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A:CARE CONGRESS 2024

# Technology: AI and the physician-patient relationship

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Family doctor,  
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**Dr. Evan Muse**  
Cardiologist,  
Scripps Clinic, San Diego, USA



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# Financial disclosure

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I received funding from the following companies: Abbott, GeneXwell & Kardiogenics

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**Clinical Notes, Suggestions, and  
New Instruments**

**A BEDSIDE TELEPHONE.**

A. E. ROCKEY, M.D., PORTLAND, ORE.

The oft repeated statement that we spend one third of our lives in bed is probably true for the average person. In that one third the average physician certainly has many telephone calls. The number, of course, depends entirely on the character of his practice. It does not apply to the city specialist,



Bedside telephone.

who sees to it carefully that his name is omitted from the residence list of the telephone directory. The man doing family practice, or emergency or industrial surgery, must literally sleep with his telephone. Before the World War I was for many years surgeon to a railway, light and power company. For ten years the telephone herewith illustrated was a source of great comfort and convenience.

It combines the bell in the base with the continental type of hand telephone, with the receiver and transmitter in one

About this time I built a new residence just outside the city limits, and had it literally supplied with jacks in the various sleeping and living rooms, and garage. There were twelve in all, and I paid for the equipment and installation. I knew nothing then about a service charge for jacks. It was only when pruning down overhead expenses at the time I went into military service that I discovered that I had been paying a service charge of twenty-five cents a month on each jack. In other words, for equipment which belonged to me I had paid the company about \$300 for a supposed service that had not cost them one cent, as no repair had ever been required. The attention of public service commissions is invited to this. It must be a local rule of the Oregon commission. On a recent visit to Los Angeles I found twenty rooms at the Good Samaritan Hospital equipped with jacks, and the ordinary desk telephone circulating between them. The entire charge for this was one dollar a month, and no service charge for the jacks.

The Ericson phone is now made by the Federal Telephone and Telegraph Company, with the bell in the base, and recently the Western Electric has added a similar instrument to its output. That will, I fancy, do away with talk about "foreign equipment," and the medical profession, and then patients, may have an adaptable bedside telephone.

The attention of telephone companies is invited to the economic importance of this real need. The Directory of the American Medical Association contains the names of 199,250 physicians, and a list of 6,794 hospitals. It is believed that the medical profession will find this bedside telephone a great convenience to themselves for night use, and to some of their patients during convalescence.

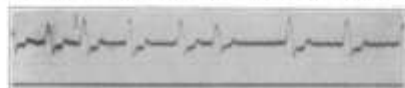
**HEART BLOCK AS A FAVORABLE INFLUENCE IN THE  
PROGRESS OF CHRONIC FIBRILLATION**

LOUIS FAUREN BISHOP, M.D., New York

President, Good Samaritan Dispensary; Consultant Cardiologist,  
Lincoln Hospital

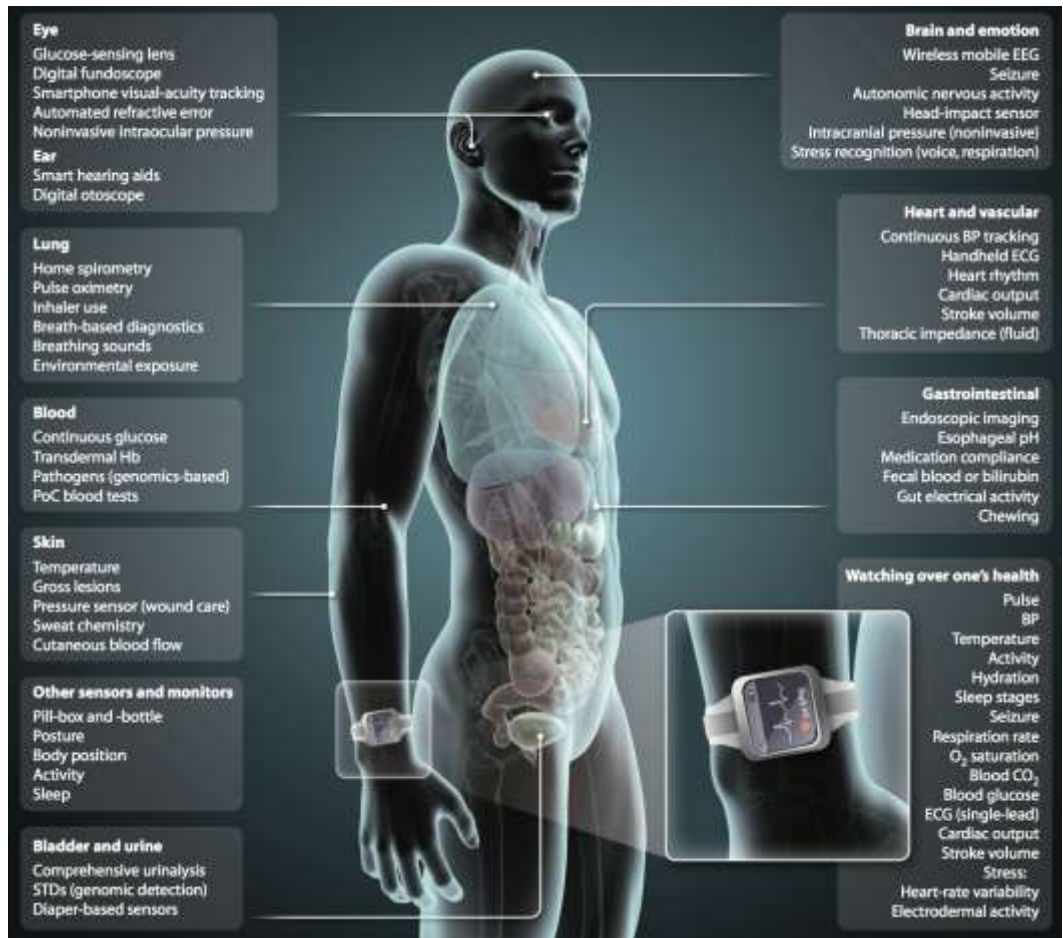
I have already reported quite a number of examples of heart block in rheumatic hearts with mitral stenosis, in which the heart block had acted favorably in preventing the evil influence of fibrillation of the auricle.

A few days ago an illustration of another variety of the same compensating mechanism came under my observation in the person of an elderly man (Mr. L. F. H. F.) whom I saw for the first time in April, 1919, when he was 70 years of age.



**“It is believed that the medical profession will find this bedside telephone a great convenience to themselves for night use, and to some of their patients during convalescence.”**









COMMENT

OPEN



# The new platform of healthcare

E. Ray Dorsey

## Comparison of health care platforms

Characteristic	Clinic-based	Technology-based
Principal measurers of health	Clinicians	Devices
Health measurements	Primarily subjective	Primarily objective
Frequency of measurements	Episodic	Continuous
Location of visits	Artificial like the clinic	Real world including the home
Nature of visits	Primarily synchronous	Synchronous and asynchronous
Clinicians	Few	Many
Limiting factors	Social and geographical	Social and technological
Concerns	Access, quality, and cost	Privacy, equity, and duty

“For the past century, the dominant locations for assessing health and delivering health care have been clinics and hospitals. That is about to change”

# Telehealth company Included Health ventures into home care



By [Mohana Ravindranath](#)  May 16, 2023

Reprints



# Vinod Khosla predicts AI doctors could be here sooner than you think



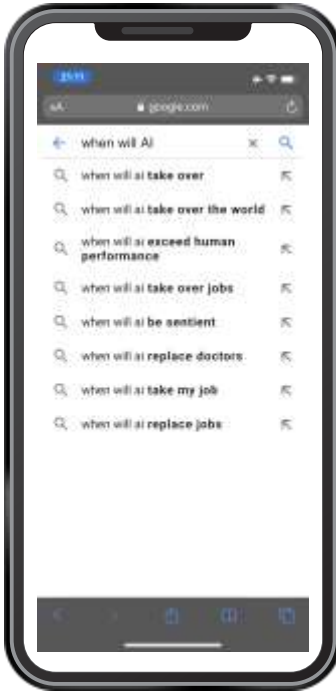
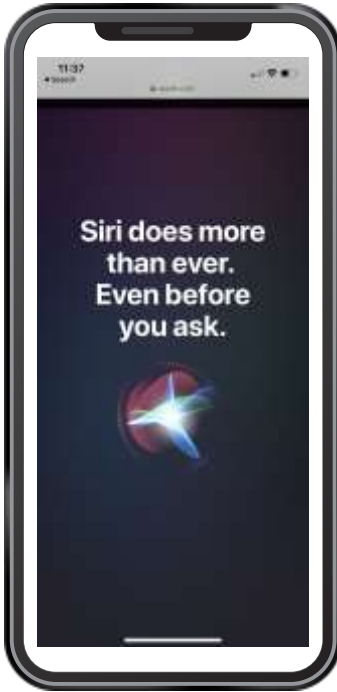
By [Mario Aguilar](#) May 3, 2023

[Reprints](#)



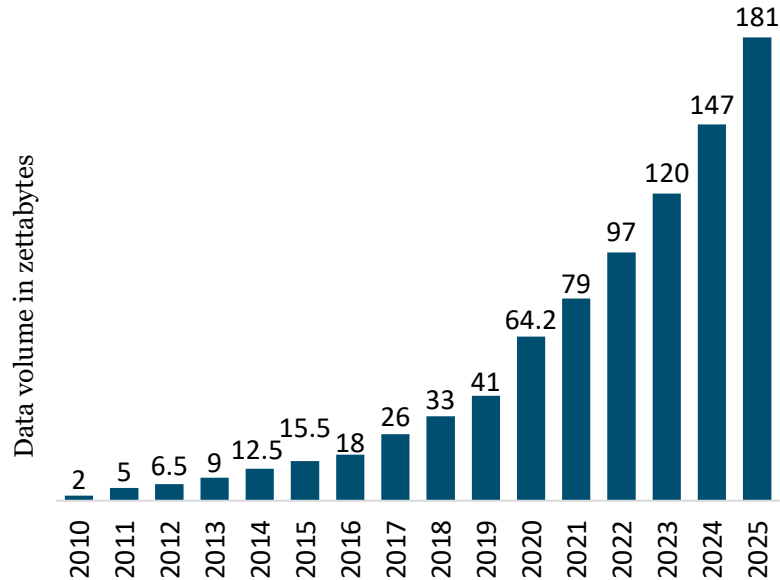
Venture capitalist Vinod Khosla speaks at the 2023 STAT Breakthrough Summit.  
SARAH GONZALEZ FOR STAT

“Within 5 to 6 years, the FDA will approve a primary care app qualified to practice medicine like your primary care physician.”

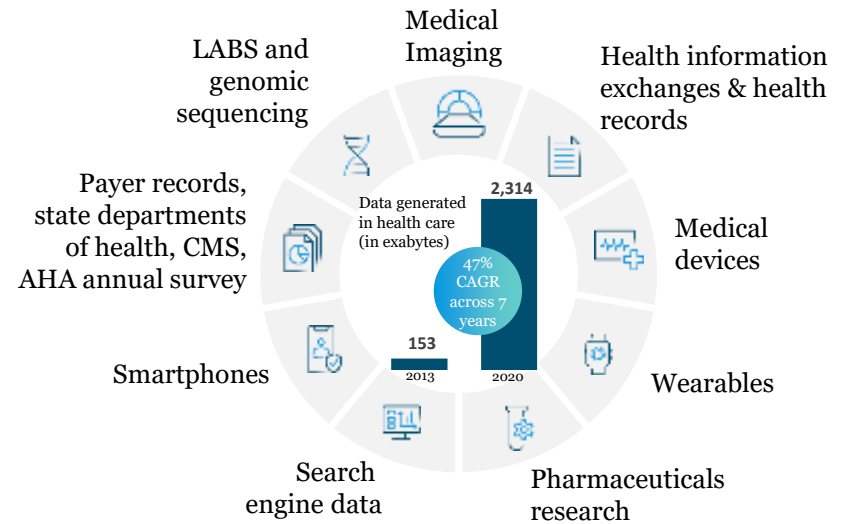


# So much DATA!

Between the years 2010-2025, it is estimated that the total amount of data created in a year will have increased by 8,950%<sup>1</sup>



Where is all the health data coming from?<sup>2</sup>



1. Duarte F. Amount of Data Created Daily. Exploding topic.2024. Available at: <https://explodingtopics.com/blog/data-generated-per-day>; 2. Micron. Big Data is Informing the Health Care Revolution. Infographic based on the Health Trends Reports Stanford Medicine 2017 « Harnessing the Power of Data in Health » Stanford Medicine 2017.

# Transforming Cardiovascular Care With Artificial Intelligence: From Discovery to Practice

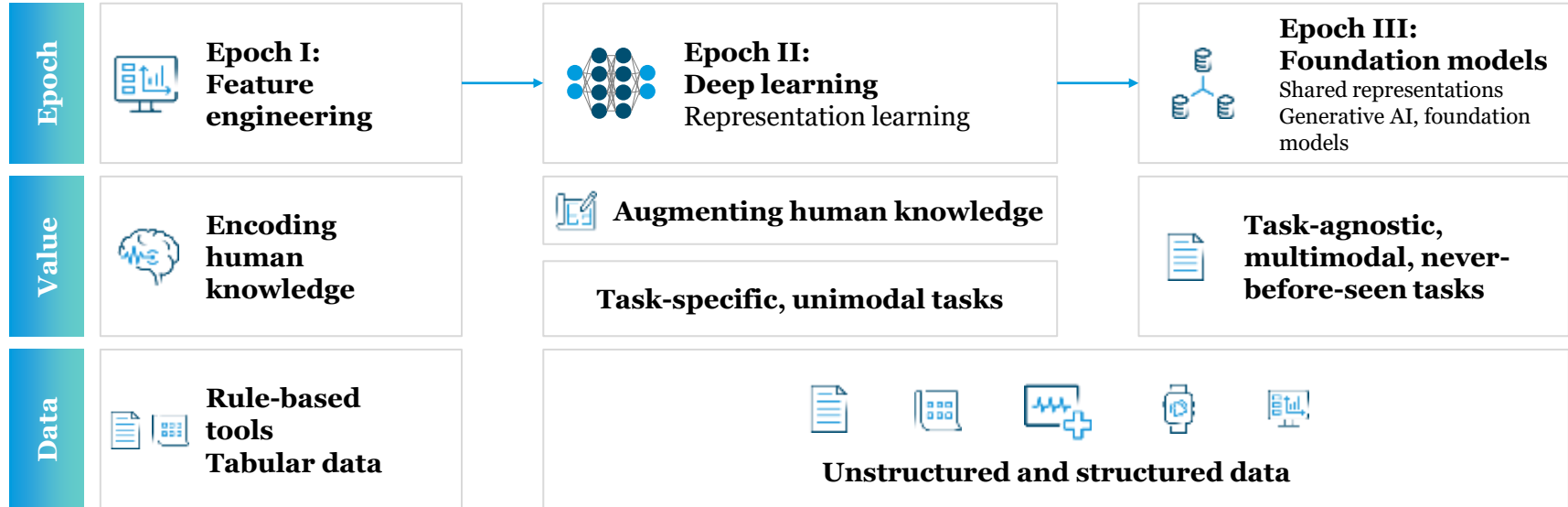
JACC State-of-the-Art Review

Roban Khara, MD, MS,<sup>1,2,3,4</sup> Evangelos K. Oikonomos, MD, DPhI,<sup>2</sup> Girish N. Nadkarni, MD, MPH,<sup>2,3</sup> Jessica R. Morley, PhD,<sup>2</sup> Jenna Wiens, PhD,<sup>5</sup> Atul J. Butta, MD, PhD,<sup>1,2</sup> Eric J. Topol, MD<sup>3</sup>

JAMA | Special Communication | AI IN MEDICINE

# Three Epochs of Artificial Intelligence in Health Care

Michael D. Howell, MD, MPH; Greg S. Corrado, PhD; Karen B. DeSalvo, MD, MPH, MSc



1. Khara R, et al. Transforming Cardiovascular Care With Artificial Intelligence: From Discovery to Practice: JACC State-of-the-Art Review. Journal of the American College of Cardiology. 2024;84(1):97-114. 2. Howell MD, et al. Three Epochs of Artificial Intelligence in Health Care. JAMA. 2024;331(3):242-4.

# Can chatbots handle medical questions better than doctors? UCSD study says yes



John W. Ayers, a UC San Diego computational epidemiologist, led a team that explored using a chatbot to answer routine medical questions. (John Gibbons)

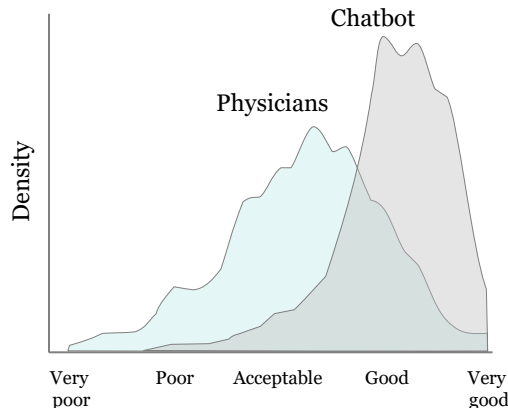
ChatGPT often answered routine questions on Reddit with more empathy than busy human doctors

BY PAUL SIBSON  
APRIL 28, 2023 9:58 AM PT

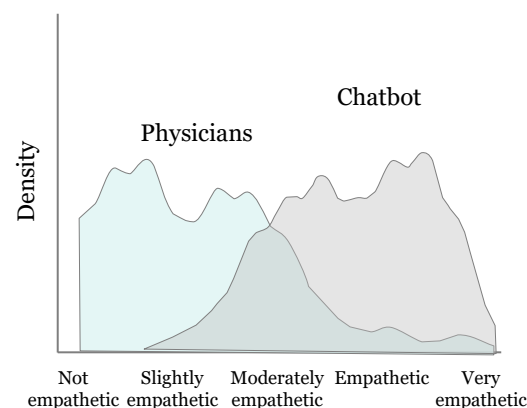
## Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum

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

(A) Quality ratings



(B) Empathy ratings



Response options

Response options

### Distribution of Average Quality and Empathy Ratings for Chatbot and Physician Responses to Patient Questions

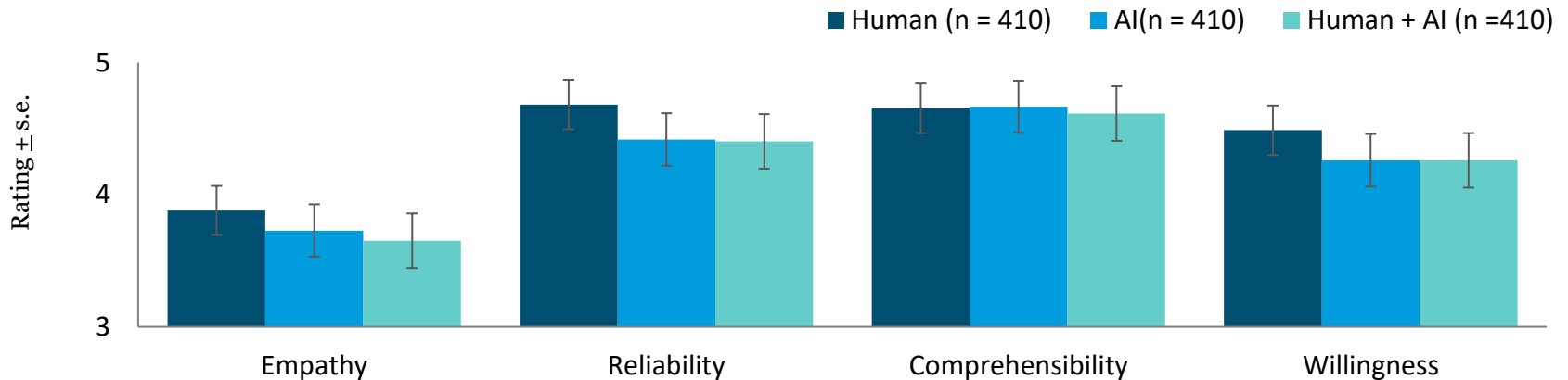
1. Ayers JW. Can chatbots handle medical questions better than doctors? UCSD study says yes. The San Diego Union-Tribune. 2023. Available at: <https://www.sandiegouniontribune.com/2023/04/28/can-chatbots-handle-medical-questions-better-than-doctors-ucsd-study-says-yes/>; 2. Ayers JW, et al. Comparing Physician and Artificial Intelligence Chatbot Responses to Patient Questions Posted to a Public Social Media Forum. JAMA Internal Medicine. 2023;183(6):589-96.

# Influence of believed AI involvement on the perception of digital medical advice

Received: 5 March 2024

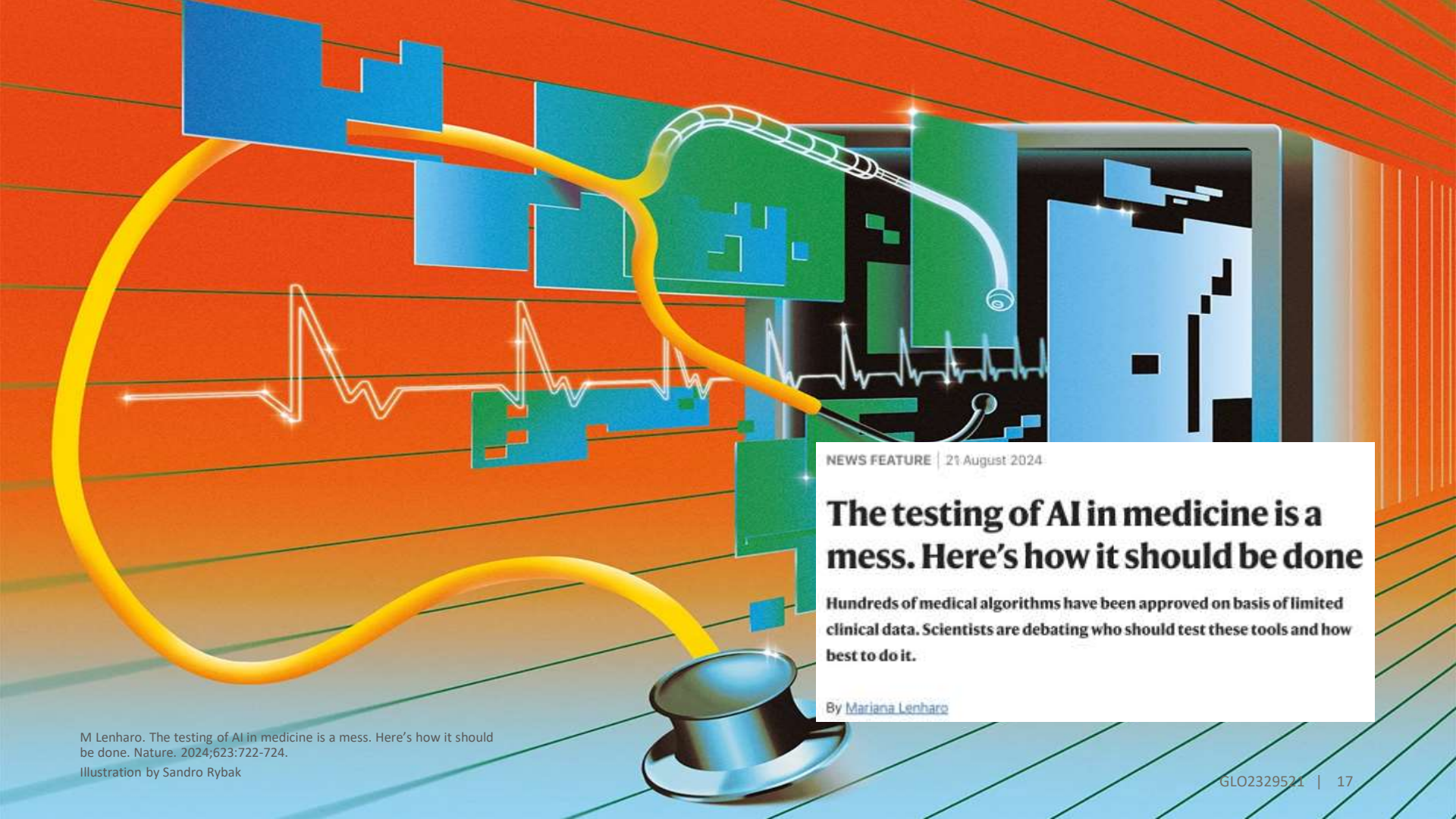
Moritz Reis<sup>1,2,4</sup>, Florian Reis<sup>2,4</sup> & Wilfried Kunde<sup>1</sup>

Accepted: 4 July 2024



Average ratings for each dimension (empathy, reliability, comprehensibility, willingness to follow the advice) and author label (human, AI, human + AI)





NEWS FEATURE | 21 August 2024

## The testing of AI in medicine is a mess. Here's how it should be done

**Hundreds of medical algorithms have been approved on basis of limited clinical data. Scientists are debating who should test these tools and how best to do it.**

By [Mariana Lenharo](#)

M Lenharo. The testing of AI in medicine is a mess. Here's how it should be done. *Nature*. 2024;623:722-724.

Illustration by Sandro Rybak

- Patients expect their clinicians to ensure AI safety

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- Preservation of patient choice and autonomy

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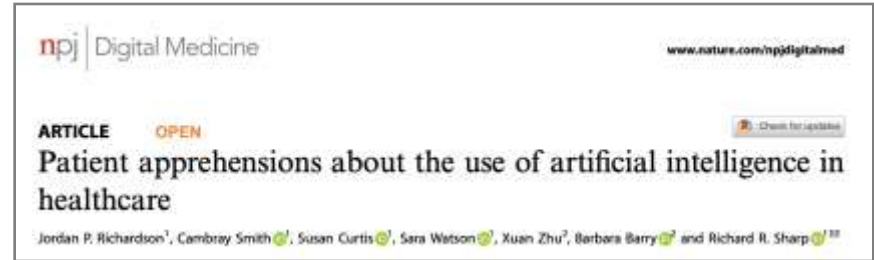
- Concerns about healthcare costs and insurance

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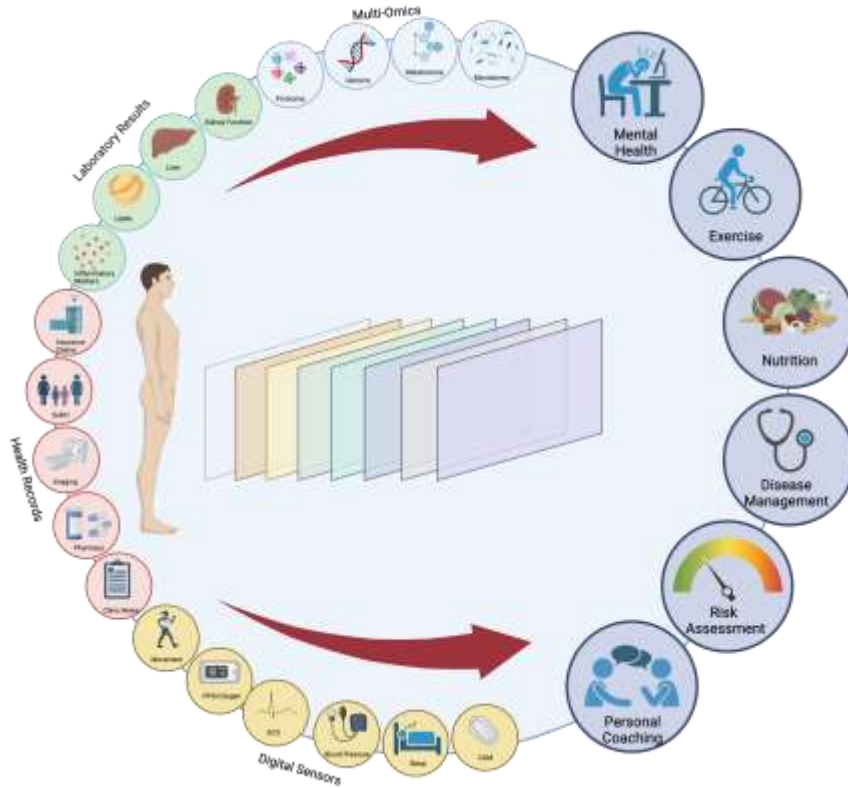
- Ensuring data integrity

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- Risks of technology-dependent systems



**“I feel like the future of AI just depends on how we choose to use it. The impact will be what we choose it to be. ... Because it’s moldable, it’s not going to do anything that we don’t allow it to do.”**



Multi-omics

Precision Labs

Health records  
+  
Imaging

Digital Sensors

## Transforming the cardiometabolic disease landscape: Multimodal AI-powered approaches in prevention and management





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I received funding from the following companies for clinical trials and research studies: Bayer, Novartis, Abbott, AstraZeneca

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# Patient-physician relationship: Foundation

A patient-physician relationship is formed when a physician attends to a patient's medical needs.

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Trust, honesty and effective interpersonal communication are fundamental in a patient-physician relationship

## Physician

“Actually, it’s always about honesty. Knowing that, when patients speak, they tell the exact truth and don’t deceive. That’s an essential factor for me. Another important factor is the patient’s capacity to communicate clearly.”

## Patient

“I think the most important thing for me is that we communicate about everything. To talk. To trust what he tells me.”

# Patient-physician relationship: Threats

**Physicians face overwhelming administrative tasks during a consultation**

## **Physician**

“Honestly, all that typing, printing, and confirming of test results and such, I waste a lot of time on it ... sometimes I forget that, while I’m typing and looking at the screen, I’m not really looking at the patient themselves, and I end up missing information I could gather just by observing them.”

**Patients express dissatisfaction of not receiving enough care and attention from their physician**

## **Patient**

“I’d prefer if the physician didn’t just look at the papers but lifted their head, talked to me, gave me a look, and conducted an examination if needed, which is equally important, because lately, it often seems to be reduced to just paperwork.”



# AI: Potential effect on the patient-physician relationship

AI: “technology that enables computers and machines to simulate human learning, comprehension, problem-solving, decision-making, creativity and autonomy”<sup>1</sup>

## Physician<sup>2</sup>

- Alleviates tedious, repetitive, and manual tasks
- More attentive to our patients and listen to their concerns, helping them navigate their health options for treatment
- Speed up diagnosis and more accurate prognosis for early intervention/treatment and preventive measures

## Patient<sup>2</sup>

- Less certain and more wary of the impact of AI on healthcare
- Perceive reduced wait time
- Expect increase access and reduce overcrowding in healthcare facilities

1. IMB. What is artificial intelligence (AI). Available at: <https://www.ibm.com/topics/artificial-intelligence> (consulted on August 30, 2024) ; 2. Čartolovni A, et al. Critical analysis of the AI impact on the patient-physician relationship: A multi-stakeholder qualitative study. DIGITAL HEALTH 2023;9:1-14.

# What are the perceived shortcomings of AI?

## Physician

- Fear of alienation and reduced interaction between patients and physicians
- De-skill in observations and recognizing emotions in humans

## Patient

- AI cannot provide emotional support or empathy to them
- Perceived loss of human touch.
- Concern that AI could reduce communication and connection

“What I absolutely dislike is losing this contact with patients, and I believe we must fight against it, no matter how accurate any system might be.”

“Well, probably, the relationship with the physician on a personal level will become less frequent. Currently, many patients can connect with a physician and develop a personal approach over time... I think that will be less and less, you know, colder.”

# Paradox of the expectations of AI

**Help improve the physician's efficiency ...**

**BUT**

It may erode the empathic and compassionate nature of the relationship between patients and physicians as a result of increased numbers of patient consultations each day due to the physician's increased efficiency



# Intelligent application of AI

- No evidence that delegation of certain tasks to AI would result in AI replacing physicians, nor the physicians' role being threatened, because their role is not only to provide a diagnosis but to fully engage with the patients, offering consolation, consultations and more. <sup>1</sup>
- AI-based tools have the potential to place the patient at the center of the caring process, safeguarding the patients' autonomy and assisting them in making informed decisions that align with their values. <sup>2</sup>

1. Sezgin E. Artificial intelligence in healthcare: complementing, not replacing, doctors and healthcare providers. Digit Health 2023. 2. Quinn TP, et al. Trust and medical AI: the challenges we face and the expertise needed to overcome them. J Am Med Inform Assoc 2021; 28: 890–894.



# Explain AI-enabled medical decision making is crucial

Physicians should retain ultimate responsibility in medical decision making with their patients even if they are leveraging on AI-enabled tools

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Clear explanation on how a particular decision has been made is the first step in building a trusting relationship between the physician, patient and AI

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The lack of explainability might be problematic for physicians to take responsibility for decisions involving AI systems

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The ability of a human expert to explain and reverse-engineer AI decision-making processes is still necessary

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Physician should be equipped with enhanced communication skills to explain to patients the outputs of AI-based tools that might influence their care

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Upskilling of physicians in AI is pivotal to maintain their role and responsibility as a care provider to their patients



# Mitigating risks and preserving the patient-physician relationship

‘AI-driven infodemic’: potential creation of vast number of scientific articles, fake news, and misinformative content.

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Physicians should neither uncritically accept nor unreasonably resist developments in AI but must actively engage and contribute to the discourse.

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Not to rely solely upon the AI recommendations and neglect clinical reasoning and physicians’ knowledge of best clinical practices.

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Adopt a critical awareness approach to AI implementation in healthcare by applying critical thinking and reasoning.

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The core values of the existing patient–physician relationship, such as trust and honesty, conveyed through open and sincere communication must be preserved.



# AI application in primary care: BRILLIANT study

**B**etter **R**isk percept**I**on via patient sim**L**arity to contro**L** hyperglycem**I**a **A**nd sustai**N**ed by **T**elemonitoring (BRILLIANT RCT)

- PERDICT.AI – An AI-enabled software created from EMR data using Machine Learning, comprising three modules
  - Patient similarity
  - Medication Recommendation
  - Personalized Care Plan
- Tool to counsel adults with type-2 diabetes mellitus to optimize their glyceimic control
- Three-arm randomized controlled trial
- Highlights: Explainable AI, Shared Decision Making, Personalized Care, Patient-Physician Relationship



**Abbott**