



Building Trust in AI: Partnership, Not Replacement, in Cancer Care

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Disclosures

Consultant/Advisor/Speaker

- Main Street Health
- Mendei ai
- Onc ai
- Optinosis
- Thyme Care



Objectives

- Define artificial intelligence and related concepts
- Identify use cases of AI in oncology treatment decision-making and clinical decision-support
- Recognize ethical and practical challenges surrounding the use of AI
- Discuss next steps to facilitate responsible use of AI within health care settings



Definitions

Artificial intelligence (AI): Pattern recognition from large datasets.¹

Autonomous AI: Operates independently without human oversight.

Assistive AI: Supports users by providing information, suggestions, or assistance in completing tasks.

Generative AI: Create new content rather than analyzing or categorizing existing information

Large Language Models: Processing and generating human-like text

Ambient AI: Systems that operate unobtrusively in the background

¹ WHO, *Ethics and governance of artificial intelligence for health*



A Tale of Two Treatment Timelines

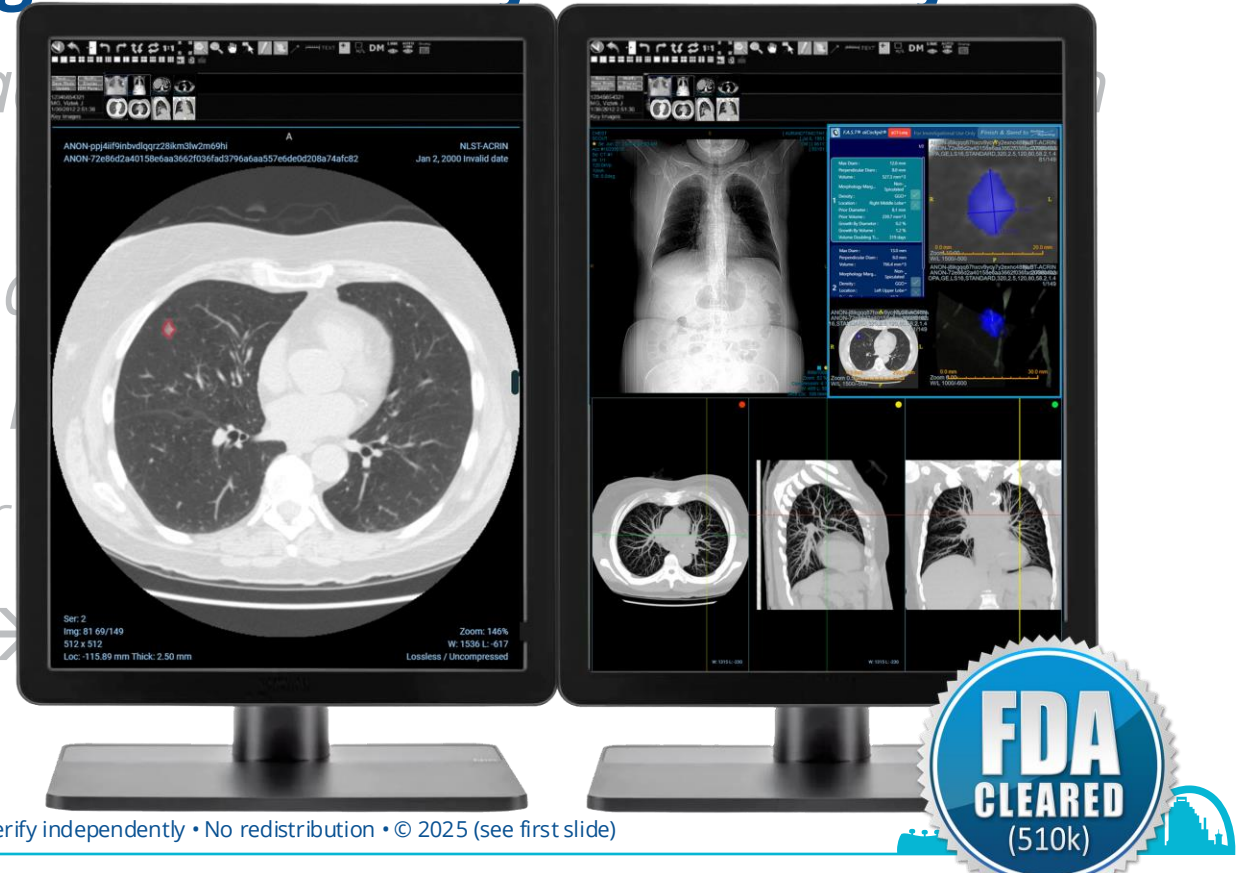
- 67 male smoker...
- **2014-2016: 2 LDCT scans → *lung nodule identified but not followed***
- **2018: New pain → *Widespread adenopathy. Biopsy = CA of unknown primary***
- Repeat biopsy → ***Poorly differentiated CA of lung origin***
 - PD-L1 negative → ***Platinum doublet + ICI***
 - **2019: Oligometastatic recurrence → *Chemoradiation***
 - **2020: Frank progression → *Clinical trial***



A Tale of Two Treatment Timelines

- 67 male smoker...
- **2010-2012: 2 LDCT scans → *lung nodule identified but not followed***
- 2015: New pain → *Widespread a primary*
- Late 2016: PD-L1 negative →
- 2018: Oligometastatic recur
- 2020: Frank progression →

2 years saved



A Tale of Two Treatment Timelines

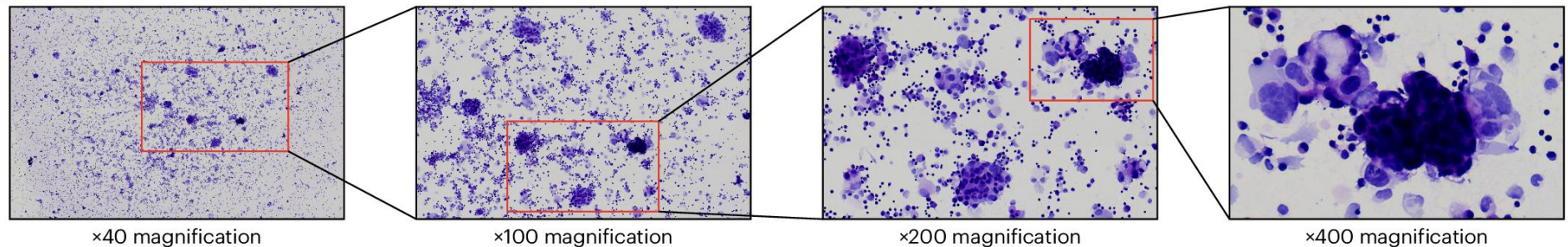
3 months saved

- 67 male smoker...

- 2010-2012: 2 LDCT scans → *lung nodule identified but not followed*

- 2015: New pain → *Widespread adenopathy. Biopsy = CA of unknown origin*

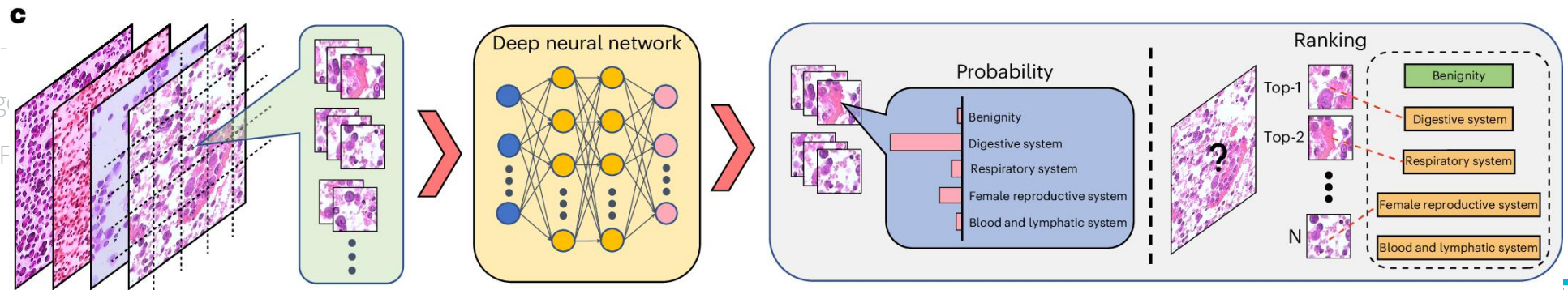
- 2016: *origin*



- Late 2016: PD-

- 2018: Oligo

- 2020: F

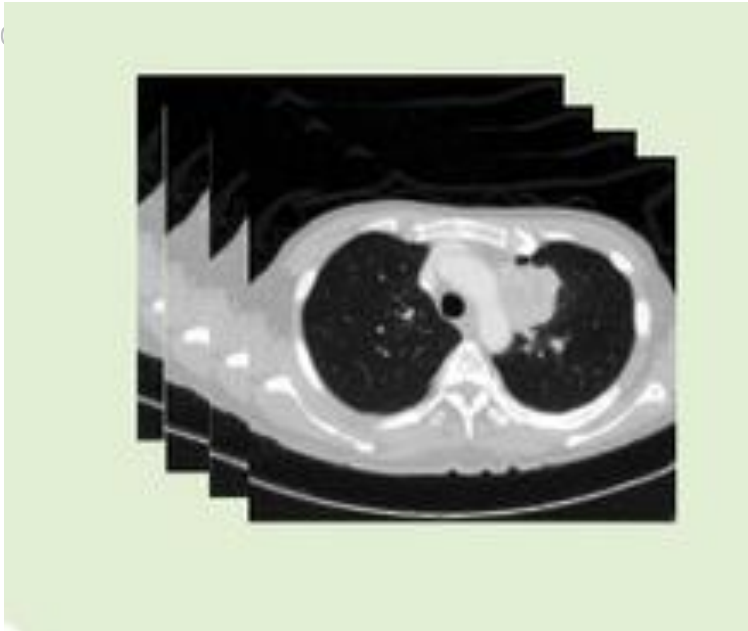


A Tale of Two Treatment Timelines

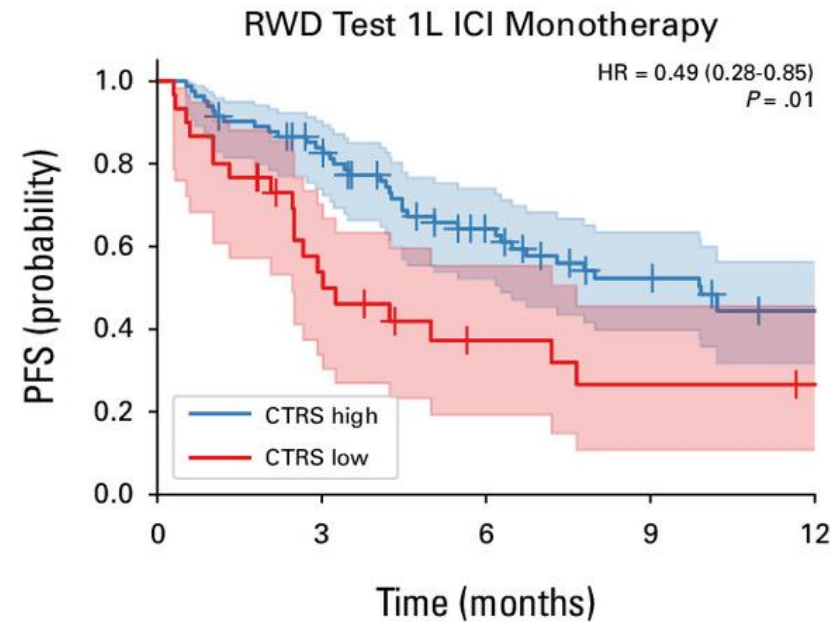
- 67 male smoker...

2-3 weeks saved

- 2010-2012: 2 LDCT scans → *lung nodule identified but not followed*
- 2015: New pain → *Widespread adenopathy. Biopsy = CA of unknown primary*
- 2016: ...



eg
→ Chem
al tri



at + ICI



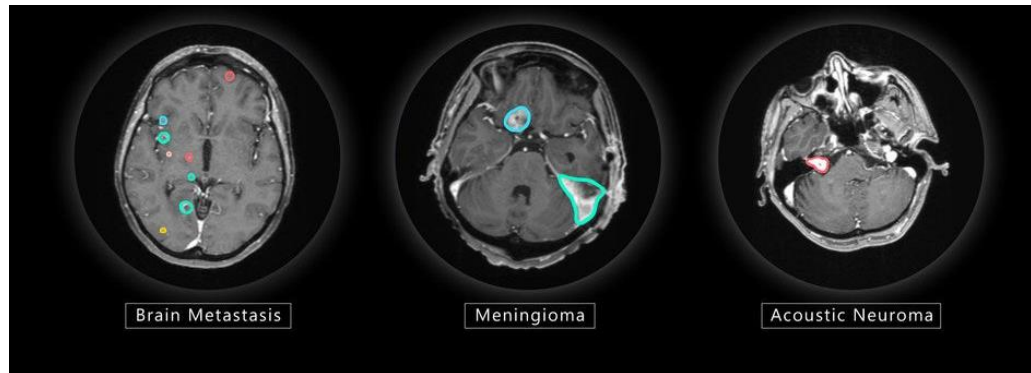
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Weeks saved

FDA Clears Tumor Auto-contouring Solution for Radiation Therapy

Published Date: April 6, 2021

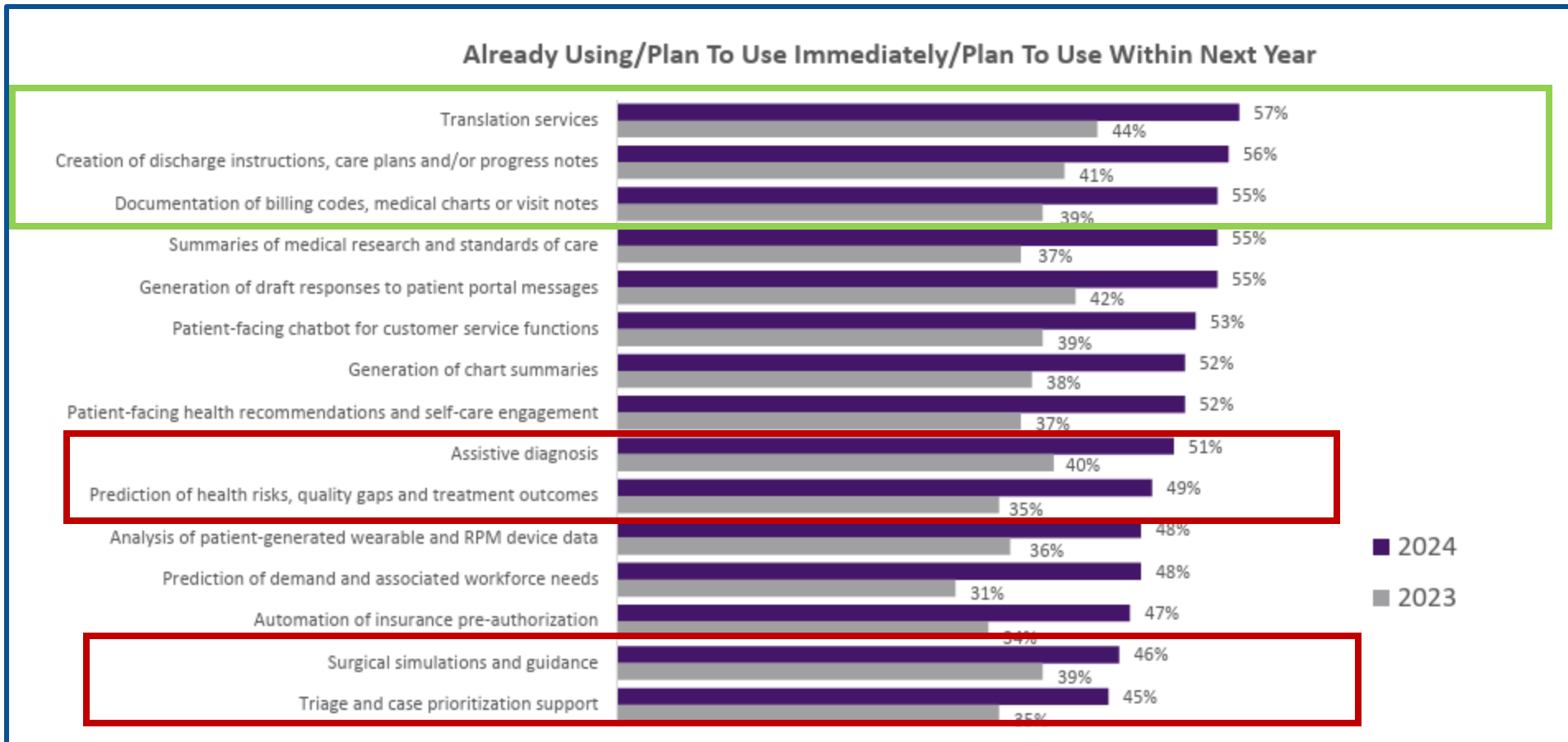


Unlu et al, JAMA 2025

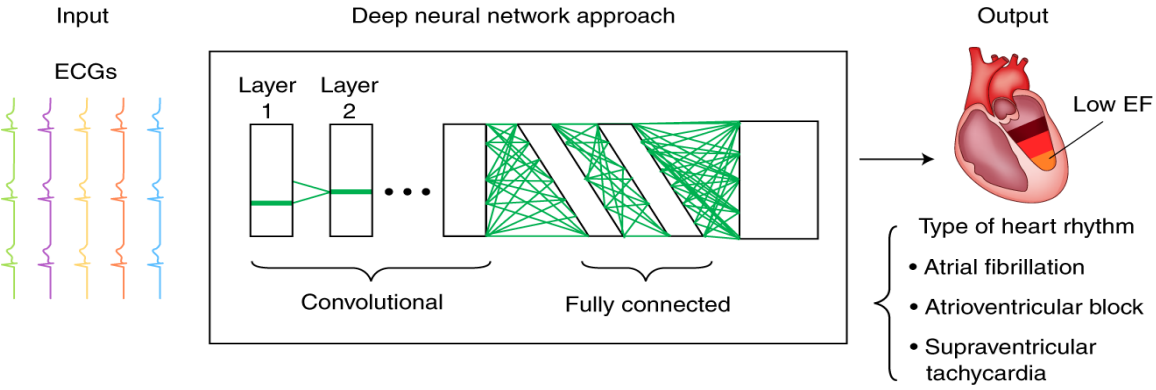
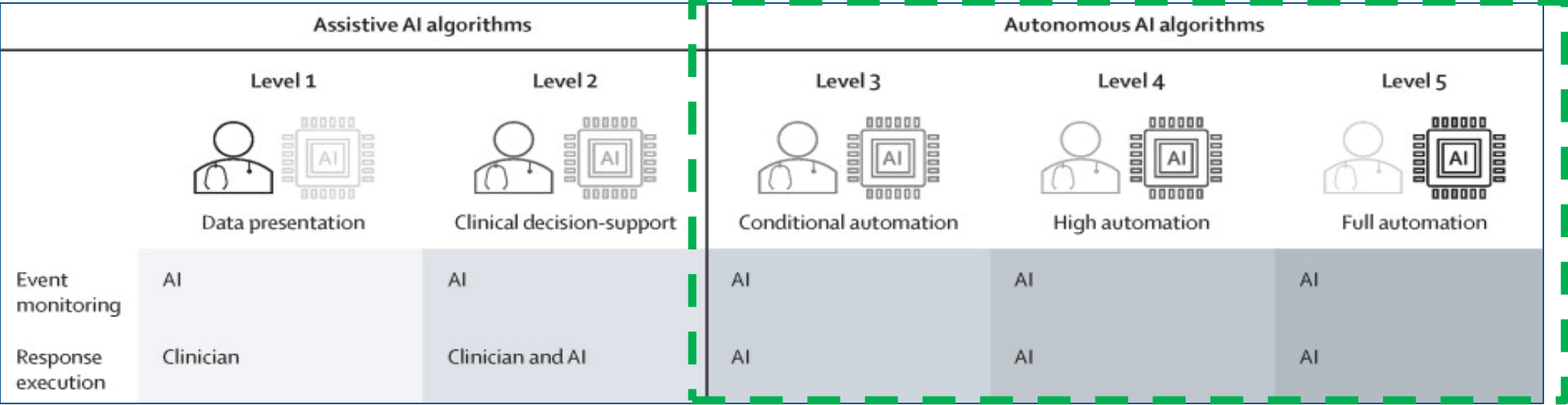


Many Doctors Still Lag in Utilizing AI

American Medical Association 2025



We pretend like all AI is autonomous...



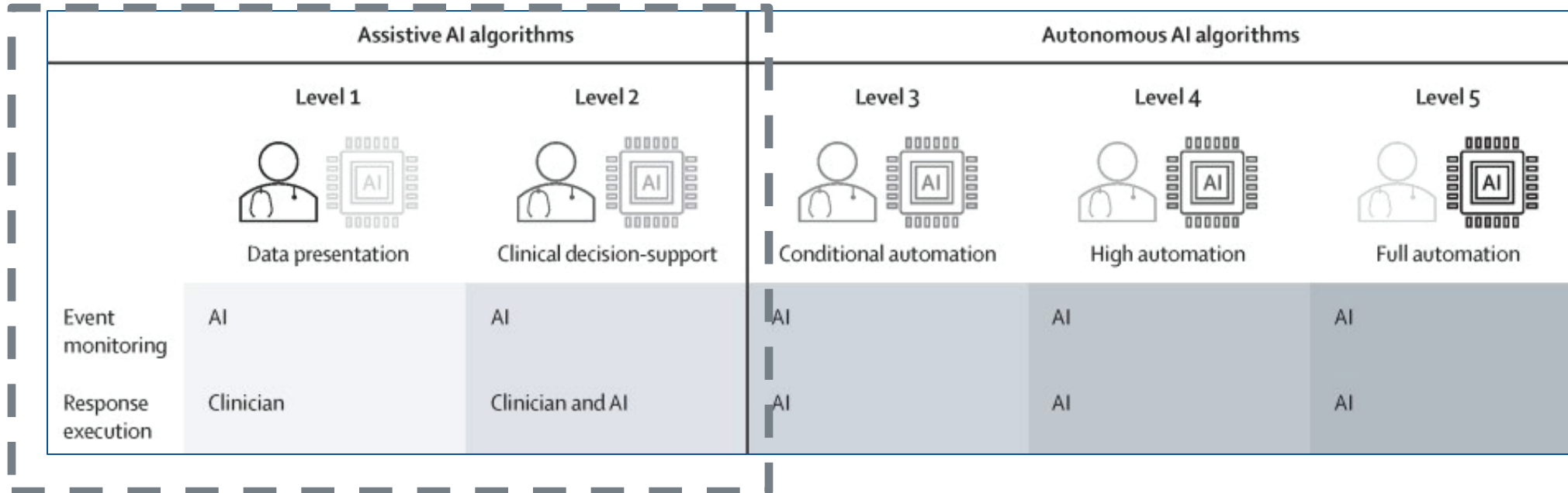
What Matters for Autonomous AI?

Accuracy

Michole and Rodriguez, Nat Med, 2019



...when instead most current AI is assistive



What Matters for *Assistive* AI?

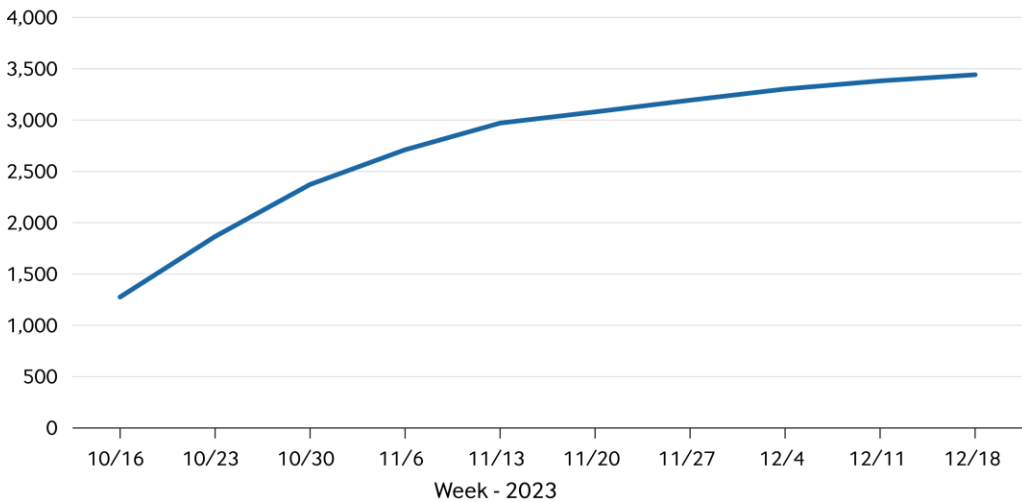
Trust

Michole and Rodriguez, Nat Med, 2019



The Ambient Scribing Revolution

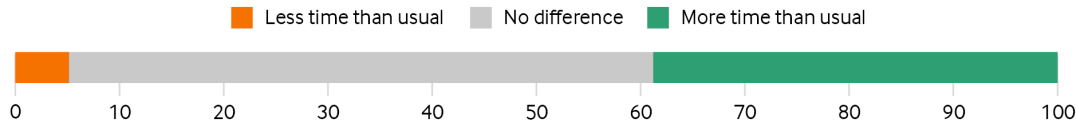
Panel A. Unique Physicians Ever Using AI Scribe



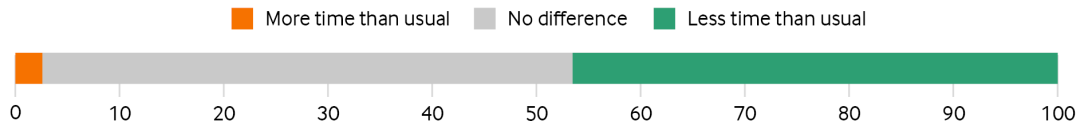
Patient Responses to Changes in Their Visit Due to the Use of an AI Scribe

These charts show patient responses in percentages for changes in the amount of time the physician spent speaking to the patient (less time than usual, no difference, more time than usual); changes in the amount of time the physician spent looking at the computer screen (more time than usual, no difference, less time than usual); changes in the quality of the visit (no effect, somewhat better, much better); and physician comfort level with AI (very uncomfortable, uncomfortable, neutral, comfortable, very comfortable).

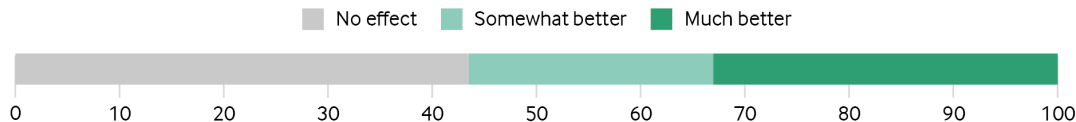
Changes in Amount of Time Physician Spent Speaking to You (%)



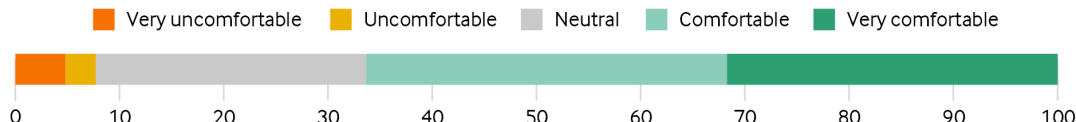
Changes in Amount of Time Physician Spent Looking at the Computer Screen (%)



Changes in Quality of Visit (%)



Comfort Level with AI (%)



Tierney et al, NEJM Catalyst, 2025



Automated Inbox Responses

GenAI-drafted reply (103 words)

Hello [patient name], I'm glad to hear that your knee pain has improved on its own. Regarding your elbow pain, it's important that we discuss your symptoms and evaluate the best course of action. It may be necessary to consider an x-ray or a referral for physical therapy, but we can determine that during your appointment on [date]. As for your test results, no results are available at this time. When results become available, you can view them in MyChart under the "Test Results." If you have any further concerns or questions, please don't hesitate to schedule an additional appointment to discuss them in person. Sincerely, [name of Epic employee] Part of this message was generated automatically and was reviewed and edited by [name of Epic employee].

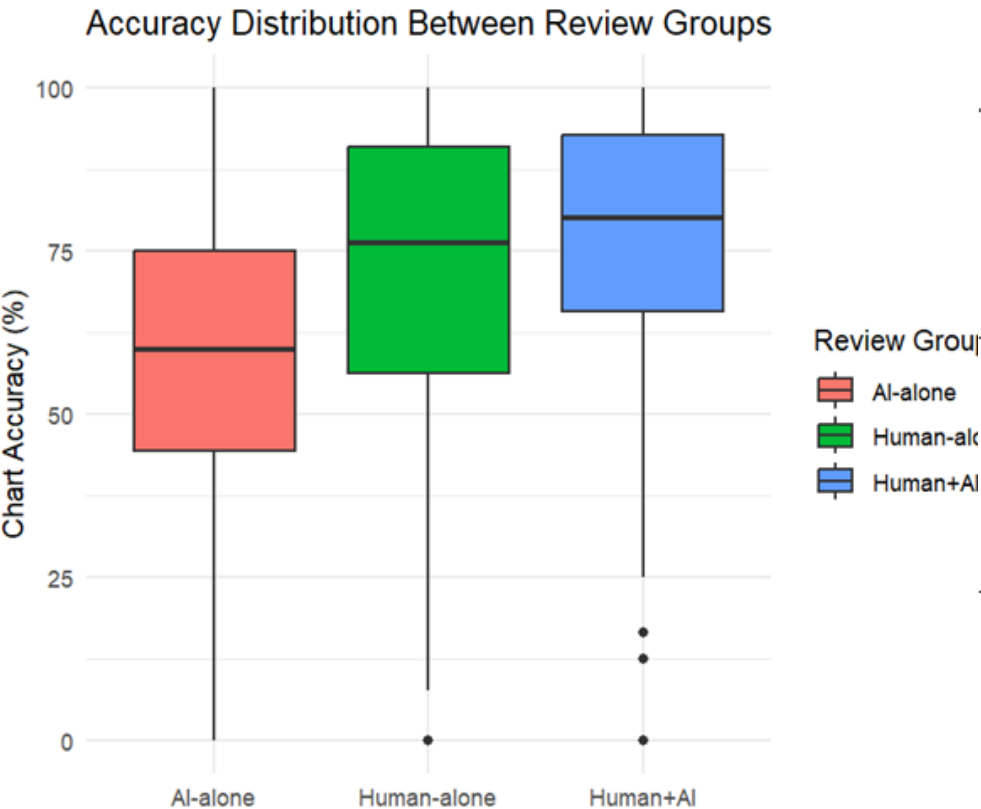
Physician reply (59 words)

Hello [patient name], I'm glad to hear that your knee pain has improved on its own. Regarding your elbow pain, unless you had an acute injury like a fall or an impact, it is unlikely that the x-rays will show very much. I would much prefer you make or keep the [date] appointment for a good examination before exposing you to x-rays. Best regards, [physician name], MD [Signature Derived From Controlled Access Password] Part of this message was generated automatically and was reviewed and edited by [physician name, MD].

Greater length of reply – whether from AI or physician – is associated with greater patient satisfaction



Prescreening for Clinical trials



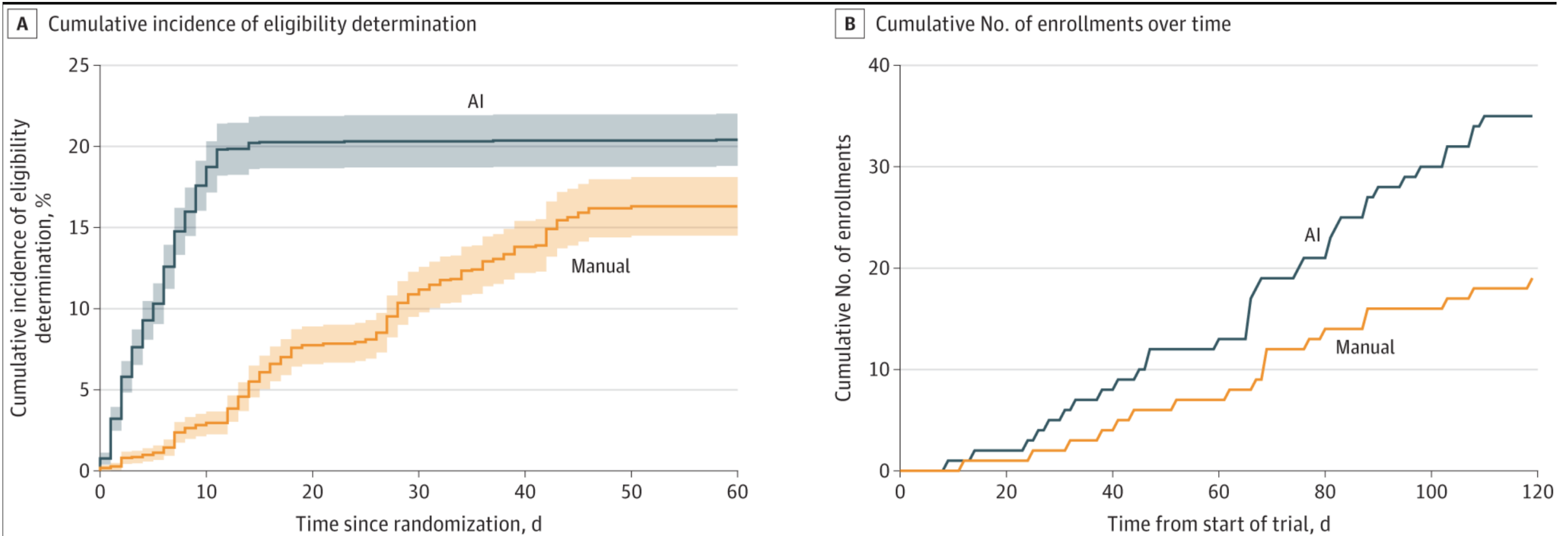
| | Criteria | Accuracy (%) | | |
|-----------|-----------------------|--------------|------------|----------|
| | | Human-Alone | Human + AI | AI-Alone |
| Biomarker | Was Biomarker Tested? | 84.6 | 93.2 | 88.1 |
| | Categorical Value | 67.9 | 79.0 | 32.5 |
| | Interpretation | 80.8 | 91.3 | 35.7 |
| Neoplasm | Cancer Type | 86.9 | 86.4 | 73.3 |
| | Stage Group | 71.7 | 73.4 | 57.0 |
| | M Stage | 43.9 | 57.0 | 60.2 |
| | N Stage | 50.5 | 66.3 | 52.6 |
| | T Stage | 56.3 | 71.6 | 54.3 |
| Other | Outcome | 23.7 | 35.9 | 55.2 |
| | Response | 47.1 | 51.7 | 60.4 |
| | ECOG Status | 84.7 | 78.1 | 34.4 |
| | Medication | | | |
| | Concept | 89.0 | 89.1 | 59.4 |

Parikh et al, ASCO, 2025



Prescreening for clinical trials

Randomized clinical trial of Manual vs AI-Assisted Clinical Trial Screening Using Large-Language Models

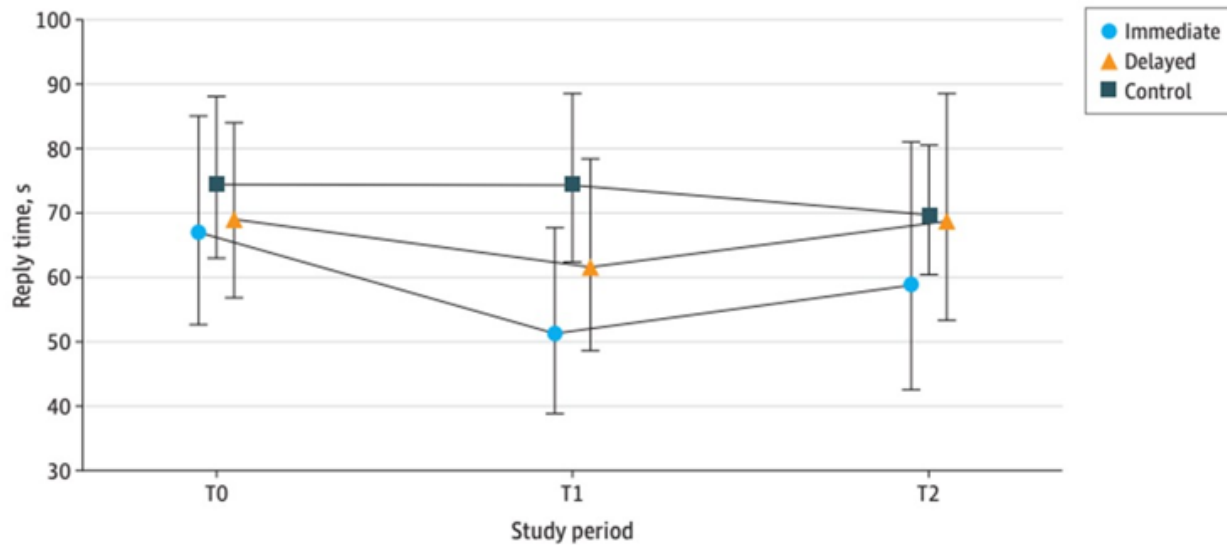


Unlu et al, JAMA, 2025



The Perils of Non-Trustworthy AI

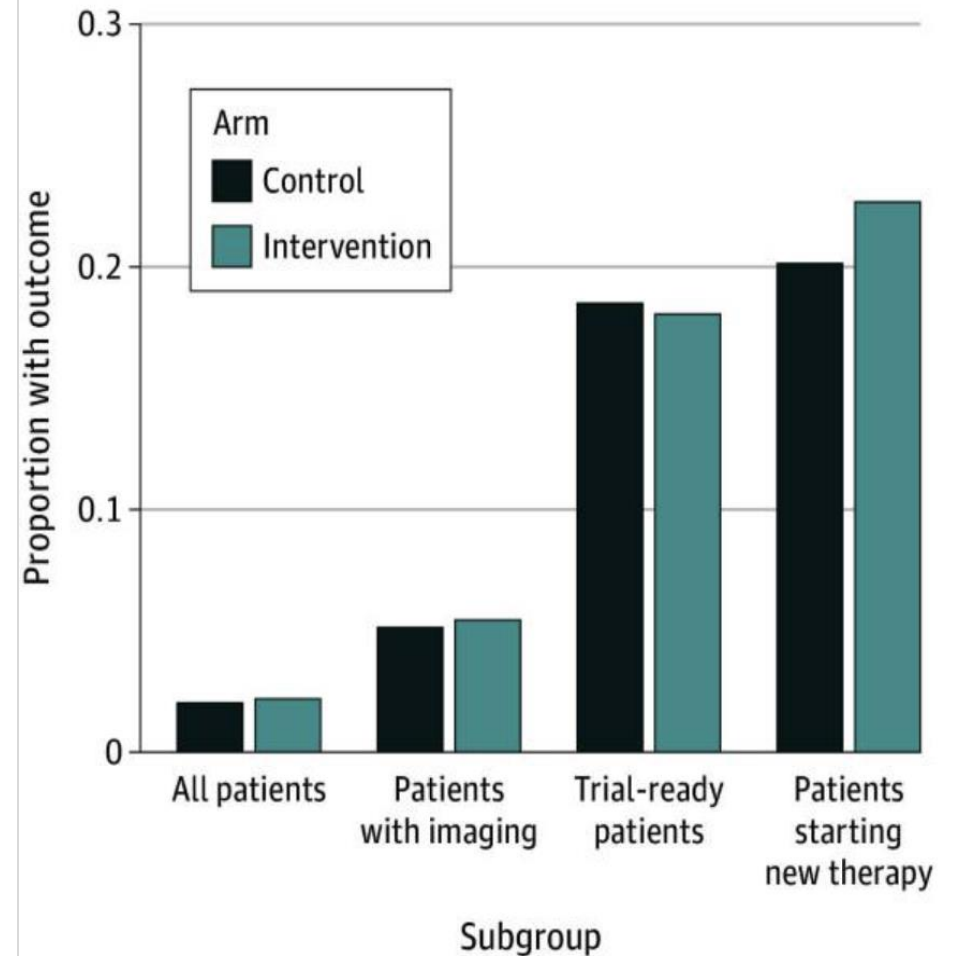
Figure 2. Reply Time per Message (in Seconds) for Each Group and Study Period



AI patient responses did not save time for clinicians

Tai-Seale et al, JAMA Netw Open 2024

A Enrollment rate



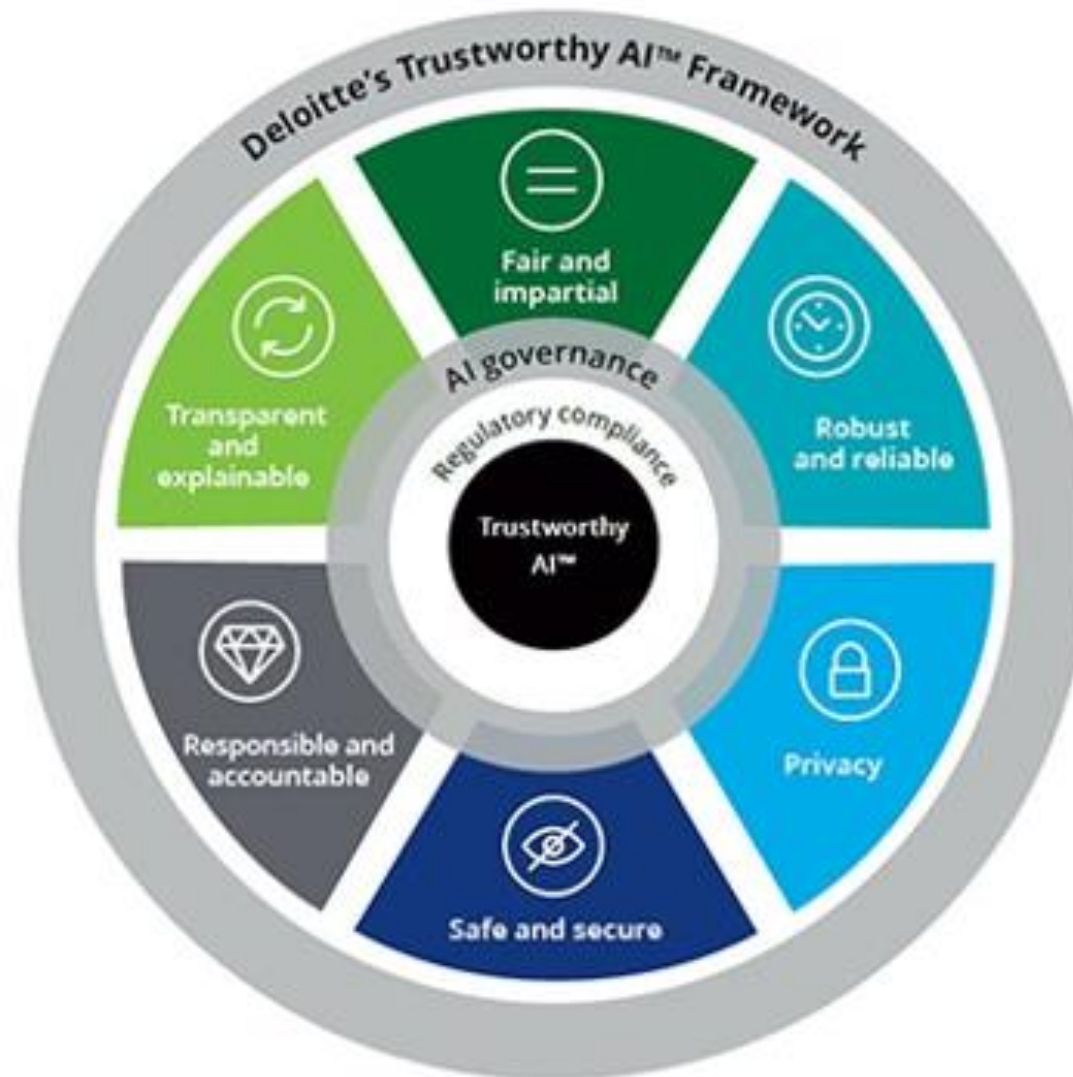
AI detection of progression with matched trials did not increase enrollment



The Need for Better Fine-Tuned Models in Oncology



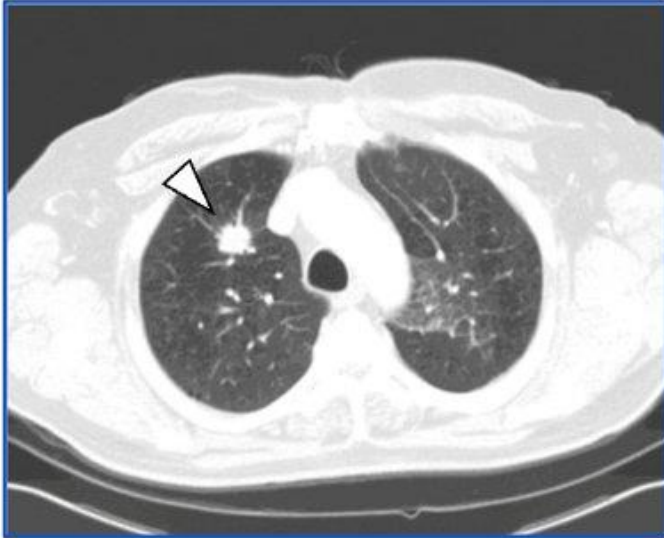
What will it take to trust AI in our clinic?



Explainable AI

Prompt:

Write a radiology report for this image as an expert radiologist..



GPT-4V:

Report:

Date: 6/25/2021

Study Type: Chest CT

Subject: 42-year-old male

Findings: The chest CT images demonstrate a nodular opacity in the left upper lobe, measuring approximately 1.3 cm in diameter. The opacity appears to have spiculated margins and is located adjacent to the pleura. There is no evidence of mediastinal or hilar lymphadenopathy.

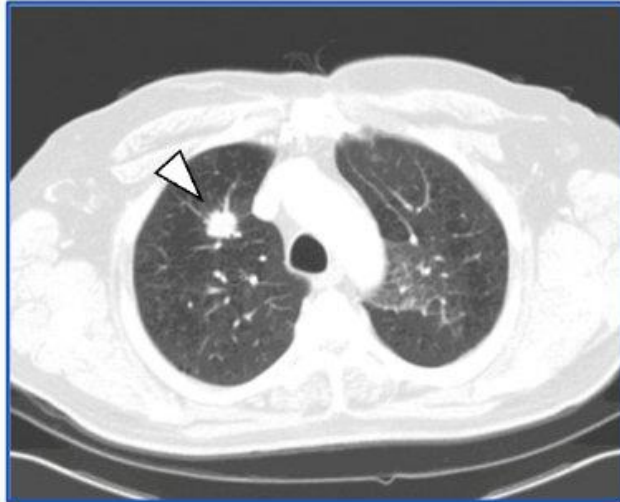
Impression: The findings are concerning for a primary lung malignancy. Further evaluation with a biopsy is recommended to confirm the diagnosis.



When Explainability Goes Wrong...

Prompt:

Write a radiology report for this image as an expert radiologist..



GPT-4V:

Report:

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Impression: The findings are concerning for a primary lung malignancy. Further evaluation with a biopsy is recommended to confirm the diagnosis.

Evaluation from Professionals:

Correct study type and identification

Mentions nodule but in the left rather than in the right.

Gives measurements (hallucination)

Source: arXiv/2309.17421

Yang et al, arXiv, 2023, "The Dawn of LMMs: Preliminary Explorations with GPT-4V(ision)"



Bias in AI Algorithms

Biased data generation → biased algorithms

Likelihood of genetic testing among African-American women with breast cancer

| Analysis | Odds Ratio (95% CI) |
|---------------------------------------|---------------------|
| Overall | 0.40 (0.34-0.48) |
| Adjusted for mutation risk | 0.66 (0.53-0.81) |
| Adjusted for physician recommendation | 0.76 (0.57-1.02) |

“The presence of a laboratory test order, regardless of any other information about the test result, has a significant association ($P<0.001$) with the odds of survival in 233 of 272

McCarthy et al, J Clin Oncol, 2016; 34 (22): 2610-2618; Agniel et al, BMJ, 2018;361:k1479

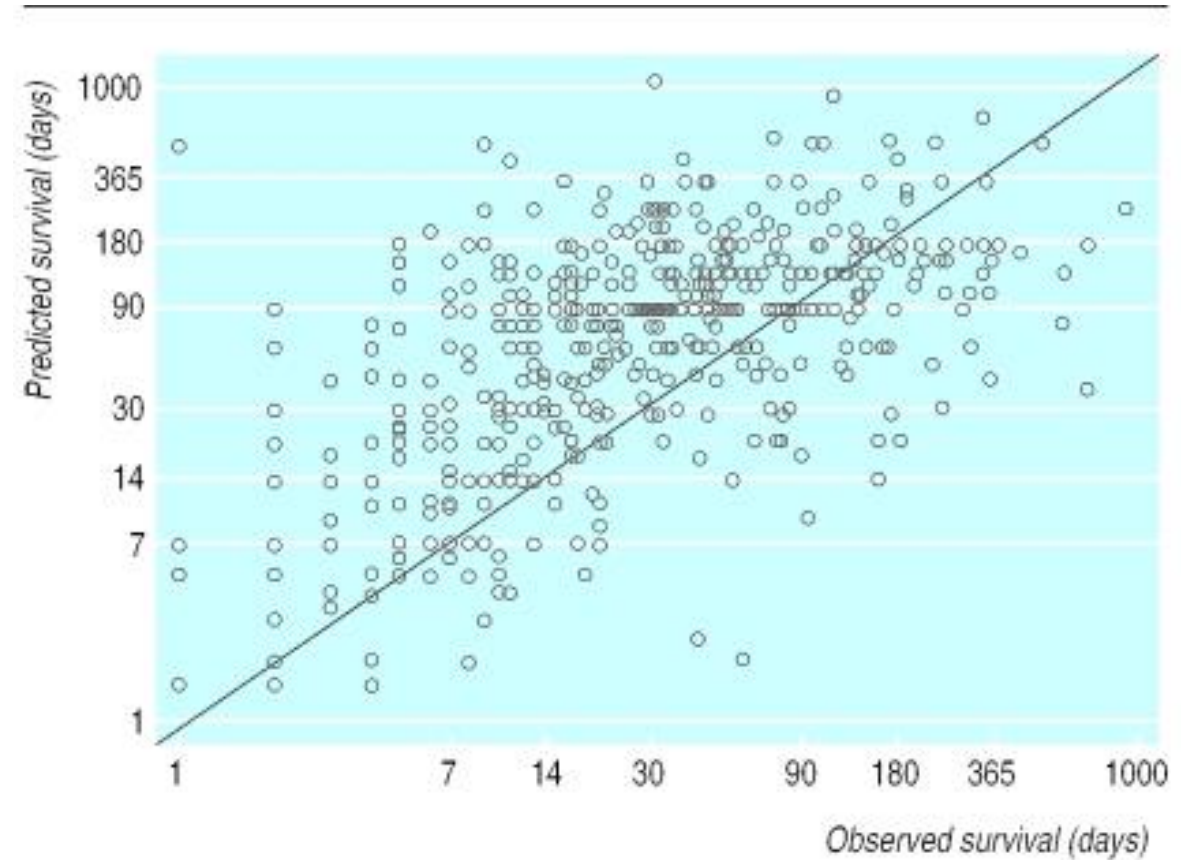


An Implementation Roadmap for AI



Use Case: Serious Illness Communication

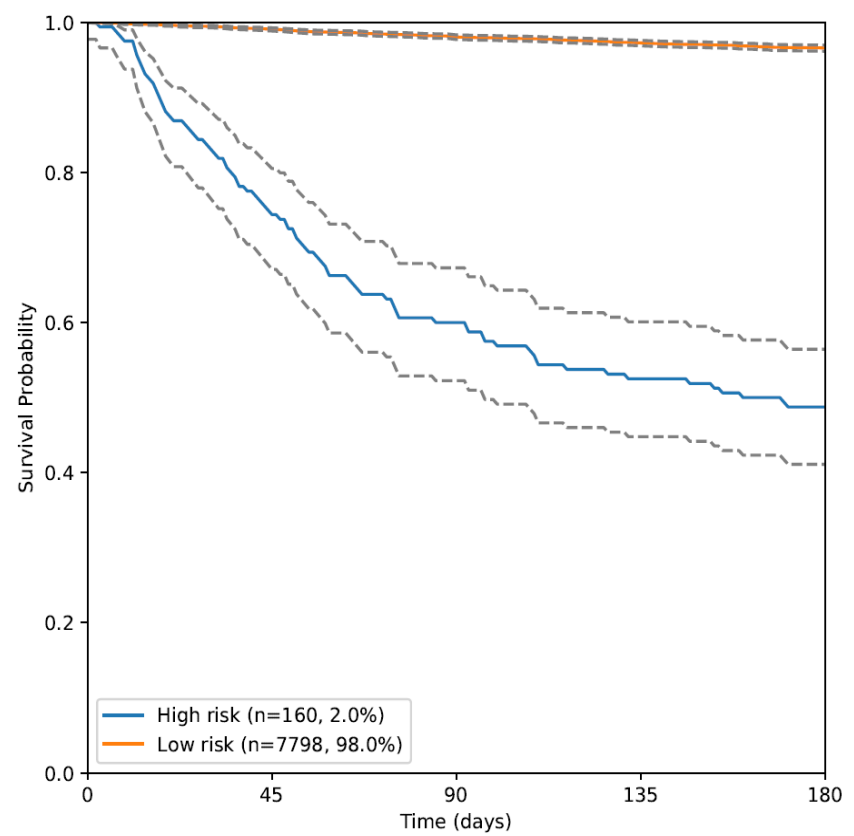
- Early communication is key to reducing oncology patient experience
 - Reduced end-of-life utilization
 - Reduced anxiety and depression
 - Improved caregiver satisfaction
- Identifying appropriate patients is key, but there is a lack of clarity in prognosis
 - Oncologists overestimate survival by **5.4x**



Christakis and Lamont, BMJ, 2000; Levoy et al, Journal of Pain and Symptom Management, 2023



Month 1-3: Developing and Piloting the Algorithm



| | | | | | |
|----------------------|------|------|------|------|------|
| High Risk n Survived | 160 | 119 | 96 | 84 | 78 |
| Low Risk n Survived | 7798 | 7726 | 7645 | 7582 | 7530 |

Clinician perspectives on machine learning prognostic algorithms in the routine care of patients with cancer: a qualitative study

Original Investigation | Oncology
Machine Learning Approaches to Predict 6-Month Mortality Among Patients With Cancer

JAMA Oncology | Original Investigation
Validation of a Machine Learning Algorithm to Predict 180-Day Mortality for Outpatients With Cancer

| Variables | Examples | Features |
|--------------------|-----------------------------|---|
| Demographics | Age, Gender | |
| Comorbidities | 33 Elixhauser comorbidities | <ul style="list-style-type: none">Total countRecent* |
| Cancer-specific | Stage, tumor markers | <ul style="list-style-type: none">Total countFirst/last valueMin/MaxProportion ordered |
| Laboratories | CMP, CBC, LDH | STAT |
| Recent utilization | Outpatient visit number | |

Parikh RB, et al. *Support Care Cancer*. 2022;30(5):4363-4372. 2. Parikh RB, et al. *JAMA Netw Open*. 2019;2(10):e1915997. 3. Manz CR, et al. *JAMA Oncol*. 2020;6(11):1723-1730.



Month 3-6: Developing Interfaces to Embed into Clinician Workflow

Use Case: Predicting mortality to prompt more serious illness communication

Next week's high-risk patients for Serious Illness Conversations

Thursday, July 18, 2019 at 8:05 AM

[Show Details](#)

Dear :

The ACC is working to help oncologists have earlier Serious Illness Conversations with patients. In the past four weeks, you have documented **2 conversations**.

18 oncology clinicians have documented more conversations than you during that time.

We have identified patients scheduled to see you next week who may benefit from a Serious Illness Conversation. [Click here](#) to view your list (you must be connected to the UPHS network).

Sincerely,

Peer Comparison

Performance Report

ML high-risk list

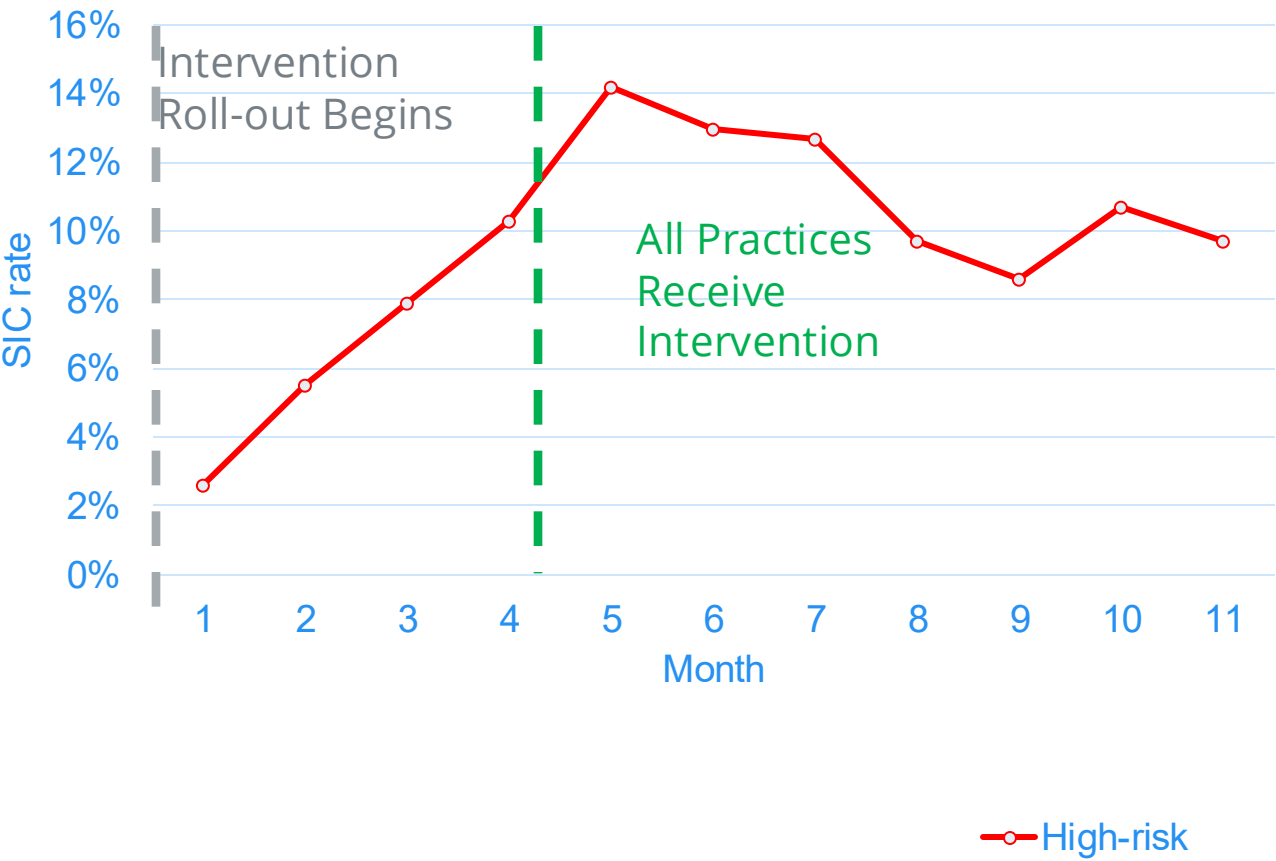
Pre-commitment

Default Text Message

| | | | | |
|---|------------|---------------|--|---|
| Conversation Connect | | Penn Medicine | Welcome Corey! | Logout |
| Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip www.conversationconnect.pennmedicine.upenn.edu | | | | |
| Doe, John | 1234567890 | Age 54 | <input checked="" type="checkbox"/> SICIP Author Name Jan 5, 2019 | <input checked="" type="checkbox"/> Select for SICIP Register Reminder |
| Doe, John | 1234567890 | Age 70 | <input type="checkbox"/> SICIP Author Name Jan 5, 2019 | <input type="checkbox"/> Select for SICIP Register Reminder |
| Doe, John | 1234567890 | Age 73 | <input checked="" type="checkbox"/> SICIP Author Name Jan 5, 2019 | <input checked="" type="checkbox"/> Select for SICIP Register Reminder |
| Doe, John | 1234567890 | Age 58 | <input checked="" type="checkbox"/> SICIP Author Name Jan 5, 2019 | <input type="checkbox"/> Select for SICIP Register Reminder |
| Doe, John | 1234567890 | Age 66 | <input checked="" type="checkbox"/> SICIP Author Name Jan 5, 2019 | <input checked="" type="checkbox"/> Select for SICIP Register Reminder |
| Doe, John | 1234567890 | Age 50 | <input type="checkbox"/> SICIP Author Name Jan 5, 2019 | <input type="checkbox"/> Select for SICIP Register Reminder |



Months 6-12: Implementation and Studying Impact



| | Control | Intervention |
|-------------------------------|---------|--------------|
| Cemo last 14 days | 10.4% | 7.5% |
| Savings in last month of life | ~\$1500 | |

Parikh et al, JAMA Onc, 2023



Can AI Mitigate Disparities?

| | Pre-intervention, % | Post-intervention, % | Absolute %-Point Difference |
|--------------------|---------------------|----------------------|-----------------------------|
| Non-Hispanic White | 3.9 (58/1494) | 14.2 (201/1417) | 10.3 |
| Non-Hispanic Black | 3.6 (17/467) | 16.9 (69/408) | 13.3 |
| Other* | 1.2 (2/164) | 19.5 (34/408) | 18.3 |

In a trial of a machine learning-based nudge to perform end-of-life conversations, there was a significantly higher impact for non-White minorities









How do we evaluate AI solutions at my institution?

- ✓ Is there a ***clinical champion***?
- ✓ Are there ***peer cancer centers*** using the tool?
- ✓ Has the algorithm been trained on ***multi-institutional, representative data***?
- ✓ Is the model ***only using “easy” data***?
- ✓ What level of ***data sharing*** is necessary?
- ✓ Is the AI model **explainable and tailored** to Winship patients?
- ✓ Is the decision that the AI informs ***high-risk***, requiring a prospective study?



What does your AI-efficient clinic look like on Monday?

-  AI Pre-screens imaging results, flagging patients who are progressing
-  Ambient scribing during patient visits
-  Review AI-generated visit summaries
-  Complex case decision-support using AI evidence synthesis tool
-  AI agent “tumor board”
-  AI-assisted trial matching; prior auth letters



Thank you!

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www.haclab.org

[@ravi_b_parikh](#)



questions and comments

