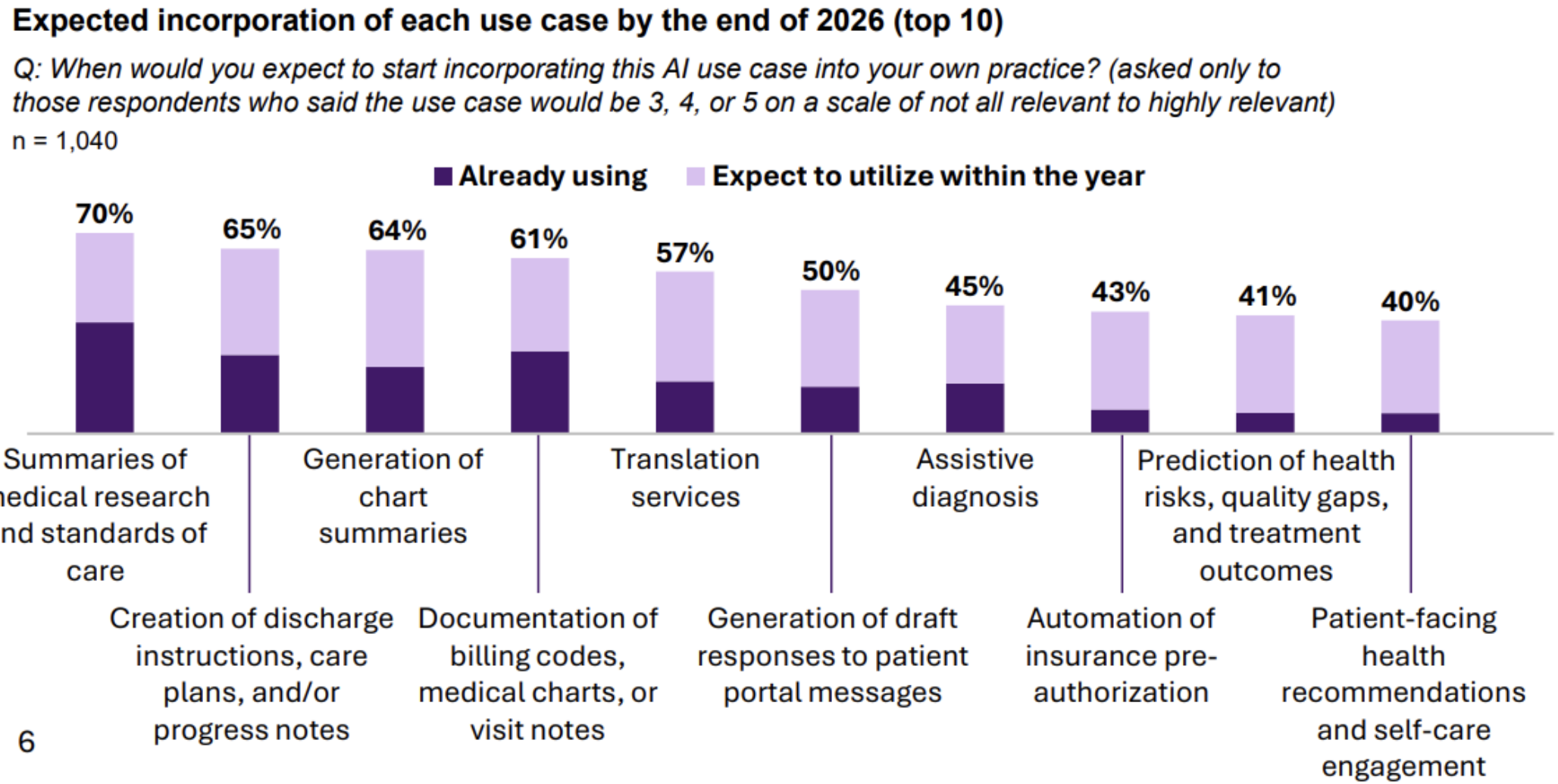
n = 1,342 (2026); n=1,183 (2024) n=1,081 (2023)



Question updates:

- The survey instrument now differentiates between physicians who are not using any AI use cases and those who are uncertain about which tools their practice offers.
- The list of evaluated AI use cases expanded from 15 to 17 in 2026 to reflect emerging technologies.

AI in Healthcare: Where Are We Now?



Applying AI In Healthcare Is Like…

Doing Yoga

Expectation: **Reality:**

Should We Be Concerned??

Editorial

Show us t

Claims that medical AI i care must be backed by evidence.

The adoption of art (AI)-powered toc rapidly across all care systems. Pr decision support tive tools have entered clinic and large language models being used by the general pu cal information and advice[2]. AI tools create value for pati health systems remains scar

Nonetheless, in publicati uct materials, claims abou are increasingly more comn there is no clear agreement evidence should be requi

AAMC

Home Resources & Services

Home / News / Doctors, beware: AI thr

AAMCNE

Doc wea pat

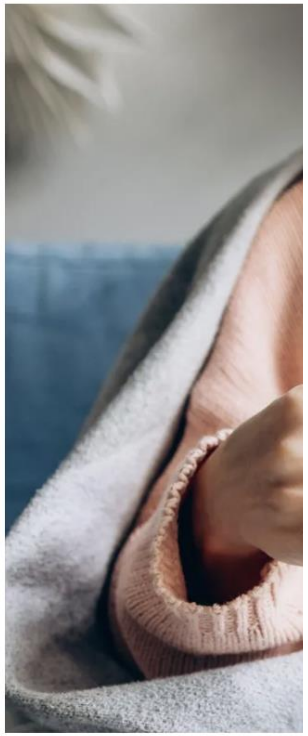
Socio as re patie bond.

Using study

10 February 2026

Ethan Gudge

South of England



Healthcare of the Future 2025
T. Bürkle et al. (Eds.)

doi:10.3233/SHTI250219

The Unexpected Harms of Artificial Intelligence in Healthcare: Reflections on Four Real-World Cases

Kerstin DENECKE[a,1] Guillermo LOPEZ-CAMPOS[b], Octavio RIVERA-ROMERO[c], and Elia GABARRON[d]
[a]*Bern University of Applied Sciences, Bern, Switzerland*
[b]*Wellcome-Wolfson Institute for Experimental Medicine, Queen's University Belfast*
[c]*Department of Electronic Technology, Universidad de Sevilla, Seville, Spain*
[d]*Department of Education, ICT and Learning, Østfold University College, Norway*
ORCiD ID: Kerstin Denecke https://orcid.org/0000-0001-6691-396X, Guillermo Lopez-Campos https://orcid.org/0000-0003-3011-0940, Octavio Rivera-Romero https://orcid.org/0000-0001-7212-9805, Elia Gabarron https://orcid.org/0000-0002-7188-550X

Abstract. *Introduction:* Rapid advances in Artificial Intelligence (AI), especially with large language models, present both opportunities and challenges in healthcare. This article analyzes real-world AI-related harms in healthcare. *Methods:* We selected four recent AI-related incidents from the AIAAIC Repository. *Results:* The incidents discussed include: Whisper's harmful hallucinations; UNOS's algorithm delaying transplants for black patients; the WHO's S.A.R.A.H. chatbot providing inaccurate health information; and Character AI's chatbot promoting disordered eating among teens. *Discussion and conclusion*: These incidents highlight diverse risks, from misinformation to safety concerns, involving both industry and institutional providers. The article emphasizes the need for systematic reporting of AI-related harms, concerns about security, privacy, and ethics, and calls for a

Researchers found that using AI to make medical decisions presented a risk to patients

UNITY HEALTH TORONTO

Our People:

11,271 Staff

5,773 Medical trainees and health professional learners

1,503 Physicians

1,195 Researchers, scientists, research staff and students

Our Care:

1,625,000+ Ambulatory visits each year

357,000+ Inpatient visits each year

172,000+ Emergency Department visits each year

54,341 Family Health Team patients rostered

5,600+ Babies born at our sites each year

1,423 Total beds across our sites

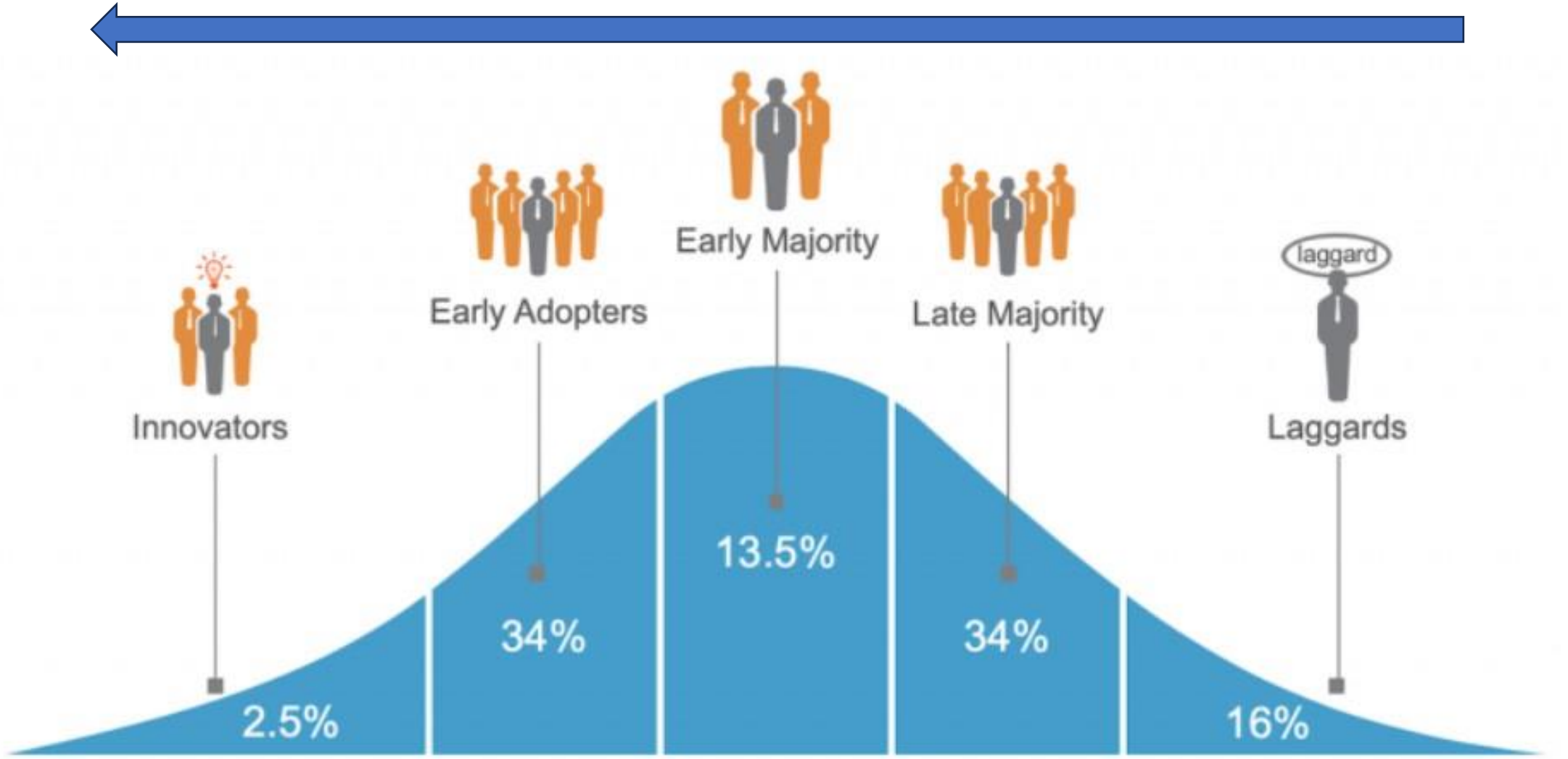
AI is a Strategic Pillar

Dedicated Data Science Team

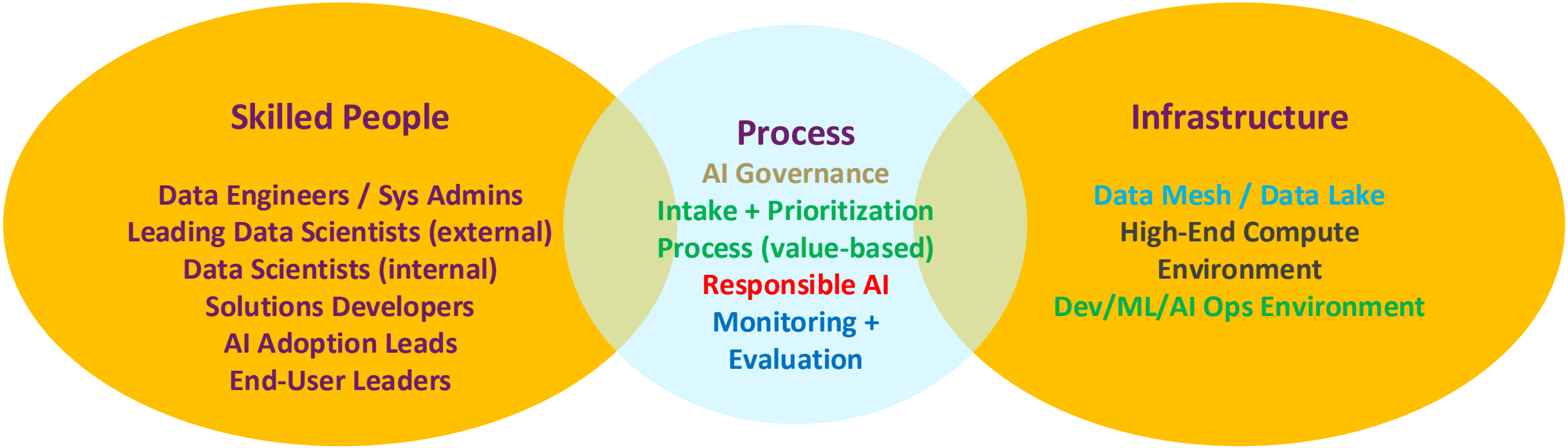
› 50 AI solutions deployed

Health AI Adoption: Organizational Strategy

AI Literacy and Supports



Health AI : Key Elements for Innovation



Community

Expert Table (Advisors)
Community of Excellence (End-Users and Champions)
Private Sector (Scalers)

Defining Value

- Porter (2006)
  - Health outcomes achieved per dollar spent

- European Commission (2019)
  - a comprehensive concept built on four value-pillars: appropriate care to achieve patients' personal goals (personal value), achievement of best possible outcomes with available resources (technical value), equitable resource distribution across all patient groups (allocative value) and contribution of healthcare to social participation and connectedness (societal value)

Priority Setting

Value Metrics

Organizational

Alignment

Oversight

Executive / Board

Sets priorities + risk appetite, defines value metrics, sees high-risk approvals, incidents, sunsets.

AI Steering Committee

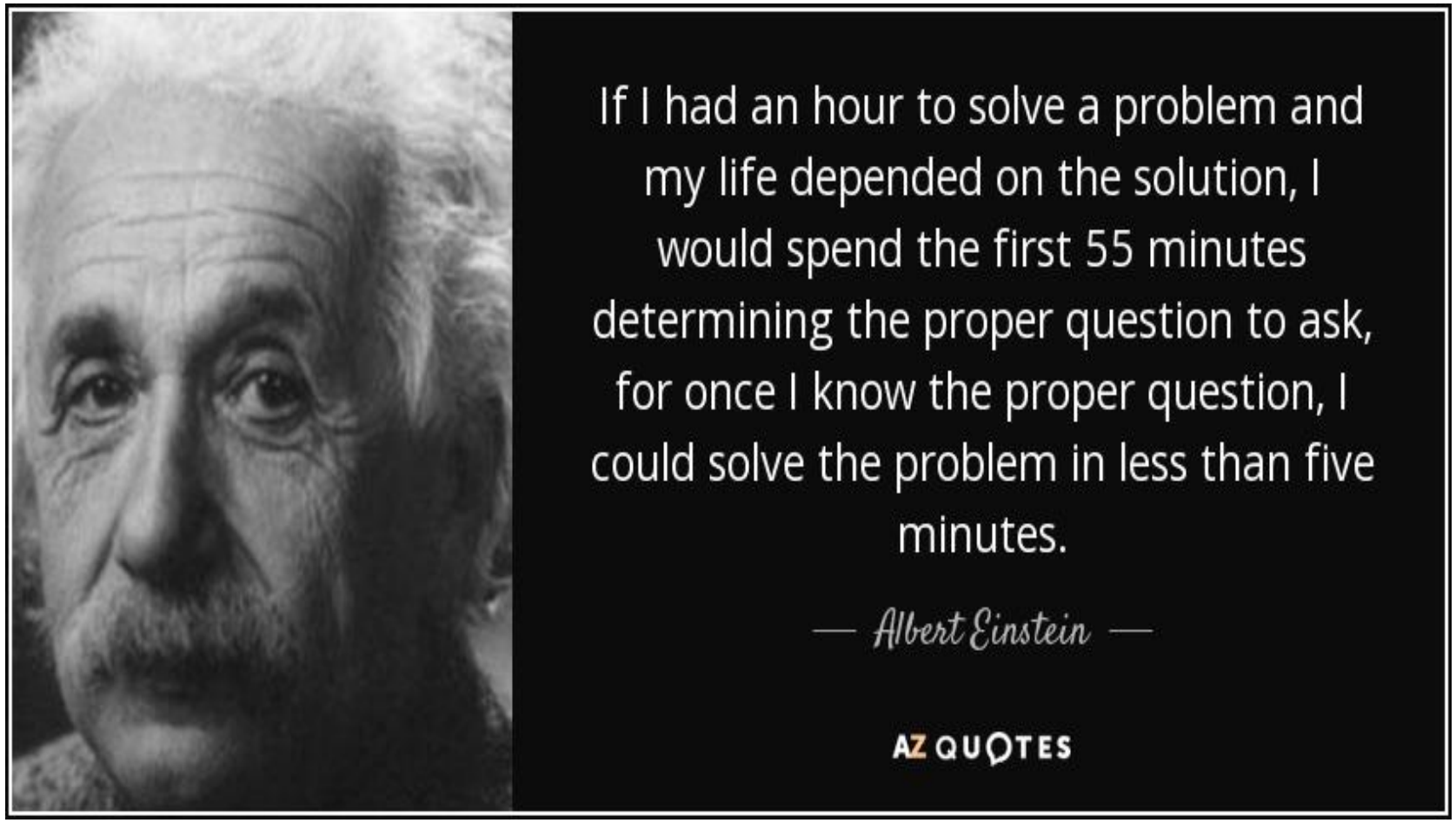
Oversees AI dossier, owns intake, tiering, approval conditions, monitoring oversight, change control.

Project teams and named owners

Leads evaluation, validates locally, implements safely, monitors continuously, maintains workflow fit.

When Science Meets Clinical Care:

The Unity Health AI Program

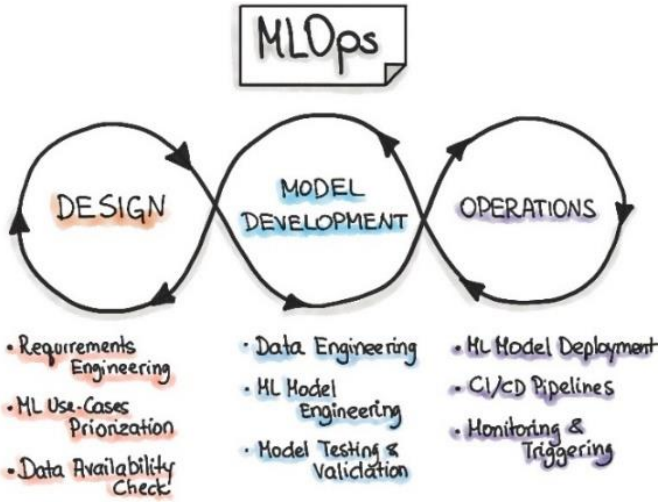


Unity Health AI Program

AI Team

Data Integration and Governance

Product Development



Advanced Analytics

Product Management and Deployment

The Intake Process

DSAA Blog

AI Success Begins at Intake

PROCESSES POST-MISCELLANEOUS

Overview of the cornerstone of DSAA's success: the project intake form

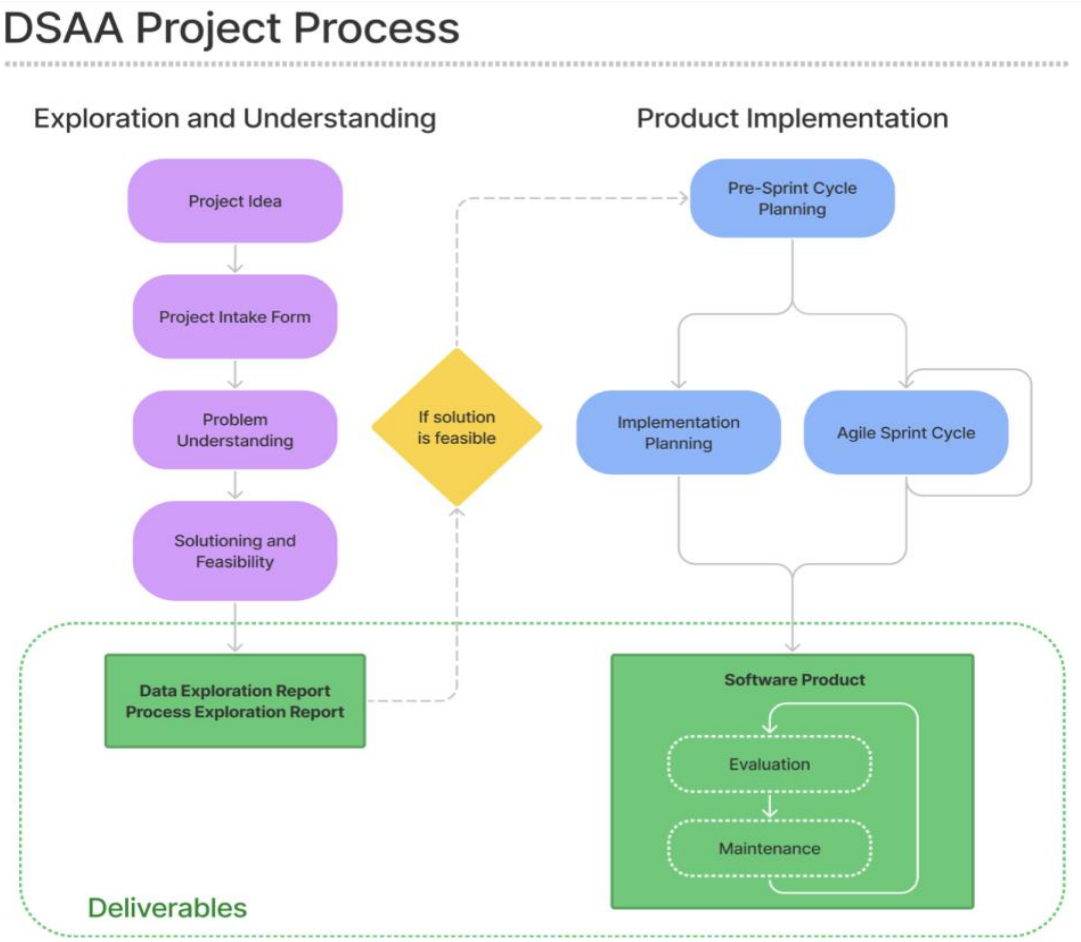
AUTHOR

Otis Ding, Michael Page

PUBLISHED

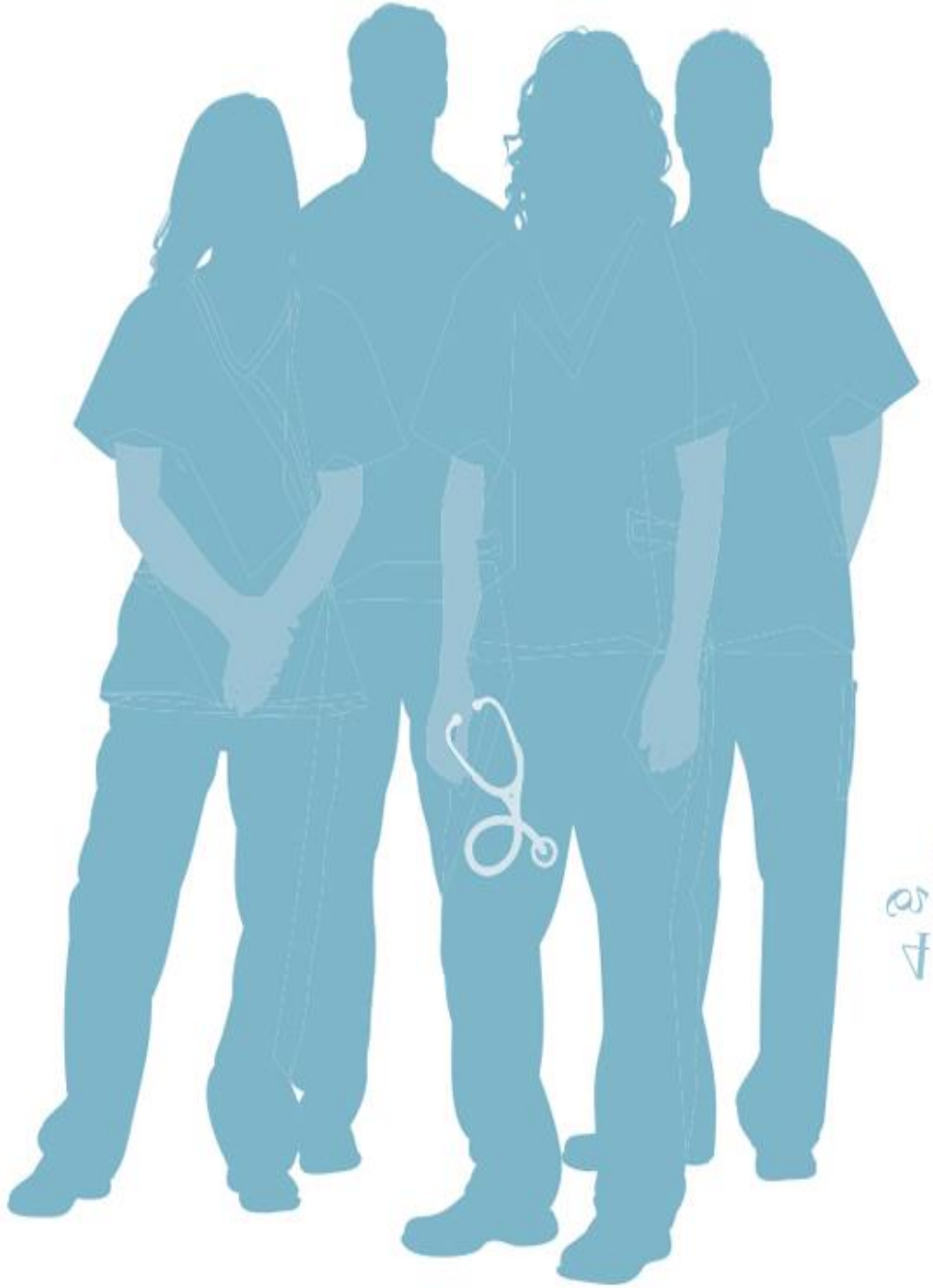
July 16, 2024

Technology is moving at a pace faster than what we've ever seen before, and this has led to significant changes in the healthcare industry as well. The integration of artificial intelligence (AI) is becoming increasingly critical. One key to the successful implementation of AI solutions in clinical settings lies in the effective communication between clinicians and data scientists. To that end, the Data Science and Advanced Analytics team at Unity Health Toronto has developed a project intake form that lays the foundation for its success. The form serves this purpose by allowing clinicians to directly communicate the problems they encounter and suggest potential solutions. Here's a closer look at the purpose of this intake form, its benefits, and how it supports our AI program.



https://lks-chart.github.io/blog/posts/2024-07-16-ai-success-begins-at-intake/

AND THE WINNERS *are...*

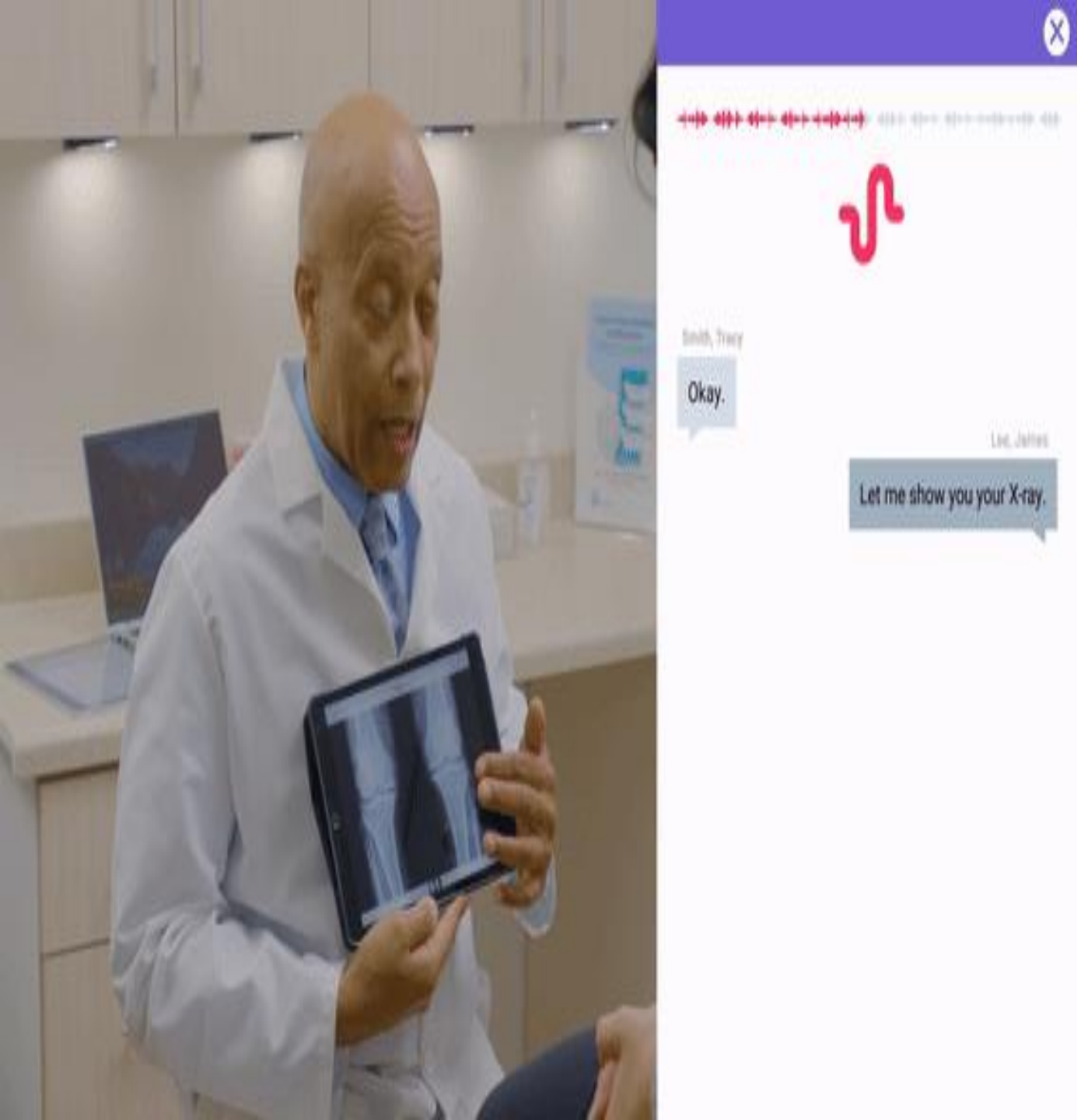


AI-Driven Nurse Staffing Optimization

~ $1 Million Annual Cost Reduction

ED RN Assignment

Nurses: 90 mins ➡ < 1 min
Clerks: 2 hours ➡ < 15 mins
Error Rates: > 20% ➡ 5%



Relieving Physician Stress: AI Note-Taking for Our Clinicians

CLINICAL EVALUATION OF ARTIFICIAL INTELLIGENCE AND AUTOMATION TECHNOLOGY TO REDUCE ADMINISTRATIVE BURDEN IN PRIMARY CARE

Commissioned by and presented to: OntarioMD

OntarioMD
Empowered Practices. Enhanced Care.

Centre for Digital Health Evaluation, Women's College Hospital
Institute for Health System Solutions and Virtual Care

Key Findings

- **76%** of participants (family doctors and nurse practitioners) reported reduced cognitive load during patient encounters when using an AI scribe
- On average, **3 to 4 hours per week** were freed up for direct patient care.
- **> 80%** of participants expressed a desire to continue using AI scribes long-term

ED Radiology Tracking Board private

Main CT US

Name	Location	ED MRP	Study	Radiologist	Since Order	Since Image	Status	Porter Status
********, ********	EDACR	SMITH	EXTREMITY - CONT		01h:47m	-	ORDERED	-
********, ********	EDACR	SMITH	EXTREMITY - CONT		01h:42m	-	ORDERED	-
********, ********	EDACR	SMITH	HEAD/SPINE C - CONT		01h:39m	-	ORDERED	-
********, ********	EDACR	SMITH	EXTREMITY - CONT		01h:31m	-	ORDERED	-
********, ********	EDACR	SMITH	EXTREMITY - CONT		01h:30m	-	ORDERED	IN TRANSIT
********, ********	EDACR	SMITH	EXTREMITY - CONT		01h:21m	-	ORDERED	PORTER REQUESTED
********, ********	EDACR	SMITH	EXTREMITY - CONT		01h:20m		ORDERED	
********, ********	EDACR	SMITH	HEAD COW -/CTA CONT		01h:40m	00h:47m	IMAGE ACQUIRED	PATIENT RETURNED
********, ********	EDACR	SMITH	HEAD COW -/CTA CONT		01h:22m	00h:41m	IMAGE ACQUIRED	RETURN REQUESTED
********, ********	EDACR	SMITH	HEAD COW -/CTA CONT		01h:27m	00h:38m	IMAGE ACQUIRED	RETURN REQUESTED
********, ********	EDACR	SMITH	HEAD COW -/CTA CONT		01h:57m	00h:36m	IMAGE ACQUIRED	RETURN IN TRANSIT
********, ********	EDACR	SMITH	HEAD COW -/CTA CONT		02h:01m	00h:20m	IMAGE ACQUIRED	PATIENT RETURNED

5	12	0	0	UPDATED 5 MINS AGO AT 2024-02-16 13:29
Patients awaiting reads	Patients awaiting scans	Active traumas	Active strokes	

CBC | MENU

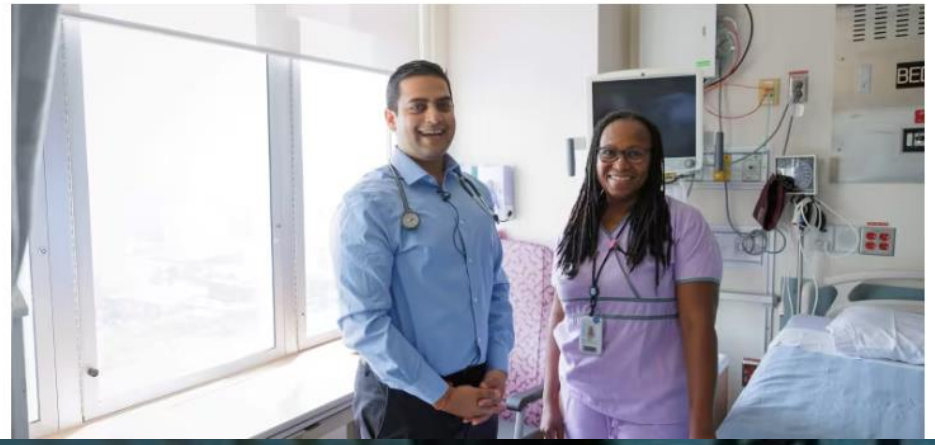
NEWS Top Stories Local Climate World Canada Politics Indigenous

Health

AI tool cuts unexpected deaths in hospital by 26%, Canadian study finds

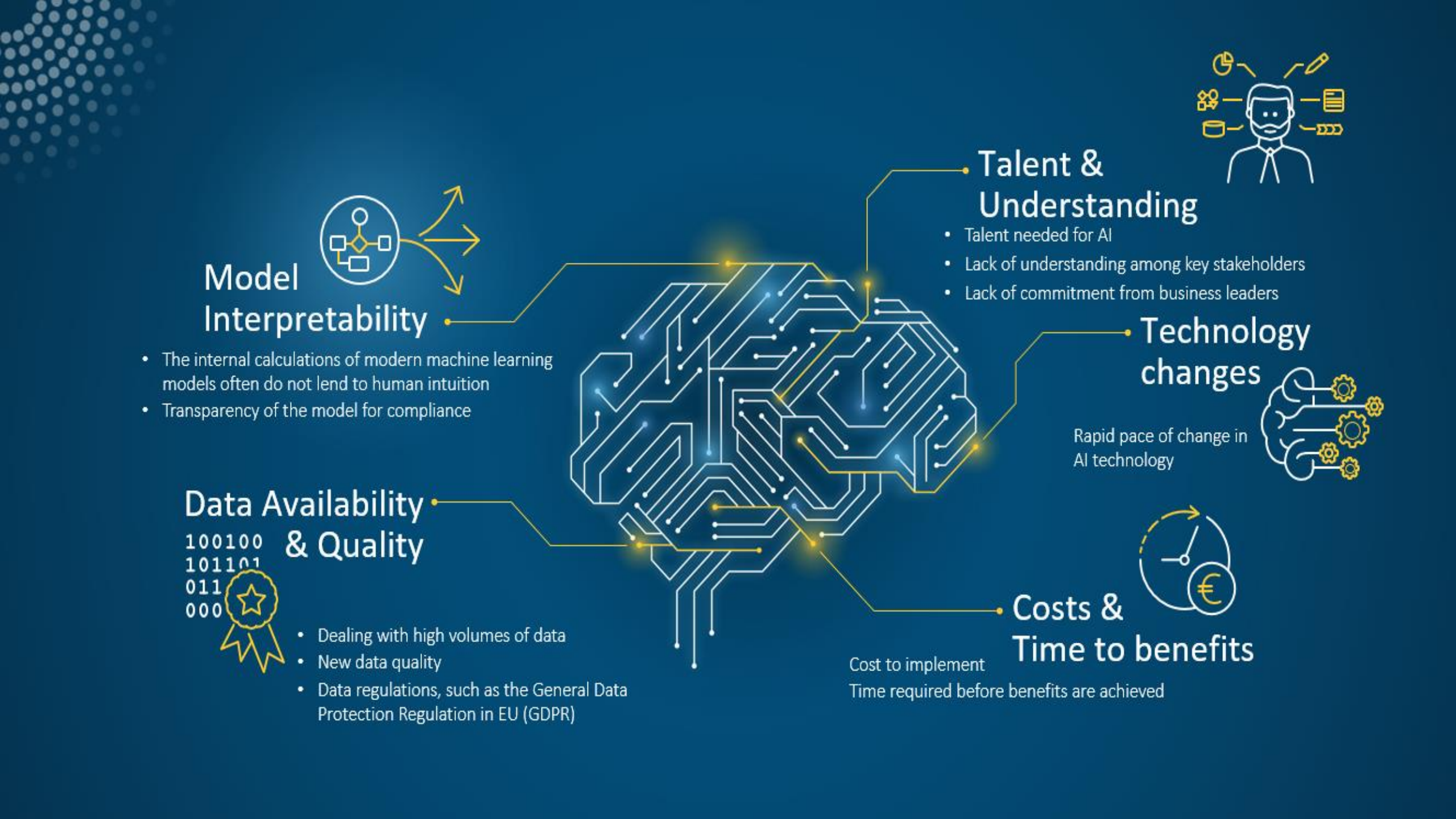
Researchers say early warning system, launched in 2020 at St. Michael's Hospital, is 'saving lives'

Lauren Pelley · CBC News · Posted: Sep 16, 2024 4:00 AM EDT | Last Updated: September 16



CHARTwatch

(Verma et al, CMAJ, 2024)


Model Interpretability
The internal calculations of modern machine learning models often do not lend to human intuition
Transparency of the model for compliance
Talent & Understanding
Talent needed for AI
Lack of understanding among key stakeholders
Lack of commitment from business leaders
Technology changes
Rapid pace of change in AI technology
Data Availability & Quality
100100
101101
011
000
Dealing with high volumes of data
New data quality
Data regulations, such as the General Data Protection Regulation in EU (GDPR)
Costs & Time to benefits
Cost to implement
Time required before benefits are achieved

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The mother of a 1
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By
Pul

A Belgian man reportedly decided to
about the future of the planet with an

Nearly 3 in 4 Teens Have Used AI Companions, New National Survey Finds

Common Sense Media research reveals majority of teens have used AI companions, with half using them regularly

Common Sense Media
Wednesday, July 16, 2025

SAN FRANCISCO, July 16, 2025 — Common Sense Media today released the report "Talk, Trust, and Trade-Offs: How and Why Teens Use AI Companions," which revealed widespread use of social AI companions among users ages 13-17. The research underscores that the use of AI companions is not a niche interest, but rather mainstream teen behavior.

"AI companions are emerging at a time when kids and teens have never felt more alone," said Common Sense Media Founder and CEO James P. Steyer. "This isn't just about a new technology — it's about a generation that's replacing human connection with machines, outsourcing empathy to algorithms, and sharing intimate details with companies that don't have kids' best interests at heart. Our research shows that AI companions are far more commonplace than people may have assumed — and that we have a narrow window to educate kids and families about the well-documented dangers of these products."

The report's key findings demonstrate a remarkable level of adoption and impact for a technology that is less than three years old:

- Seventy-two percent of teens have used AI companions at least once.
- Over half use these platforms at least a few times a month.
- About one in three teens:
  - Have used AI companions for social interaction and relationships, including role-playing, romantic interactions, emotional support, friendship, or conversation practice.
  - Find conversations with AI companions to be as satisfying or more satisfying than those with real-life friends.
- About one in three teen AI companion users:
  - Report feeling uncomfortable with something an AI companion has said or done.
  - Have chosen to discuss important or serious matters with AI companions instead of real people.

Responsible AI

RESEARCH METHODS AND REPORTING

FUTURE-AI: international consensus guideline for trustworthy and deployable artificial intelligence in healthcare

Karim Lekadir,[1,2] Alejandro F Frangi,[3,4] Antonio R Porras,[5] Ben Glocker,[6] Celia Cintas,[7] Curtis P Langlotz,[8] Eva Weicken,[9] Folkert W Asselbergs,[10,11] Fred Prior,[12] Gary S Collins,[13] Georgios Kaissis,[14] Gianna Tsakou,[15] Irène Buvat,[16] Jayashree Kalpathy-Cramer,[17] John Mongan,[18] Julia A Schnabel,[19] Kaisar Kushibar,[1] Katrine Riklund,[20] Kostas Marias,[21] Lameck M Amugongo,[22] Lauren A Fromont,[23] Lena Maier-Hein,[24] Leonor Cerdá-Alberich,[25] Luis Martí-Bonmatí,[26] M Jorge Cardoso,[27] Maciej Bobowicz,[28] Mahsa Shabani,[29] Manolis Tsiknakis,[21] Maria A Zuluaga,[30] Marie-Christine Fritzsche,[31] Marina Camacho,[1] Marius George Linguraru,[32] Markus Wenzel,[9] Marleen De Bruijne,[33] Martin G Tolsgaard,[34] Melanie Goisauf,[35] Mónica Cano Abadía,[35] Nikolaos Papanikolaou,[36] Noussair Lazrak,[1] Oriol Pujol,[1] Richard Osuala,[1] Sandy Napel,[37] Sara Colantonio,[38] Smriti Joshi,[1] Stefan Klein,[33] Susanna Aussó,[39] Wendy A Rogers,[40] Zohaib Salahuddin,[41] Martijn P A Starmans[33]; on behalf of the FUTURE-AI Consortium

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Additional material is published online only. To view please visit the journal online.
Cite this as: *BMJ* 2025;388:e081554 http://dx.doi.org/10.1136/bmj-2024-081554
Accepted: 10 January 2025

Despite major advances in artificial intelligence (AI) research for healthcare, the deployment and adoption of AI technologies remain limited in clinical practice. This paper describes the FUTURE-AI framework, which provides guidance for the development and deployment of [illegible] established through consensus based on six guiding principles—fairness, universality, traceability, usability, robustness, and explainability. To operationalise trustworthy AI in healthcare, a set of 30 best practices were defined, addressing technical, clinical, socioethical, and legal [illegible]

Table 1 | Clustering of trustworthy artificial intelligence (AI) requirements and selection of FUTURE-AI guiding principles

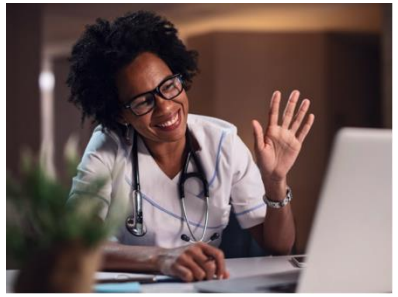
Clusters of requirements	Core principles
1. Fairness, diversity, inclusiveness, non-discrimination, unbiased AI, equity	Fairness
2. Generalisability, adaptability, interoperability, applicability, universality	Universality
3. Traceability, monitoring, continuous learning, auditing, accountability	Traceability
4. Human centred AI, user engagement, usability, accessibility, efficiency	Usability
5. Robustness, reliability, resilience, safety, security	Robustness
6. Transparency, explainability, interpretability, understandability	Explainability

Responsible Implementation of AI in Healthcare

Some Considerations

Pre-Implementation

Clinical Validation



Bias Assessment

Ethics Assessment

External Validation and Explainability

Soft Launch

Silent Testing

Evaluation

Implementation and Post Implementation

Communication
(Re-iterating Expectations)

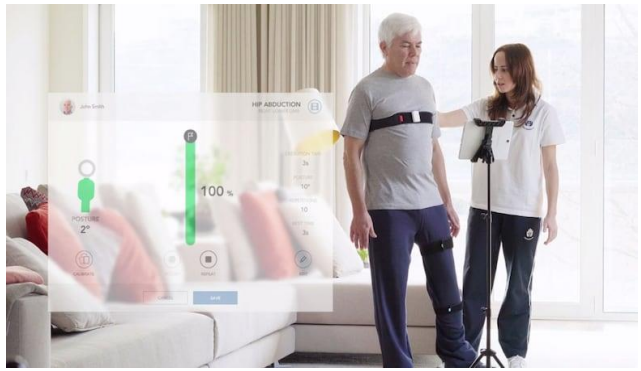
Monitoring, Evaluation, and Maintenance

IMPROVE-AF

ED Volume Forecasting

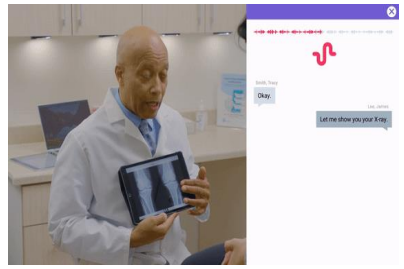
Structurally Vulnerable IV Drug User Surveillance

What Could the Future Look Like?

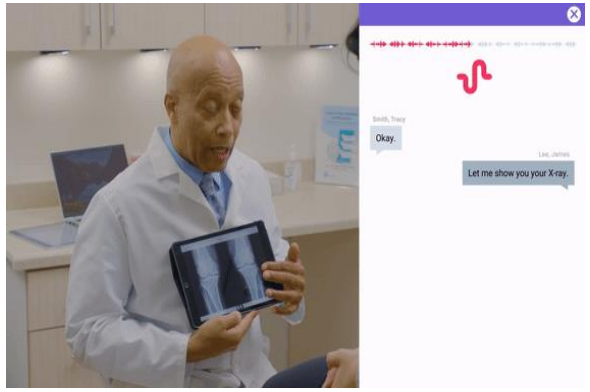


Pocket Consult

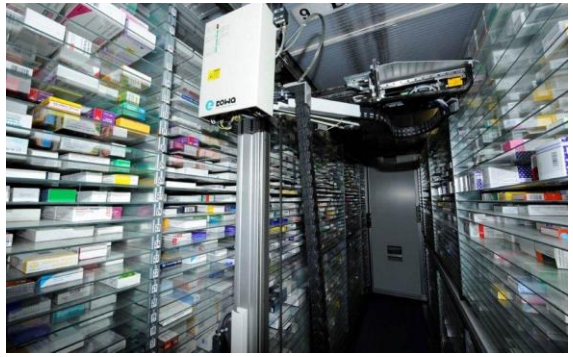
Triage



Clinical Decision Support



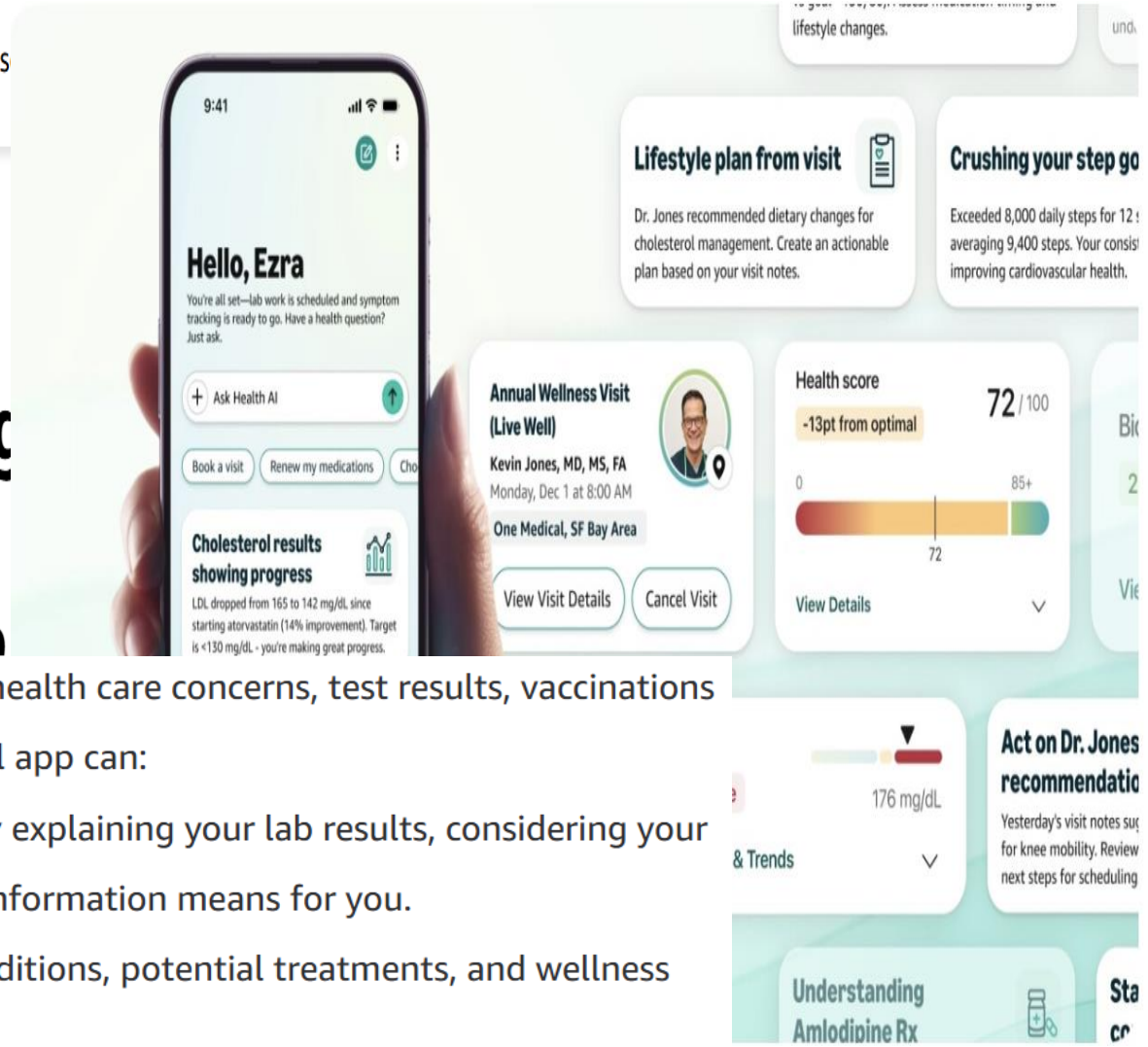
System Integration



Care Delivery

Rapid Access

Amazon One Medical introduces ag Health AI assistant for simpler, personalized, and more actionable he



This takes labs,

It delivers tailored guidance that considers your past health care concerns, test results, vaccinations and current medications. Health AI in the One Medical app can:

- Answer general and complex health questions by explaining your lab results, considering your unique health history, and explaining what this information means for you.
- Provide 24/7 health guidance on symptoms, conditions, potential treatments, and wellness questions.
- Help you choose the right care option based on your specific situation. This includes a virtual visit, an in-person appointment, or urgent care.
- Streamline your ongoing care tasks, including helping you book appointments with your One Medical provider, or renew medications, which you can choose to fill with Amazon Pharmacy.

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Trust, attitudes and use of artificial intelligence

A global study 2025

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This is where Canada ranks among the least AI literate countries in the world

By Joshua Santos

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