AI On Call: Transforming Clinical Workflows with Generative Intelligence

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Learning Objective:

Understand the core functionalities and real-world applications of large language models (LLMs) in clinical settings, including ambient listening, generative documentation, and patient communication tools.

How does the use of AI change the provider/patient interaction

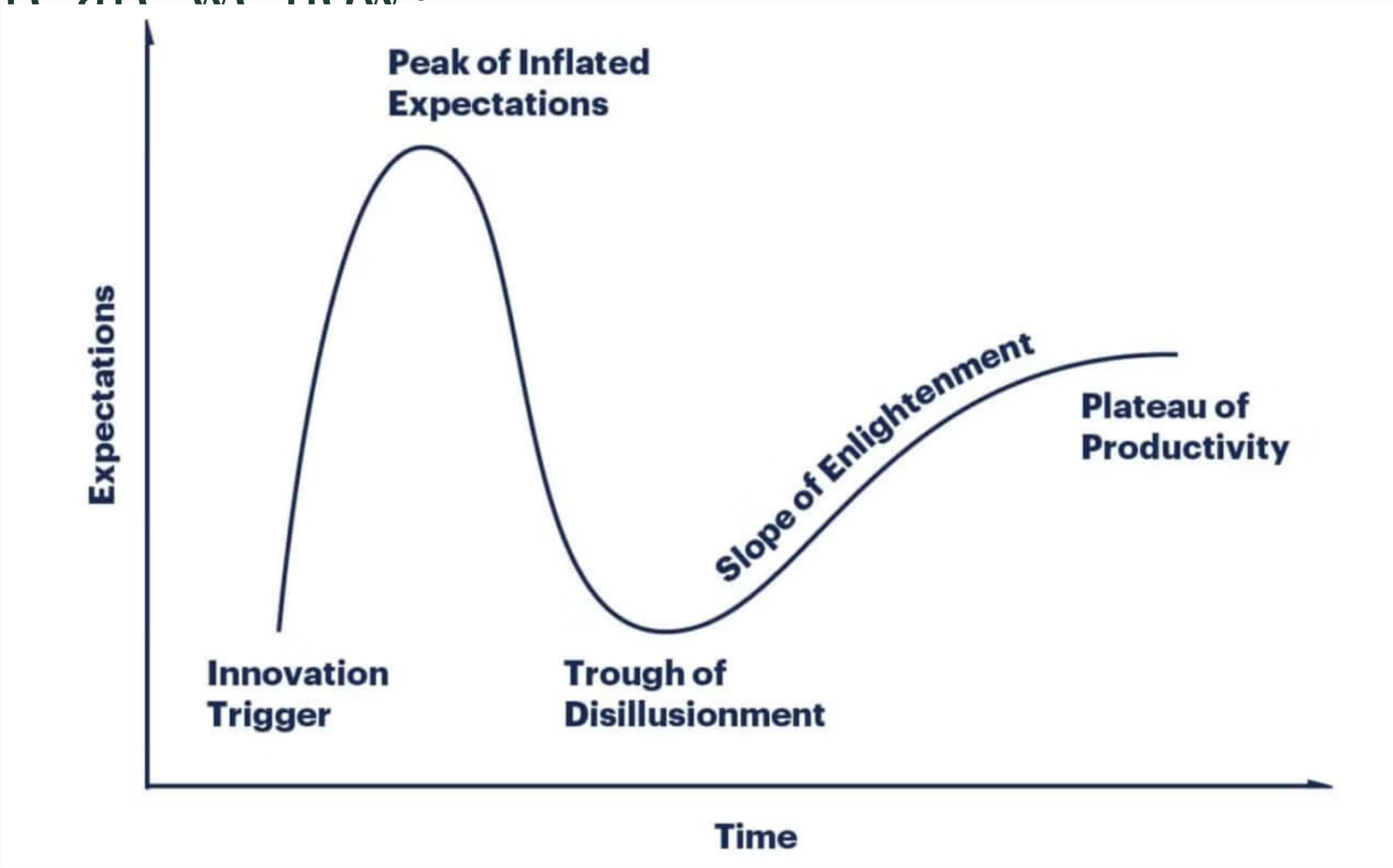
How does the use of AI change the thought processes behind medical decision making

The Future Predicted

Dr. William Schwartz, in an article entitled “Medicine and the Computer — The Promise and Problems of Change” in 1970:

He speculated that in the future, computers and physicians would engage “in frequent dialogue, the computer continuously taking note of the history, physical findings, laboratory data, and the like, alerting the physician to the most probable diagnosis and suggesting the appropriate, safest course of action.”

Artificial Intelligence: Where are we now?



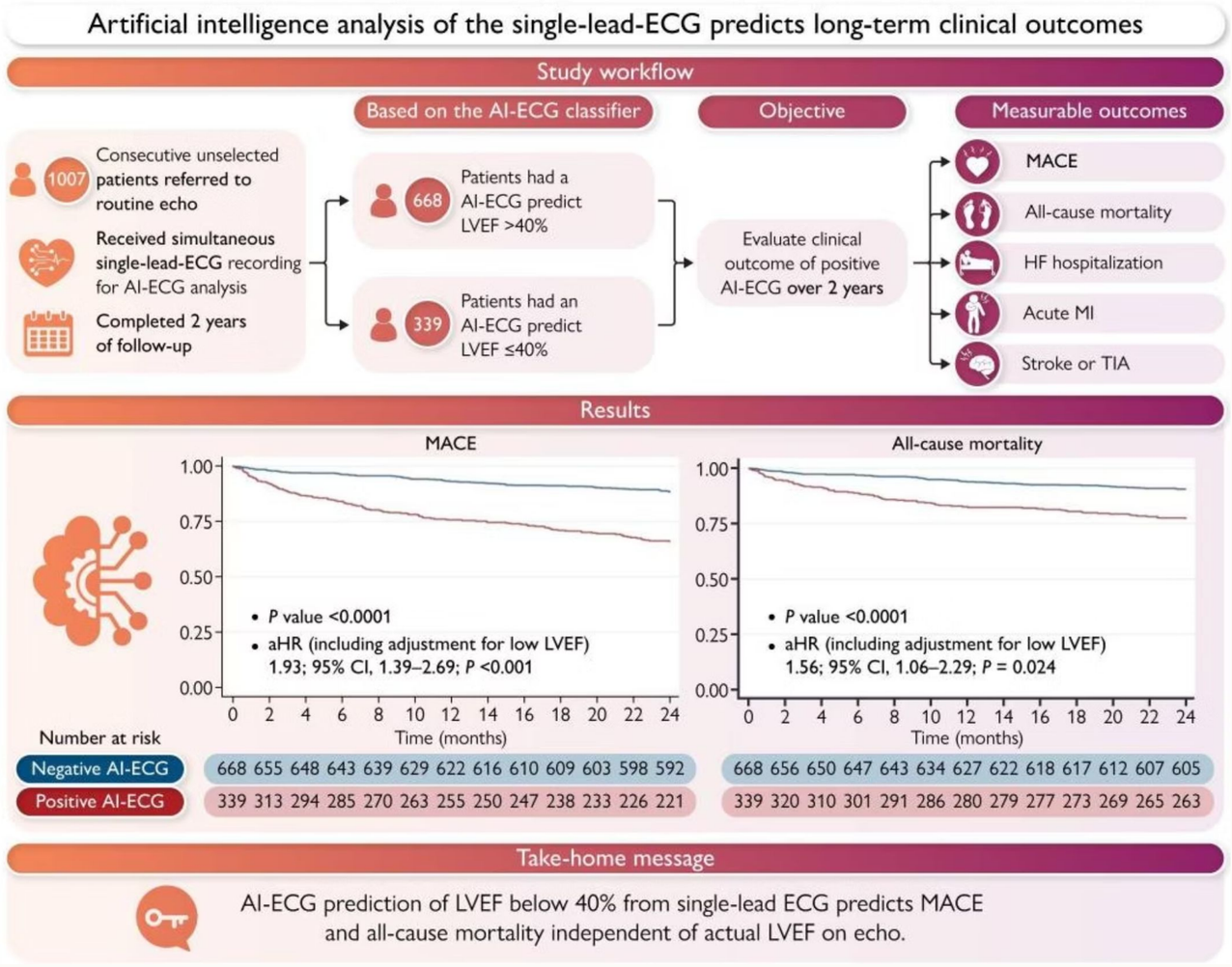
"Wait, It Can

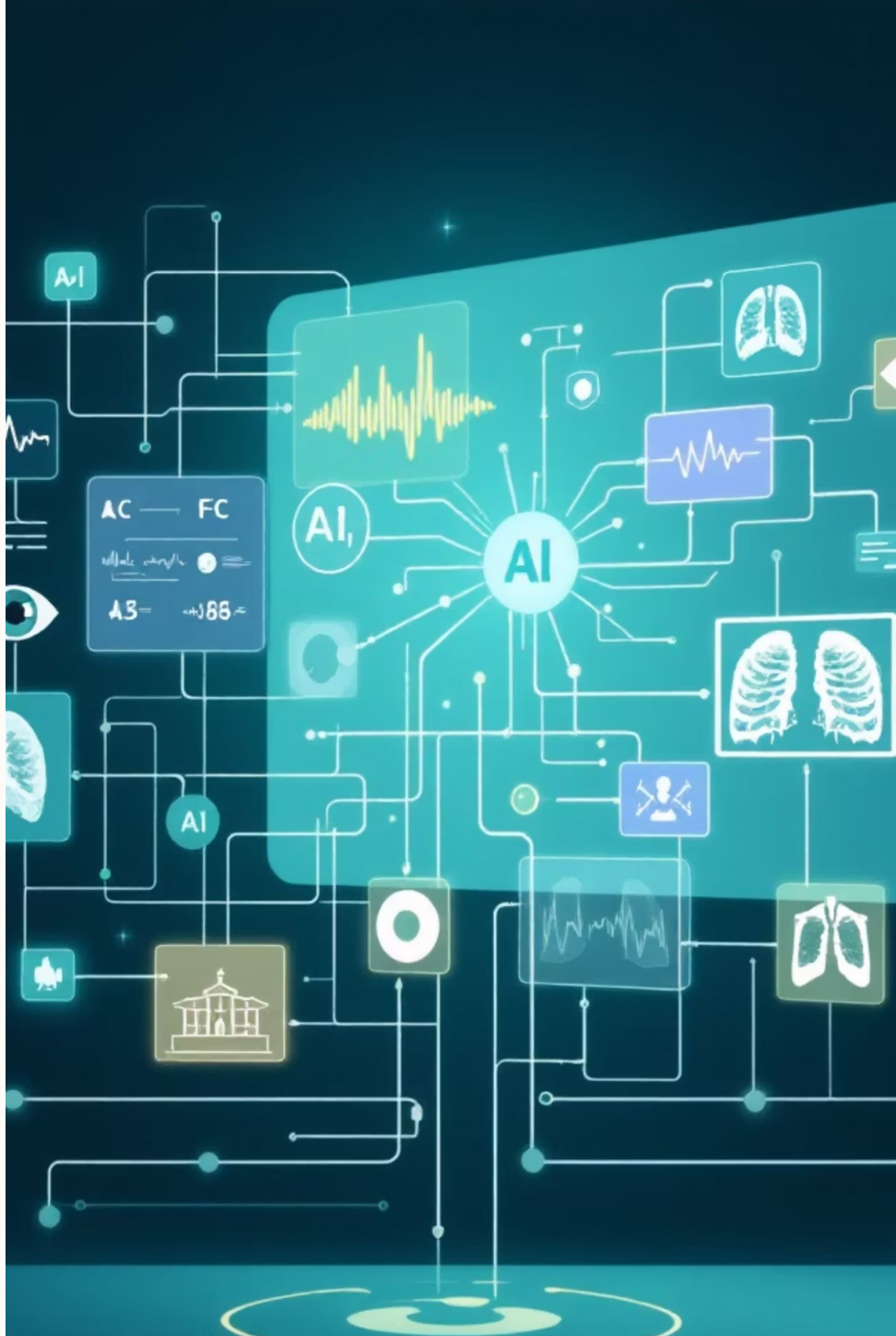
ECG Analysis

AI algorithms identify patients at risk of major adverse cardiac events from single-lead ECG recordings, independent of actual LVEF on echocardiogram

Source: European Heart Journal

Beyond Left Ventricular Ejection Fraction (LVEF)



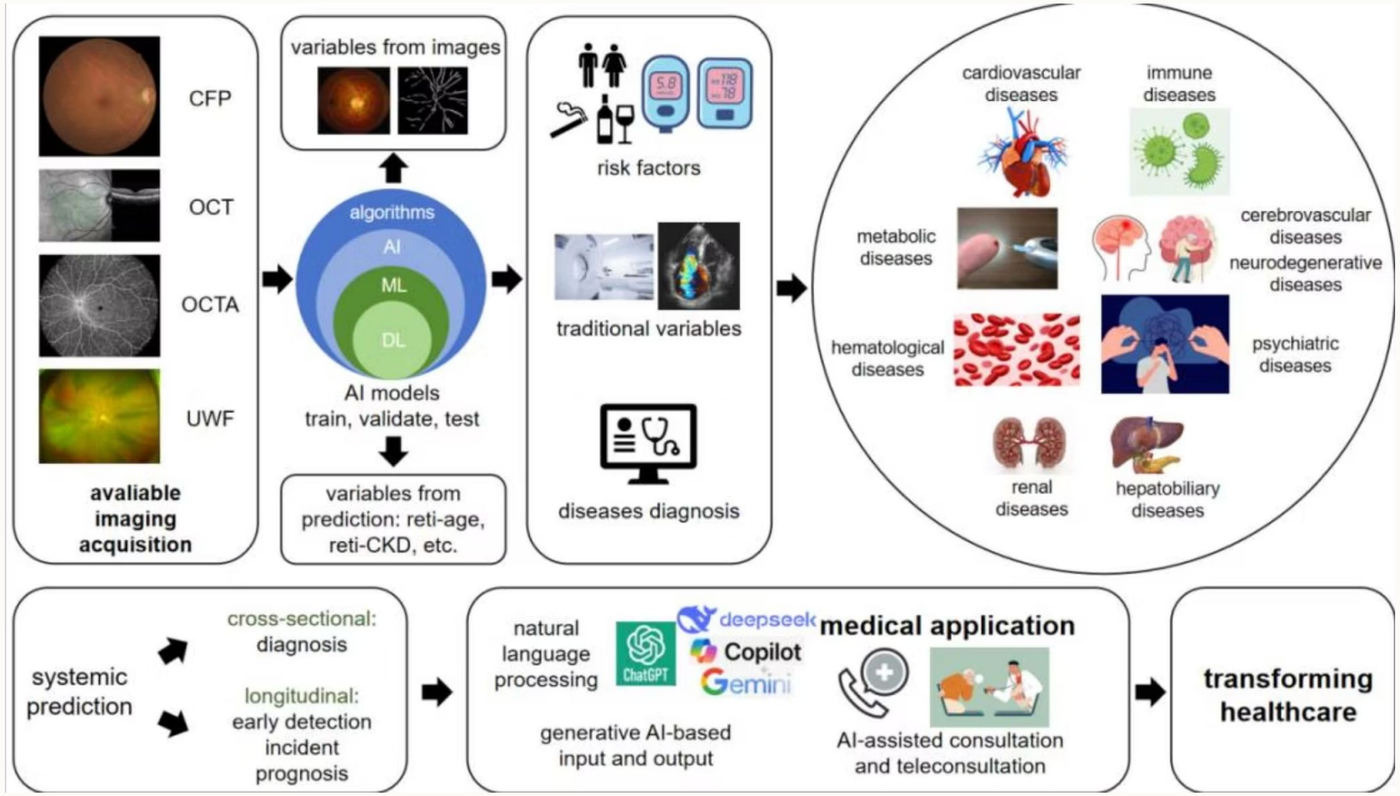


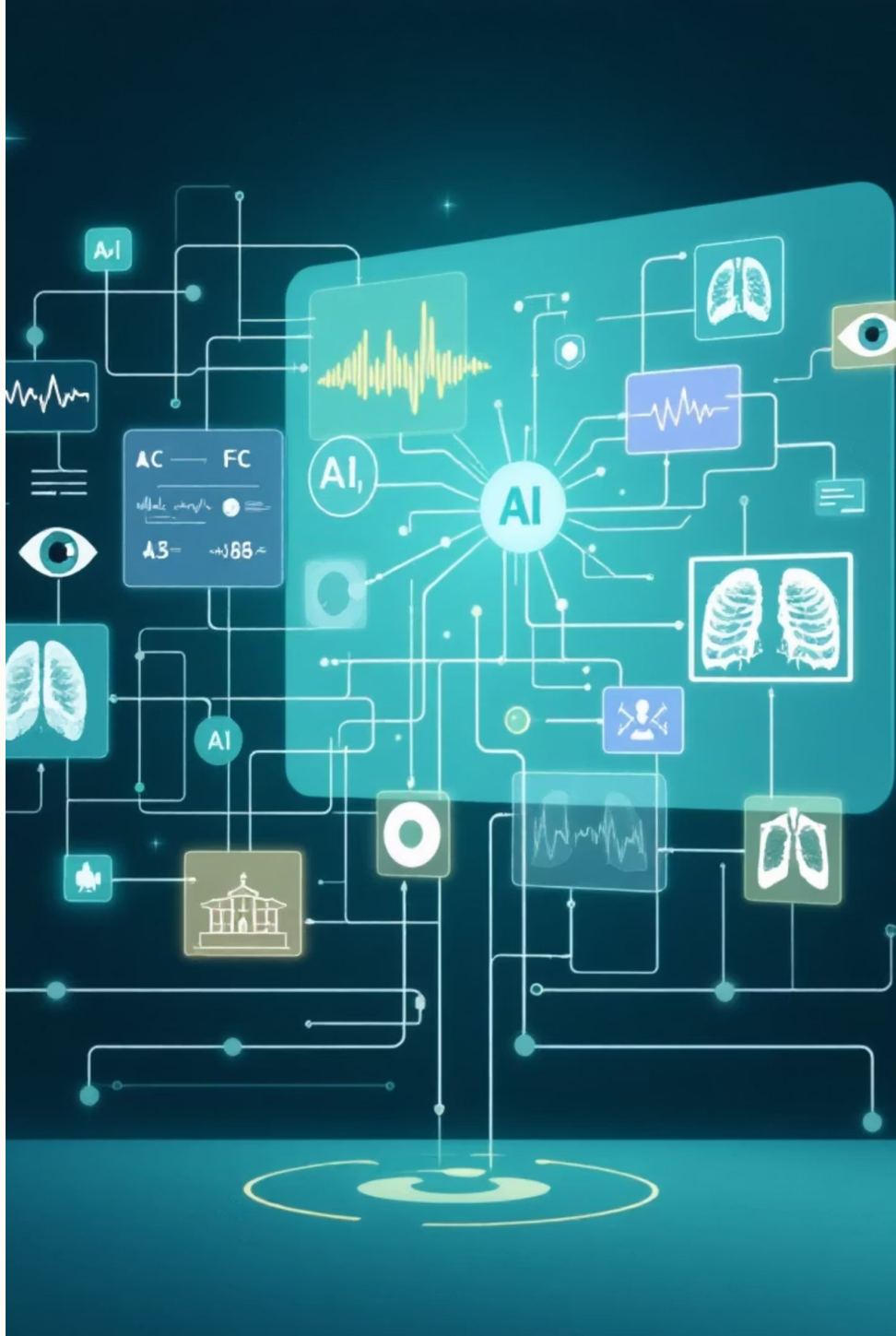
"Wait, It Can Do

Retinal Diagnostics

AI analysis of standard retinal photos can detect metabolic disease, anemia, and liver conditions with high sensitivity

Source: Theranostics Journal



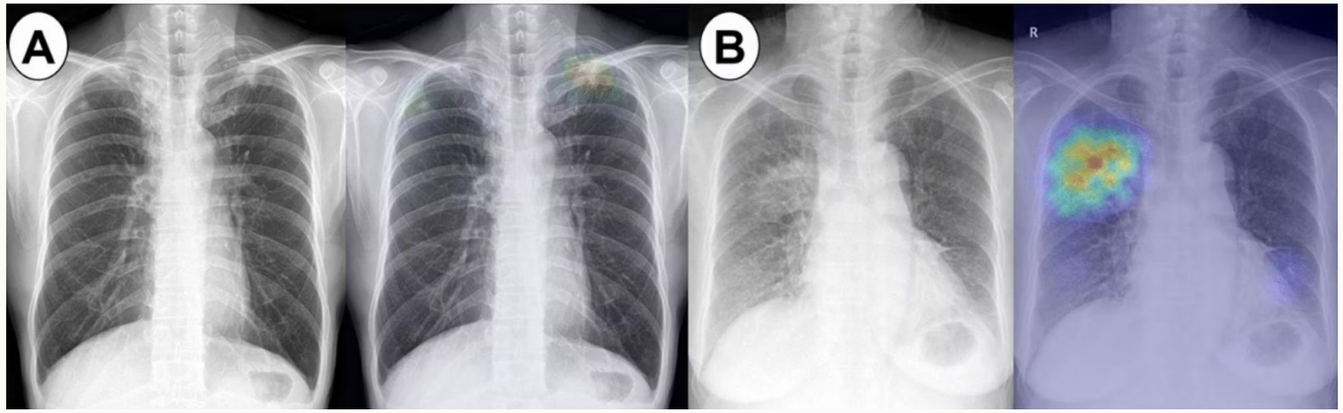


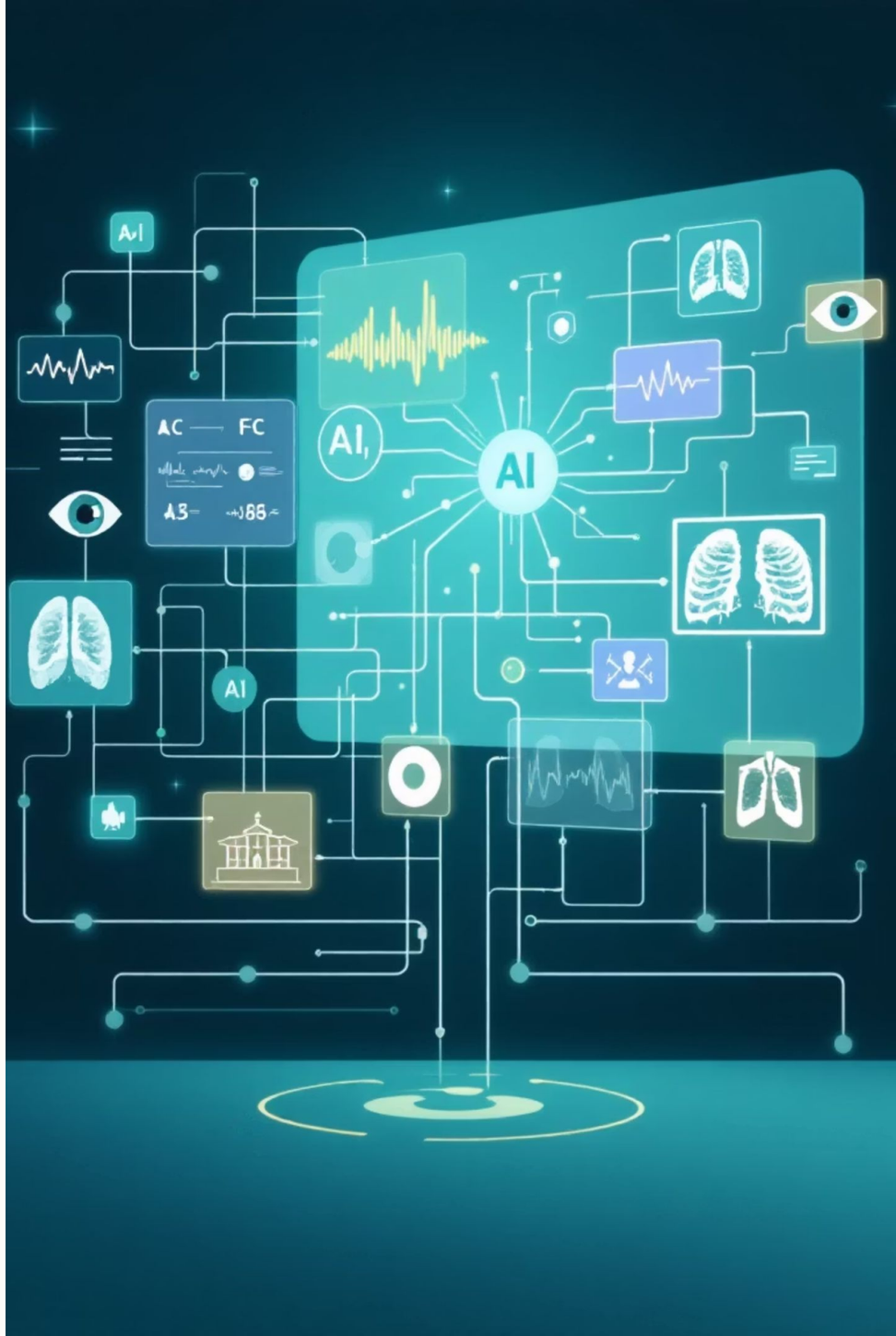
"Wait, It Can Do That?"

TB Treatment Response Prediction

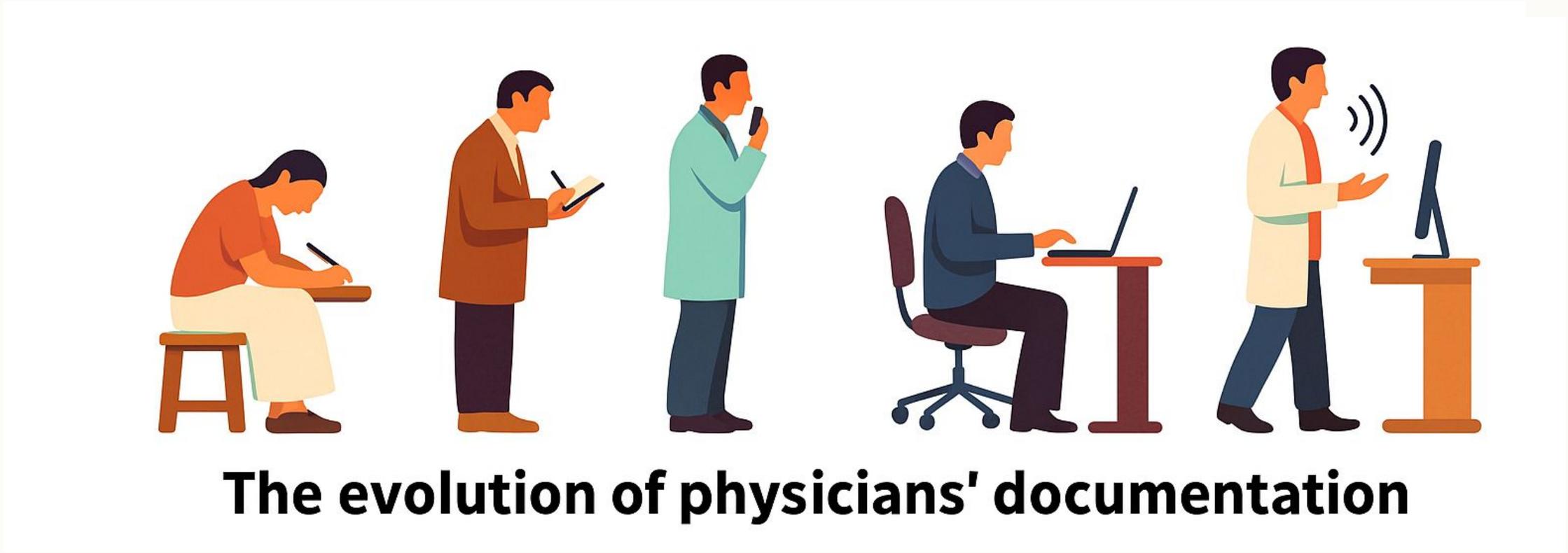
AI assessment of chest X-rays at time of TB diagnosis can predict treatment response trajectory with 85% accuracy

Source: Nature Scientific Results



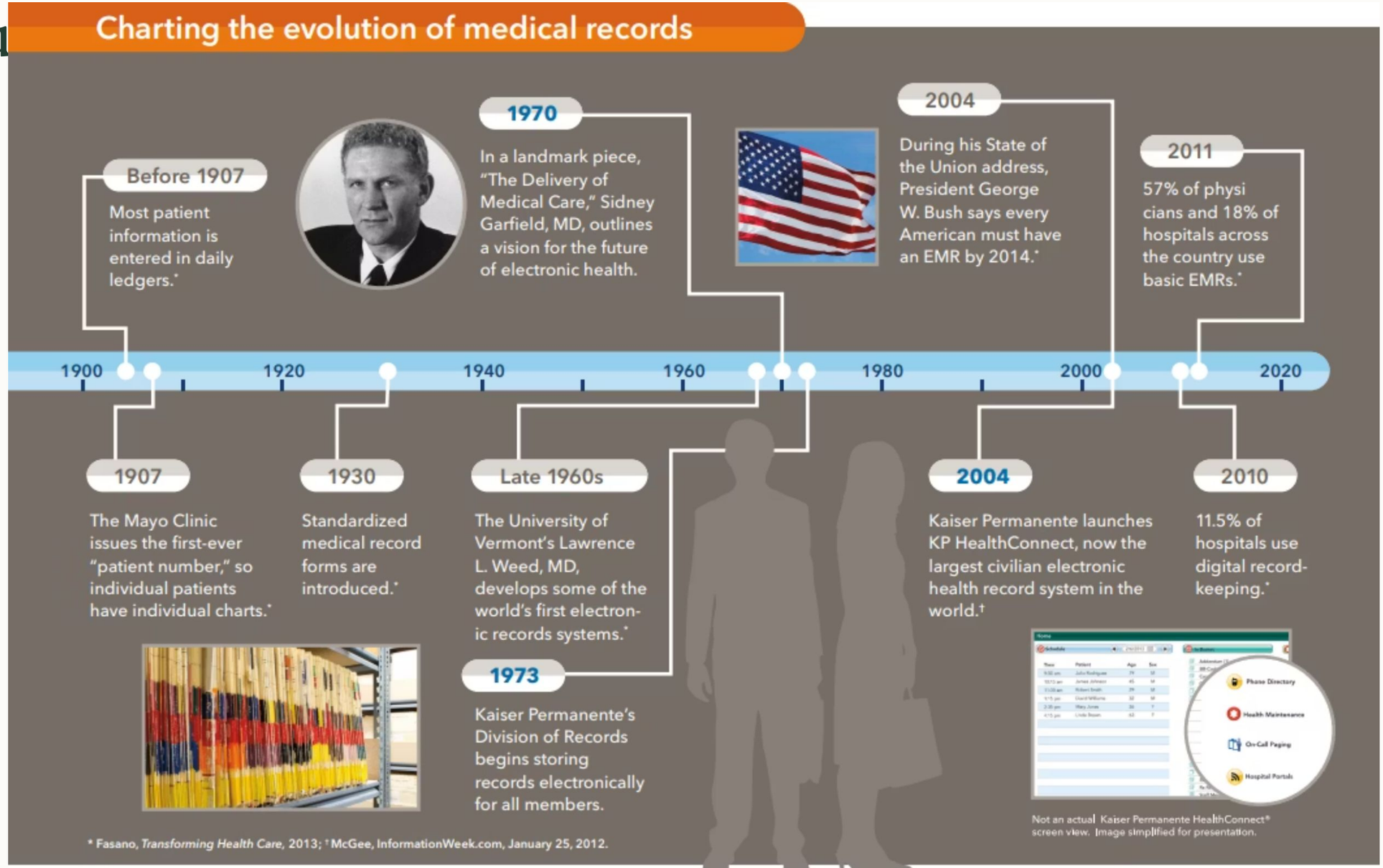


The Evolution of Clinical Documentation



Source: Open AI

The Evolution of Clinical Docu



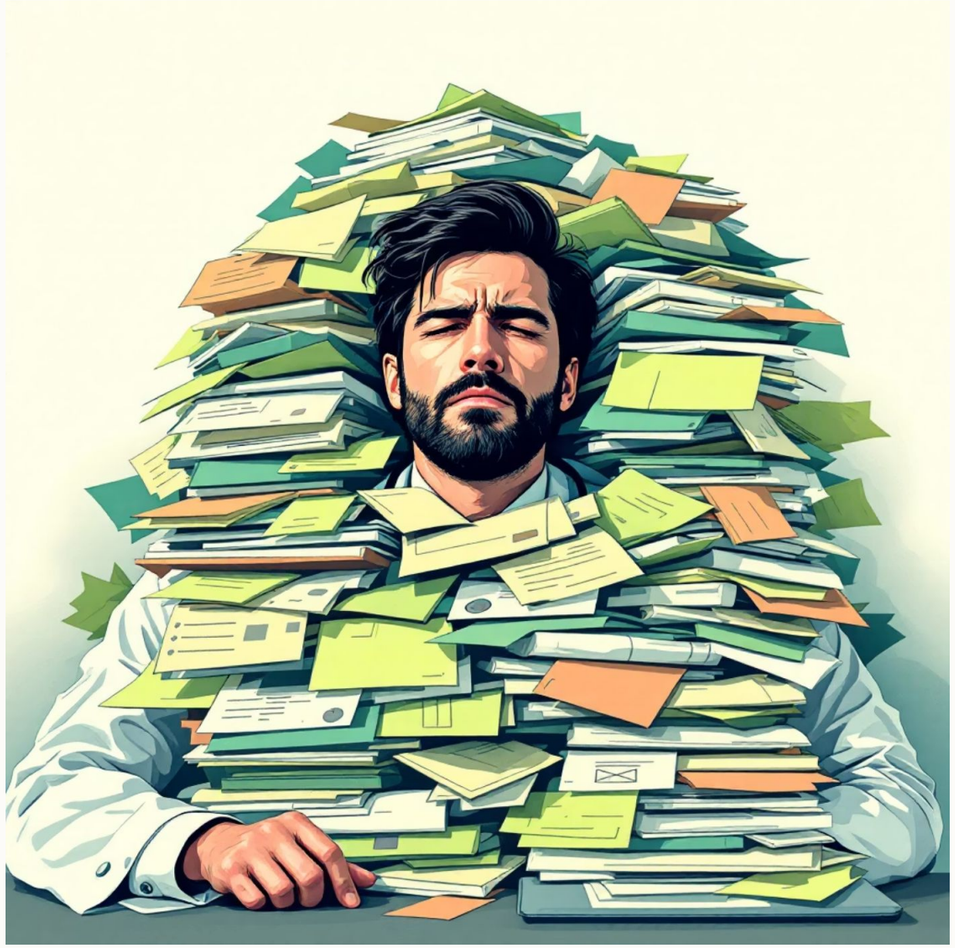
Kaiser Permanente | Making Sense of Health Information Systems

Patients Over Paperwork

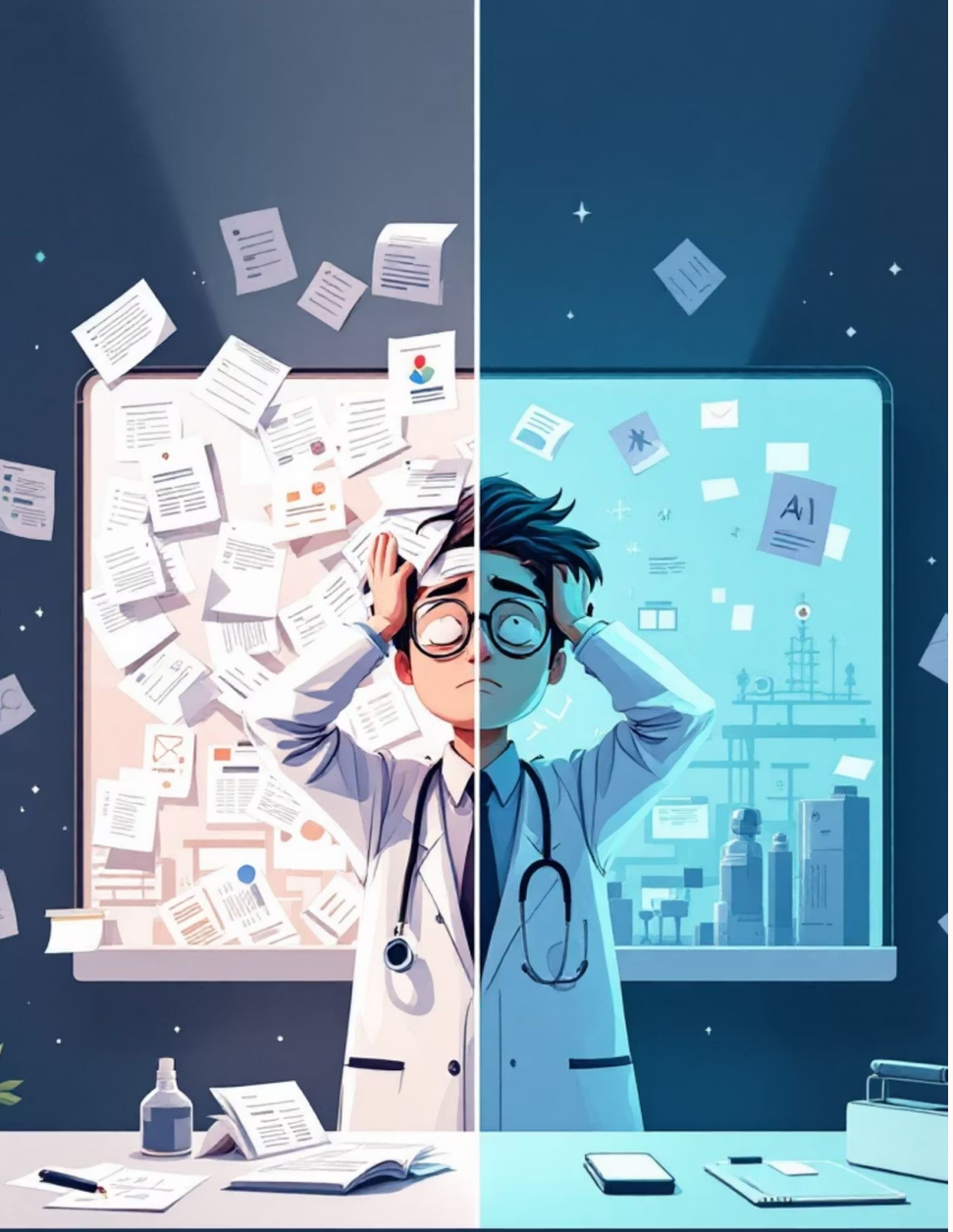
The American Medical Informatics Association (AMIA) conducted a survey of health care professionals earlier this year to capture their perceptions about documentation burden.

Survey findings

- 75% of physicians said they had not seen a noticeable recent decrease in the time or effort it takes them to complete documentation tasks,
- 83% said they did not believe the amount of time and effort they spent documenting patient care was appropriate,
- 84% said they finish work later than desired or have to do additional work at home because of excessive documentation tasks,
- 81% said the time and effort required to complete documentation tasks impedes patient care
- 22% said they found it easy to document patient care using their EHR.



AMIA 25x5
Reducing Documentation Burden



From Promise to Reality

How does Artificial Intelligence affect care for frontline clinicians?
Will it solve all our problems?

Burnout

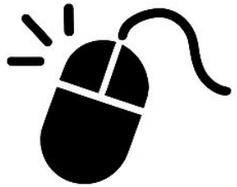
Pajama Time

Documentation

Administrative Burden

Cognitive Overload

Note Bloat



Click Fatigue

Efficiency

Source: Open AI

How Ambient Listening Works

Capture

Record the clinical encounter with patient consent

Process

AI converts speech to text, identifies medical concepts, and can extract structured data

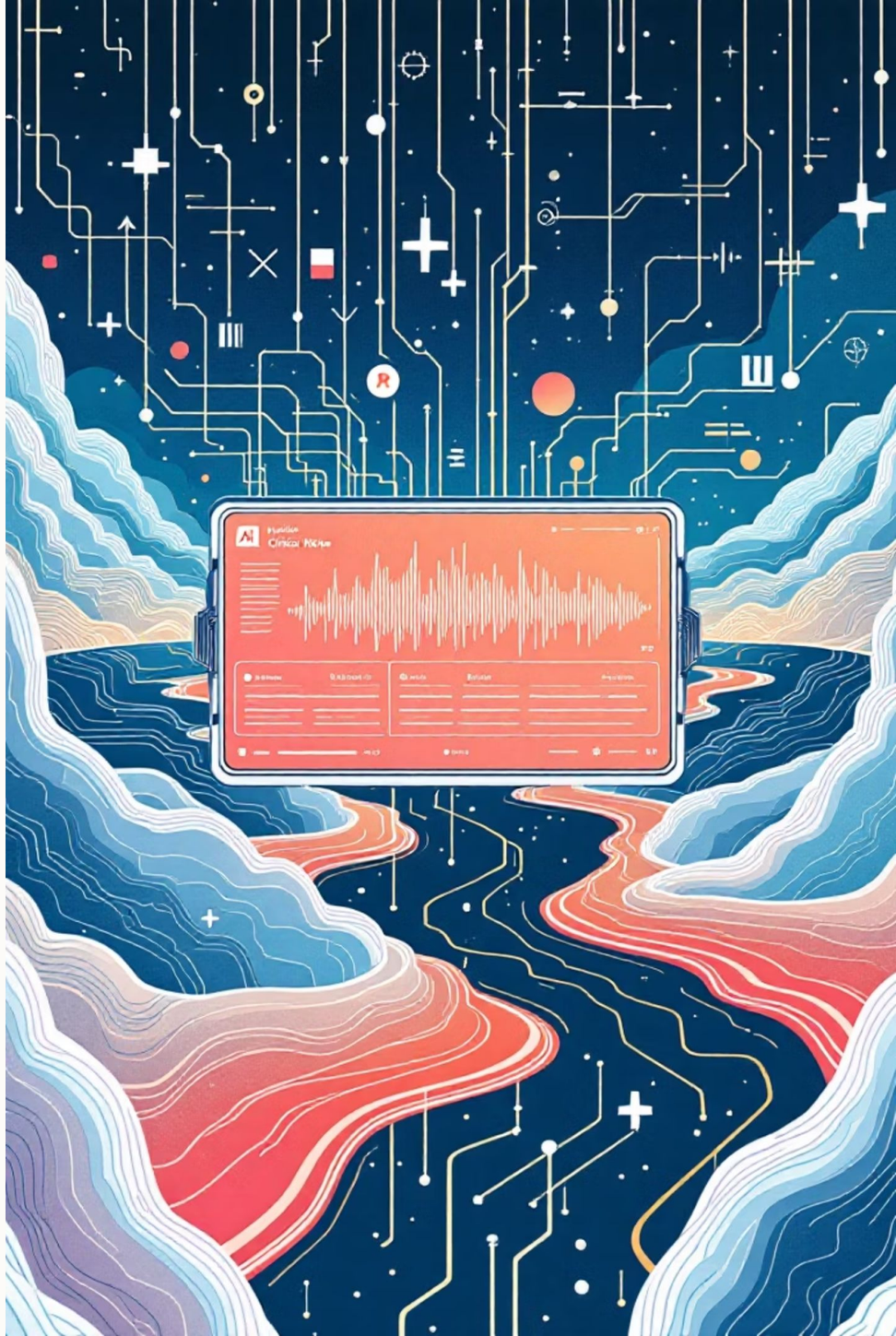
Generate

Creates draft note in provider's style with proper formatting

Review

Provider reviews, edits, and approves the AI-generated documentation

Technical Considerations: Enterprise solutions require integration with existing EHR systems, proper data governance, and comprehensive security protocols for protected health information.



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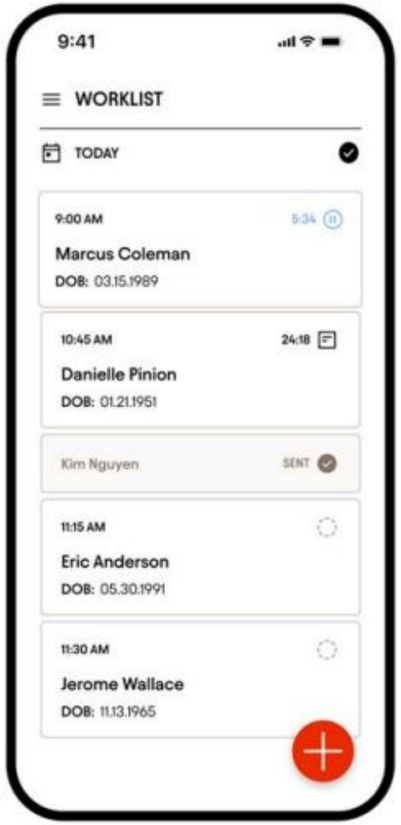
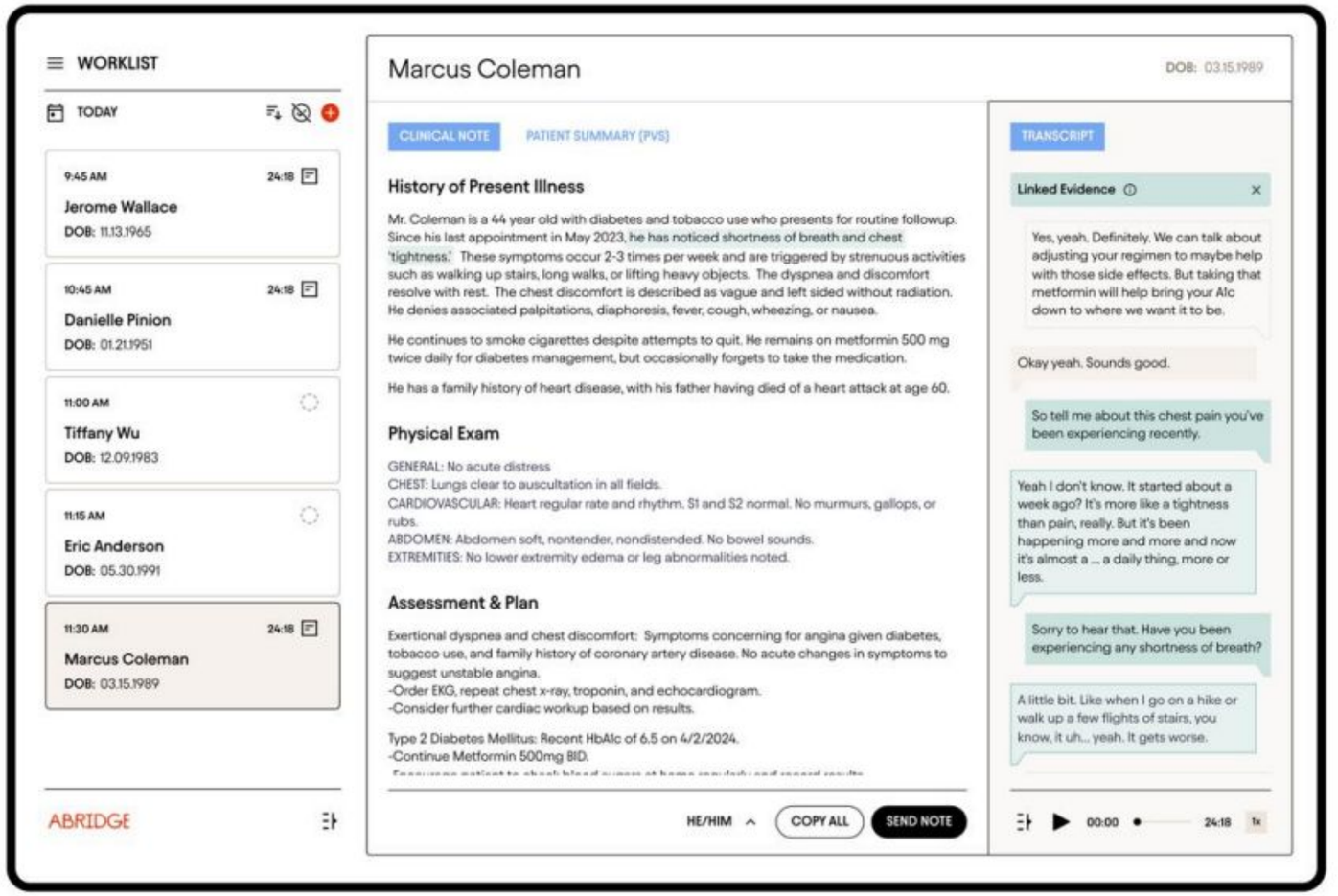




STEP 1

Select a patient from a schedule within the Abridge App.

STEP 2

Record the patient encounter. A draft note will be created with an associated transcript and audio.

STEP 3

Review the draft note. Use Linked Evidence to map any part of the summary to the source audio/transcript. Send the note directly to the EHR by clicking “Send Note.”

STEP 4

Parts of the edited note are pulled into the EHR using dot phrases. For example, .hpisec will pull the HPI section into the EHR note.

Nabla

Demo using Nabla

Ambient Listening: The Clinical Impact

Provider Burnout

Study at Mass General Brigham and Emory Healthcare looking at use of ambient documentation technology and reported burnout as measured by the Professional Fulfillment Index.

50.6%

Baseline

Providers reporting Burnout

29.4%

Day 42

Providers reporting Burnout

1.6%

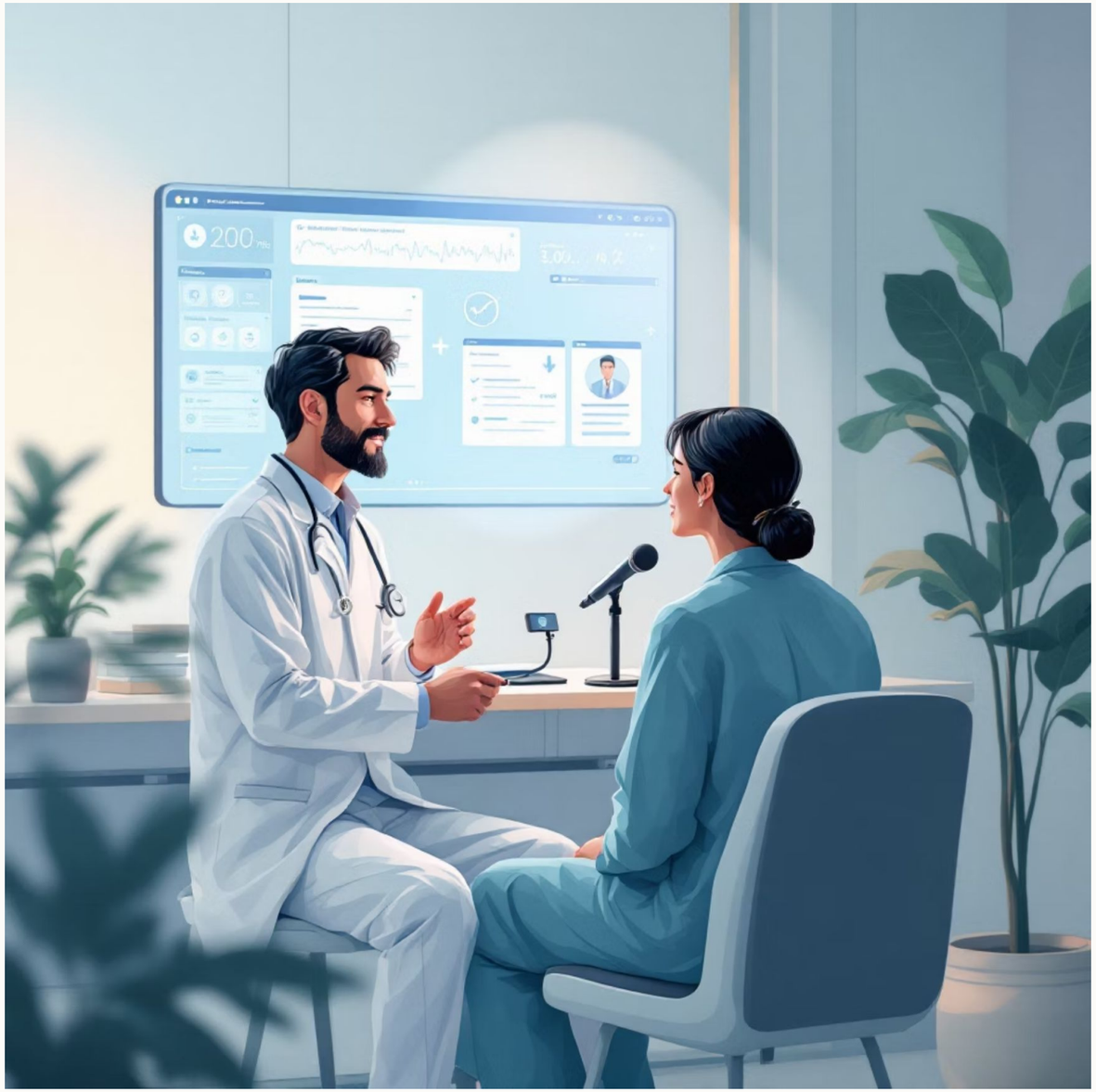
Baseline

Providers reporting positive impact on documentation

32.3%

Day 84

Providers reporting positive impact on documentation



Limitations: Low response rate (30% at day 42 and 22% at day 84) could represent responses from more enthusiastic users. Only surveyed at baseline to day 84—does not study sustained reduction in reported burnout

Source: Ambient Documentation Technology in Clinician Experience of Documentation Burden and Burnout | Health Policy | JAMA Network Open | JAMA Network

Ambient Listening: The Clinical Impact

Time Spent in documentation

Study at Providence Health Systems using 24 Family Medicine providers using a step wedge design.

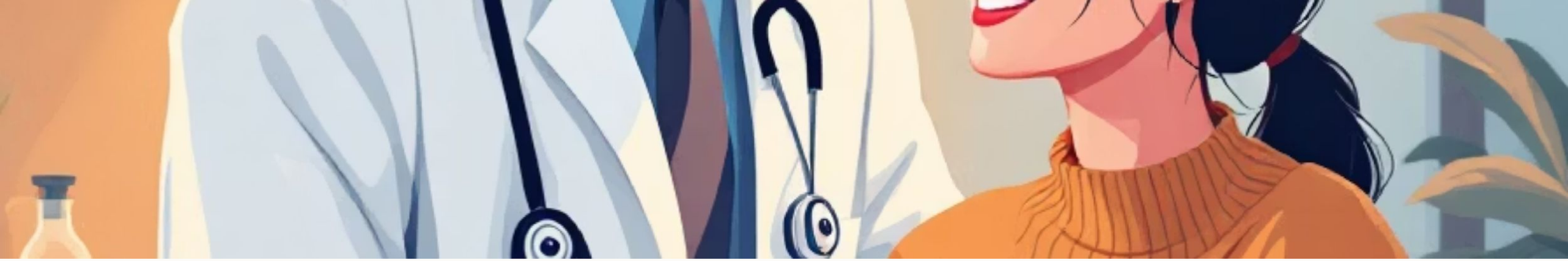
Table 1
Provider-reported experience survey.

Agreement with the statement	Prior to DAX® implementation N=63		After DAX® implementation N=71		Logistic regression (clustered by provider)		
	%	95% CI	%	95% CI	RR	95% CI	p-value
I felt burned out from my work	57.1%	(44.7–68.7)	26.8%	(17.8–38.2)	0.5	(0.3–0.9)	<0.01
I felt frustrated with the patient visit documentation process	88.9%	(78.5–94.6)	39.4%	(28.8–51.2)	0.4	(0.3–0.6)	<0.001
I felt I was not able to connect with my patients during their visit	23.8%	(14.9–35.8)	4.2%	(1.4–12.3)	0.3	(0.1–0.7)	<0.001
I spent too much time documenting patient encounters	96.8%	(88.2–99.2)	45.1%	(34.0–56.7)	0.4	(0.3–0.5)	<0.001

Provider surveys from both groups were treated as one sample for analysis. The Late Implementation group only had pre-DAX-usage data because they did not use DAX during the study, while the Early Implementation group only had one pre-DAX-usage survey before they started use.

Limitations: Small number of providers (24) and limited study duration.

Source: Deploying ambient clinical intelligence to improve care: A research article assessing the impact of nuance DAX on documentation burden and burnout



Ambient Listening: The Clinical

Improved Workflow

Clinicians reported a significantly improved perception of the ease of documentation workflow and note completion.

Reduced Burden & Burnout

The AI tool decreased documentation burden, reduced time spent documenting outside clinical hours, and lowered burnout risk.

Increased Satisfaction

Providers experienced increased job satisfaction, indicating a more positive work environment.

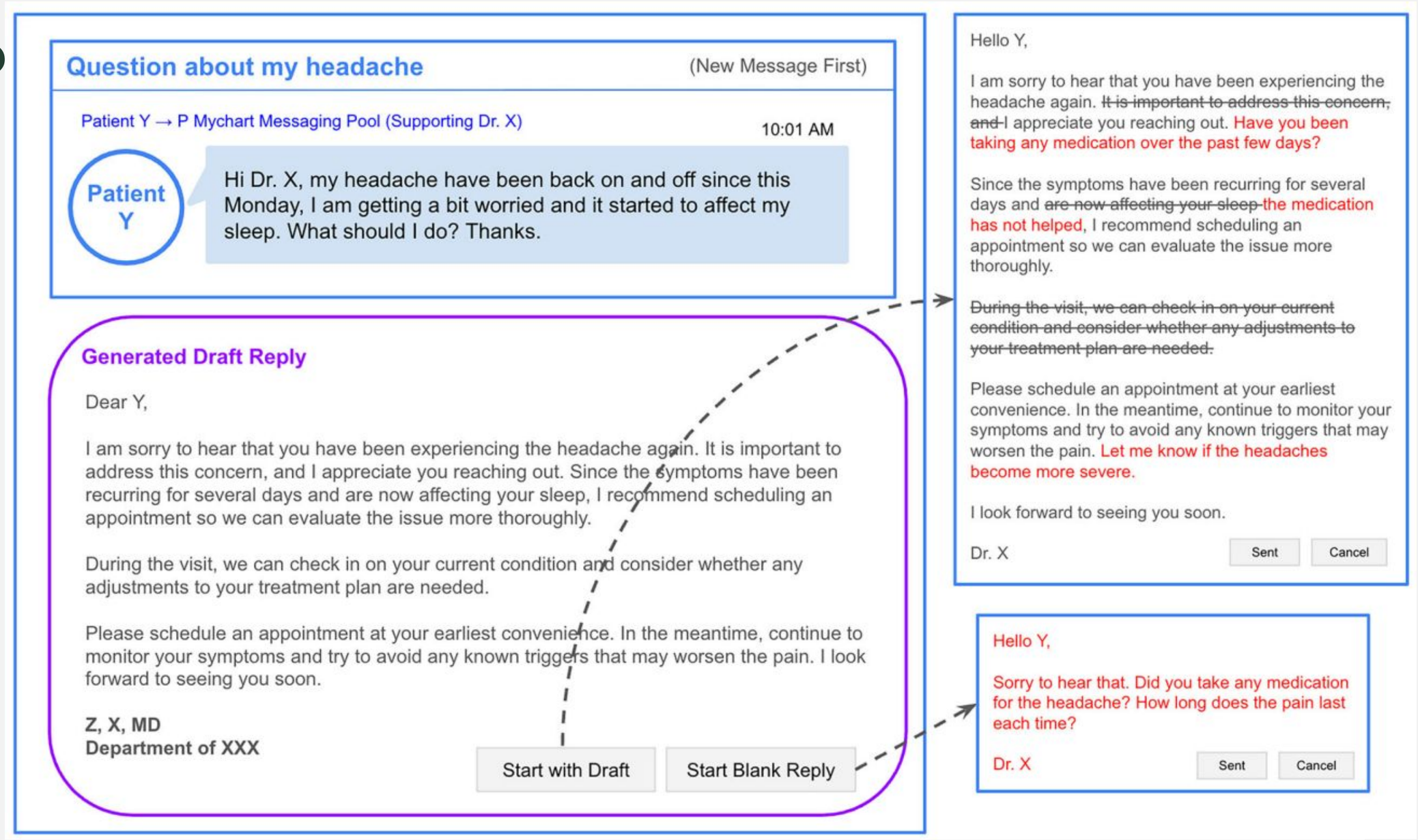
Enhanced Capacity

Nearly half (48%) of respondents believed they could see an additional patient if needed due to time savings.

Source: Ambient Clinical Intelligence and Clinician Experience and Workflow: A Single-Center Pilot Study

ABRIDGE

AI in Patient Communication: Portal Resp



Source: A systematic review of early evidence on generative AI for drafting responses to patient messages | npj Health Systems

AI in Patient Communication: Portal Responses

- In blinded evaluations, one study found that patients felt Gen AI was more empathetic and the messages were more often attributed to human authorship
- GenAI drafts were frequently rated as comparable in information quality and more favorable style
- Empathy consistently emerged as a notable strength for GenAI drafts
- Challenges: hallucinations, incoherent language, limited contextual understanding
- Laypersons (and sometimes even clinicians) could not accurately distinguish between AI and human-authored responses in blinded reviews

Source: A systematic review of early evidence on generative AI for drafting responses to patient messages | npj Health Systems

AI in Patient Communication: Portal Responses

Generative AI is increasingly used to draft patient portal messages, aiming to streamline communication and reduce administrative load. But how is it received?

Provider Perspective

Early data show **low usage but time savings when the AI draft messages are used**. There are subjective reports of decreased cognitive burden and compassion fatigue

- 25% Usage rate among all users—providers and nurses
- 25 seconds saved per message (when draft used)

Source: Panel: In Basket AI Triage and Augmented Response Technology: Epic 2025 CLINAC104

Patient Perspective

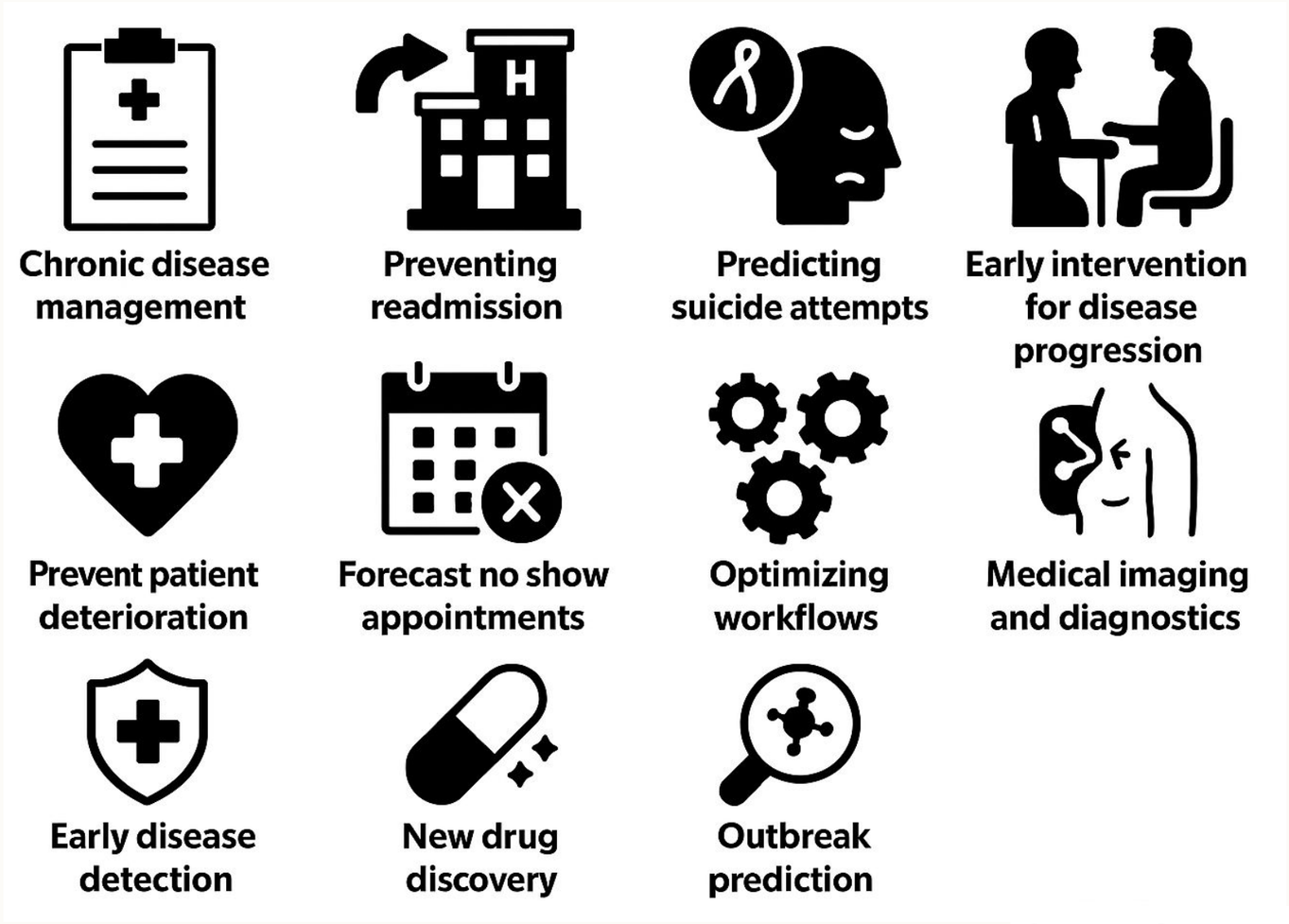
Patients generally **appreciate faster responses but emphasize the importance of clarity and empathy**. **Transparency about AI use is crucial for trust**, with patients preferring human oversight.

- Patients preferred the AI response in overall satisfaction, usefulness of information, and feeling cared for.
- Slight decrease in satisfaction when told AI was involved

Source: Ethics in Patient Preferences for Artificial Intelligence–Drafted Responses to Electronic Messages | Ethics | JAMA Network Open | JAMA Network

Predictive AI models

Predictive



Source: Open AI

Predictive AI models

Predictive Analytics:
Early sepsis detection

Sepsis prediction models are meant to detect patterns hours before clinical deterioration becomes apparent, allowing patients to be identified and treatment to begin sooner.

- Studies use a variety of data points, including
  - Vital signs: heart rate, respiratory rate, temperature, systolic and diastolic blood pressure and Oxygen saturation
  - Laboratory data: blood cultures, cells counts, inflammatory markers, and others
  - Clinical notes
  - Other known scoring tools
- Goal: Predict sepsis earlier, allow for faster initiation of antibiotics, reduce mortality

Predictive AI models:

Artificial Intelligence Tool for Detection and Worklist Prioritization Reduces Time to Diagnosis of Incidental Pulmonary Embolism at CT

Key Result

Artificial intelligence (AI)-assisted workflow prioritization of incidental pulmonary embolism (IPE) on chest CT scans significantly reduced time to diagnosis in patients with cancer.

Patients:

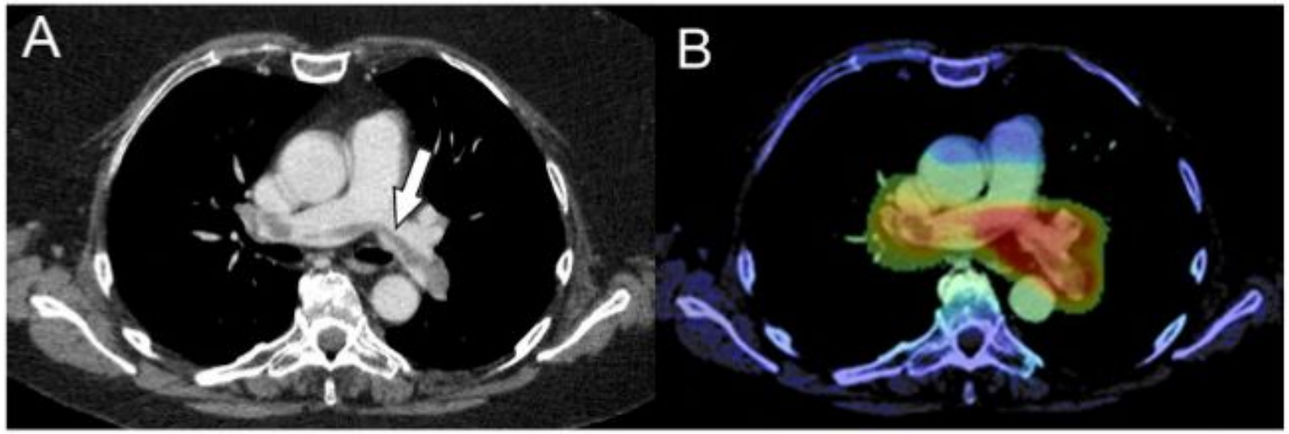
- 6447 adult oncology patients (n = 11,736 CT scans)

Methods:

- Regulatory-cleared AI software was evaluated to prioritize IPE on routine chest CT scans with intravenous contrast.
- Diagnostic accuracy metrics were calculated, and temporal endpoints were assessed at three time periods: routine workflow without AI, human triage without AI, and worklist prioritization with AI (prospective evaluation)

Results:

- The AI software achieved high diagnostic accuracy for IPE detection:
  - Sensitivity = 91.6%
  - Specificity = 99.7%
  - NPV = 99.9%
- Missed rate of IPE significantly reduced from 44.8% to 2.6% when radiologists were assisted by AI.
- Median detection and notification time of IPE reduced from several days to 1 hour in a practice with a backlog of unreported examinations.



Source: Artificial Intelligence Tool for Detection and Worklist Prioritization Reduces Time to Diagnosis of Incidental Pulmonary Embolism at CT | Radiology: Cardiothoracic Imaging

Beyond Documentation: Care Summaries

Patient Care Summaries

Comprehensive lookbacks generate concise summaries across inpatient stays or between ambulatory visits

Ambulatory

- Recent lab work and trends
- Recent imaging
- Summarize chart notes including patient portal messages over a time frame (since last visit or over past X months/weeks/days)
- Helps get the provider quickly informed about recent events before they see the patient
- Generate patient instructions for after visit summary

Inpatient

- Summarize information from the past shift day or help a hospitalist coming on shift to better understand what has happened since admission
- Summarize trends in lab work during the admission
- Help generate a hospital course summary for use in the discharge summary—beneficial to the patient and Primary Care Provider
- Generate patient instructions

Beyond Documentation: Medical Coding and Billing

Revenue Integrity & Risk Adjustment

AI models find overlooked HCCs or secondary diagnoses to accurately capture patient complexity, which is crucial for value-based care reimbursement.

Automated Code Suggestion

NLP extracts information from clinical notes to map diagnoses and procedures to appropriate ICD-10, CPT, or DRG codes, reducing manual effort and improving first-pass accuracy.

Medical Necessity Checks

AI compares documentation against payer policies to ensure the chart supports the billed level of service or procedure, preventing upcoding/undercoding and reducing audit risk.

Claim Scrubbing & Error Detection

AI models check claims against payer rules and coding guidelines to flag missing or incorrect codes before submission, lowering denial rates and accelerating payments.

Denial Prediction & Appeals

Predictive models assess claims at risk for denial, suggest corrections, and can even draft appeal letters, leading to fewer write-offs and more successful appeals.

The Future of AI in Healthcare: Enhanced Access & Empowerment

Generative AI will revolutionize healthcare delivery, fostering greater patient autonomy and operational efficiency through personalized, intelligent solutions.

AI-Powered Appointment Management

Intelligent chatbots will simplify scheduling, provide proactive reminders, and facilitate seamless rescheduling.

Advanced Virtual Care & Monitoring

AI-driven video consultations for post-surgical recovery, including remote range of motion evaluation.

Empowering Patient Understanding

Patient-facing AI to interpret results, notes, imaging, and assist in drafting visit agendas.

Are we there

What can we learn as we implement Artificial Intelligence?

Post-Market Surveillance: Learning from Past Challenges

FDA clearance signifies a drug's safety and efficacy under controlled conditions, but history shows that widespread use can reveal unforeseen risks. These cases underscore the critical need for continuous vigilance and robust post-market monitoring.

Vioxx (Rofecoxib)

Initially FDA approved for pain, it was prescribed to millions. Later studies revealed a significant increase in heart attack and stroke risk, leading to its withdrawal in 2004 and thousands of deaths.

Fen-Phen (Fenfluramine & Phentermine)

A popular FDA approved obesity treatment, this combination was linked to pulmonary hypertension and heart valve damage. The FDA requested its removal in 1997, resulting in extensive lawsuits.

Key Takeaways for Future Drug Development:

- Pre-market trials have limitations; rare or long-term side effects may not be apparent.
- Real-world usage by diverse populations can uncover new risks.
- Robust post-market surveillance and rapid response to warning signs are paramount for public safety.

Do AI Scribe Workflows change how we think?

	Generative Mode (authoring from scratch)	Editing Mode (scribe/AI draft)
Process	Tends to follow a narrative writing style • Recall → Structure → Document • Example: write history, review results, edit physical exam, finally add Assessment/Plan and review before closing	Tends to be scanning and error detection • skim for inaccuracies, omissions, or "hallucinations" • Compare recorded data against memory • reconcile with objective data (labs, vitals, medications)
Cognitive load	Recollection, reviewing manual notes, synthesis	verification and trust (is the draft good enough)
Efficiency	Typing fluency, template familiarity, ±copy forward use	Editing ability, template familiarity
Errors	tend to be omissions (forgetting to document something said or done)	tend to be commissions (leaving in incorrect statements because they look plausible)

Do AI Scribe Workflows change how we think?

Automation Bias

Over-trusting the draft and missing inaccuracies

Confirmation Bias

Skimming only for what the clinician *expects* to see

Anchoring

Accepting the scribe/AI's phrasing and not fully reconsidering differential or plan

Omission neglect

Assuming "if it's not in the draft, it wasn't important"

Changing how we think:

- Writing from scratch is predictable and more comfortable, but comes at a cost (time)
- Editing a draft shifts our efforts from creation to verification. May need guardrails to help prevent errors
- A significant change in workflow requires a compensatory change in how we practice medicine

Automation

Man fined for reading book while driving on freeway

Reporter TVBS News Staff
Release time：2023/08/31 16:30
Last update time：2023/08/31 16:30

Over-reliance on Artificial Intelligence?

⚠ "The EMR didn't warn me that the patient's blood pressure was too high"

"I didn't get the pop-up with that medication interaction"

"Why can’t the EMR do _____"

Over-reliance on Artificial Intelligence?

Automation Bias: the propensity for humans to favor suggestions from automated decision-making systems.

Mammogram Results: show that inexperienced, moderately experienced, and very experienced radiologists reading mammograms are prone to automation bias when being supported by an AI-based system.

Automation Bias in Mammography: The Impact of Artificial Intelligence BI-RADS Suggestions on Reader Performance | Radiology

EKG Automated readings : Incorrect automated readings reduced the interpreter's diagnostic accuracy, especially with physicians who were not cardiologists.

Automation bias in medicine: The influence of automated diagnoses on interpreter accuracy and uncertainty when reading electrocardiograms - PubMed

Pathology : AI integration significantly improved overall performance but caused a 7% automation bias, where correct evaluations were overturned by incorrect AI advice. Time pressure worsened this issue, leading to increased reliance on negative AI consultations and a decline in performance.

Automation Bias in AI-Assisted Medical Decision-Making under Time Pressure in Computational Pathology

Factors that increase risk of Automation Bias

Task complexity	Workload
Time pressure	Competing priorities

Potential Pitfalls of AI predictive

High False alarm burden/ Alarm Fatigue

-can decrease confidence in a model and lead to increased costs/over utilization of resources

Variable Generalizability

-often a model developed at one institution does not immediately perform reliably at other institutions

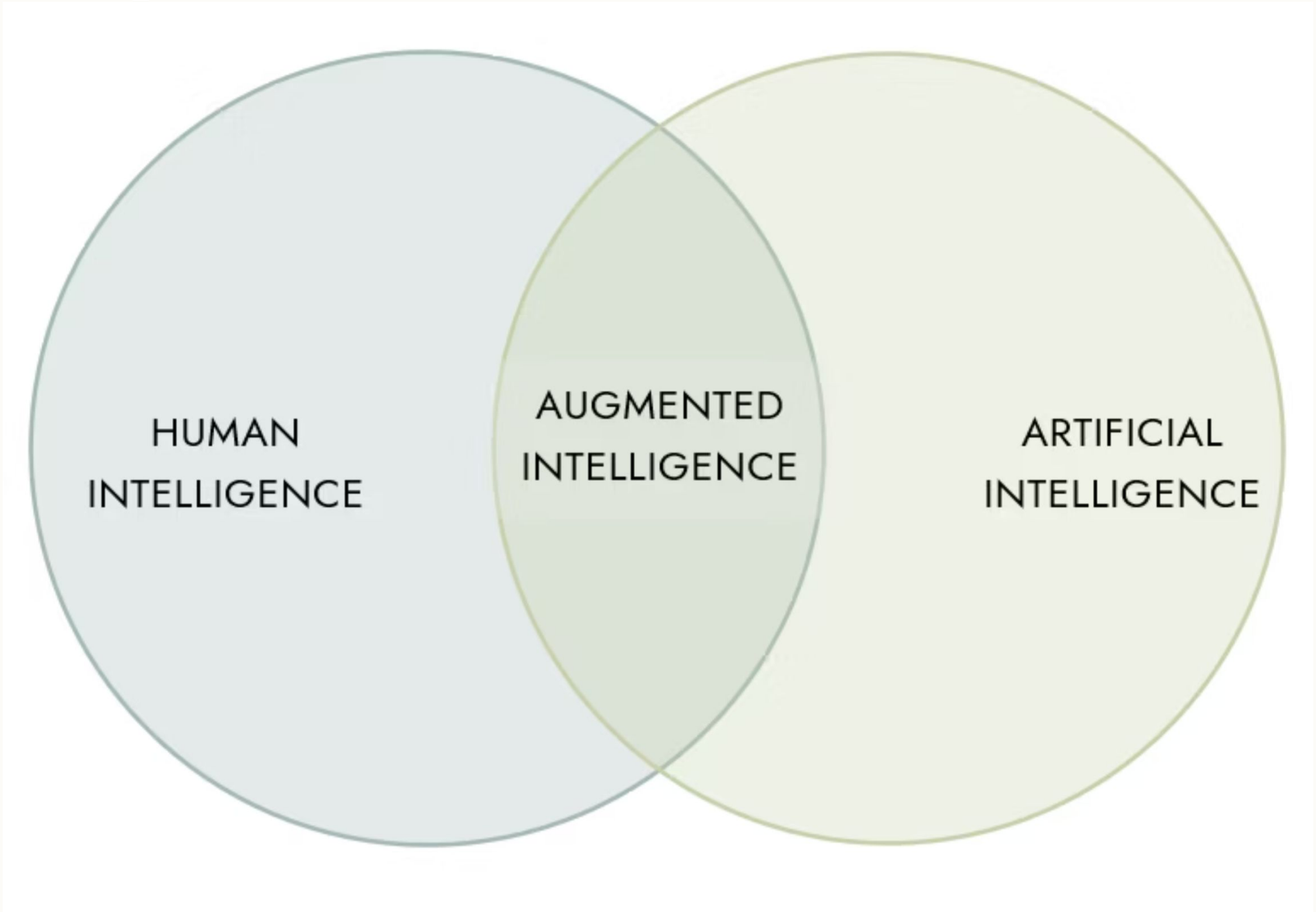
Workflow disruption

-how a model is implemented into a caregivers workflow may add to the cognitive load rather than help

Bias/Equity

-models can inadvertently reflect systemic inequities (e.g., under-identifying sepsis in populations with less frequent lab testing or different baseline physiology)

Will we be replaced by AI?



The Human Element Remains Essential

> "One of the essential qualities of the clinician is an interest in humanity, **for the secret of the care of the patient is in caring for the patient** ."
>
> — Francis Peabody, The Journal (88:877, 1927)

The Human Element Remains Essential

> "AI's greatest promise isn't replacing human judgment—it's amplifying our capacity for connection and care. As we integrate these powerful tools, we must preserve the human-centered core of medicine while leveraging technology to reduce burdens that distract from our primary purpose."

— Eric Topol, “Deep Medicine”

Thank you!

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