"This is the final warning for those considering careers as physicians: AI is becoming so advanced that the demand for human doctors will significantly decrease... It's inevitable that AI doctors will serve as primary care physicians within the next few years."

— **Derya Unutmaz, MD**, immunologist and longevity researcher at The Jackson Laboratory for Genomic Medicine

Harnessing AI in Family Medicine: Innovations and Implications

PAUL BORNEMANN, MD

SUNDAY, JUNE 8, 2025 • 10:45–11:30 AM

SONESTA RESORT, HILTON HEAD ISLAND, BALLROOM C

Paul Bornemann, MD

Director of Procedural Training & Ultrasound, Lexington Medical Center (LMC)

Clinical Professor of Family & Preventive Medicine, USC School of Medicine

Learning Objectives

1. Understand the current landscape of AI in family medicine.

2. Address the challenges and limitations of AI in family medicine.

3. Incorporate AI technologies into daily practice.

Generative AI Basics

Definition: Models trained to generate novel content by learning patterns from data.

Core Architecture: Transformer networks with self-attention enabling context-aware generation.

Key Processes: Pretraining on large corpora followed by fine-tuning for specific tasks.

Multimodal Capabilities: Models integrate text, images, audio, and sensor data for tasks like radiograph interpretation + clinical notes.
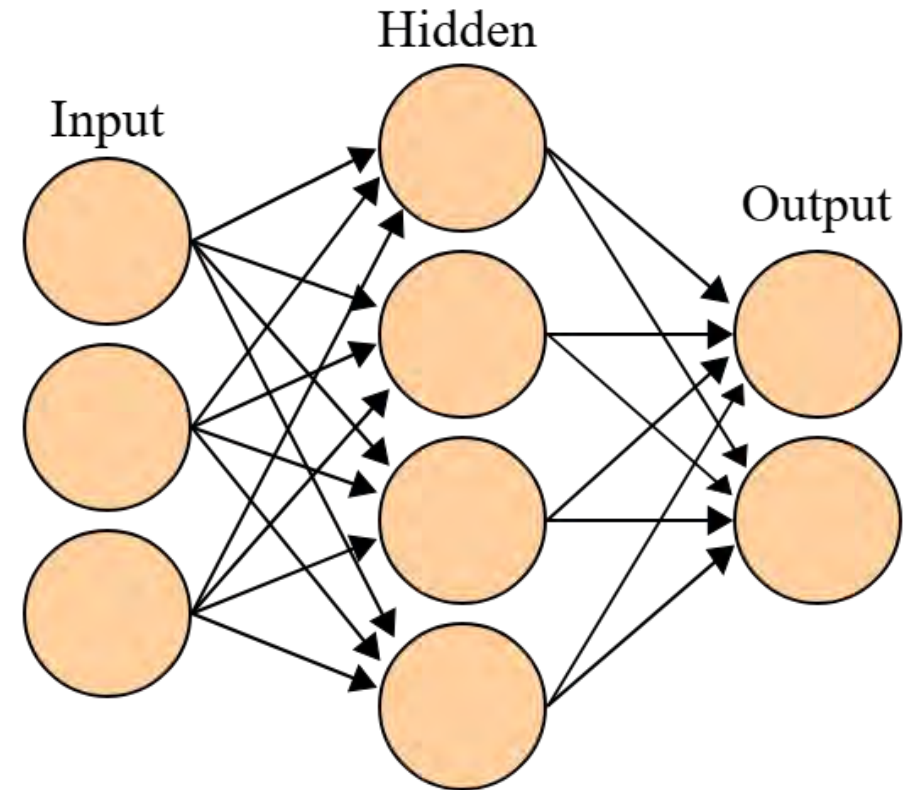
https://commons.wikimedia.org/wiki/File:Artificial_neural_network.svg

AI Access & Integration

Direct subscriptions: Web/mobile access to ChatGPT, Bard, etc.

Third-party platforms: API-driven tools embedded into EHRs or custom dashboards.

Vendor integrations: Specialty assistants for documentation, triage, and patient engagement.

Customization: Fine-tuned models reflecting practice protocols.

Current Landscape I: Diagnosis & Decision Support

AI-powered differential diagnosis assistants generate prioritized lists in seconds.

Clinical decision support integrates EHR data for risk stratification and management suggestions.

FM examples: antibiotic stewardship alerts, fall-risk prediction, automated drug-interaction & lab-value flags.
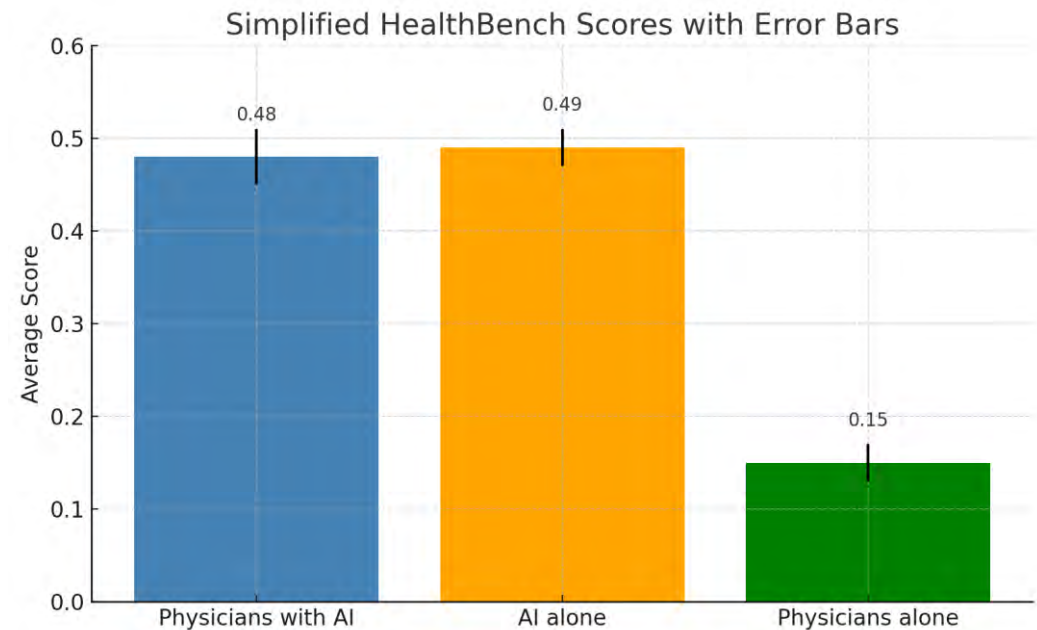
Singhal K, Golinelli D, Krishnan R, et al. *HealthBench: Evaluating Large Language Models on Real-World Clinical Decision-Making*. medRxiv. 2024.
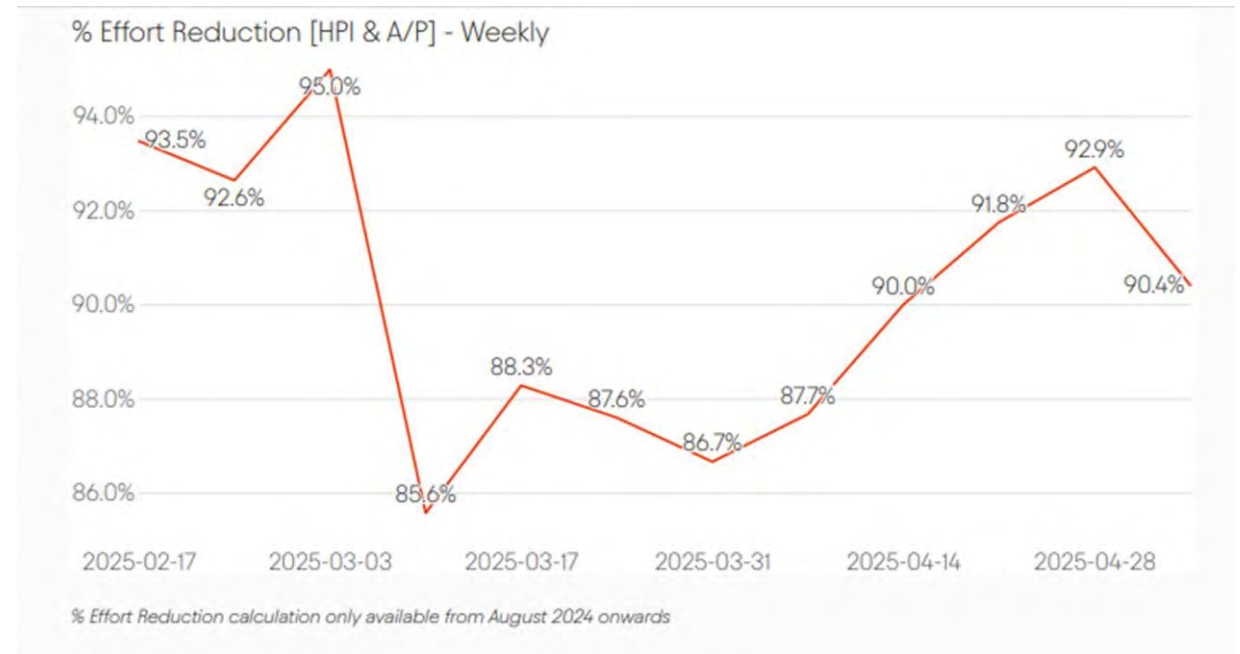
Current Landscape II: Workflow & Documentation

AI scribe: 72% chart-time reduction + burnout relief.

AAFP Innovation Lab: Impact of AI documentation assistants on clinician workload. 2023.

LMC aBridge Pilot (internal, unpublished): 85–95% reduction in note-writing effort; excels in HPI & A&P capture.

Citations: Waldren S. Healio. 2023; AAFP. Innovation Lab: Nuance DAX pilot. 2023.

% Effort Reduction [HPI & A/P] - Weekly

93.5%
92.6%
95.0%
85.6%
88.3%
87.6%
86.7%
87.7%
90.0%
91.8%
92.9%
90.4%

94.0%
92.0%
90.0%
88.0%
86.0%

2025-02-17   2025-03-03   2025-03-17   2025-03-31   2025-04-14   2025-04-28

% Effort Reduction calculation only available from August 2024 onwards

Ancillary Service Support

In-Basket Automation Pilot (internal, unpublished): patient-message reply drafting → 40% nursing inbox-time saved.

AI-Generated Prior Authorization Letters Pilot (internal, unpublished): extracts & cites supporting documentation automatically → reduces nursing workload.

Patient Support Tools

AI note-taking tools (aBridge, Otter.ai) let patients record & review visits.

Automated patient education modules via portal/SMS: personalized instructions & follow-up plans.

Emerging: AI chatbots for post-visit Q&A, symptom trackers, multilingual summaries.

Interactive Prompt

If you reclaimed 3 hours of charting per week, what would you do first?

Challenges I: Bias, Data & Black-Box

Algorithmic bias (Obermeyer high-risk algorithm example).

Obermeyer Z, Powers B, Vogeli C, Mullainathan S. Science. 2019;366(6464):447–453.

Messy EHR data & model hallucinations.

Need human verification and oversight.

Challenges II: Privacy & Ethics Frameworks

HIPAA/PHI safeguards, BAAs, on-prem vs cloud deployment.

WHO Six Ethical Principles: autonomy, safety, transparency, accountability, equity, sustainability.

AAFP. The Promise and Pitfalls of AI in Primary Care. 2024.

Mid-Lecture Demo Video

INSERT VIDEO HERE

5-min prerecorded encounter showing audio → transcription → summary → differential → work-up → note → patient handout.

Exponential Acceleration

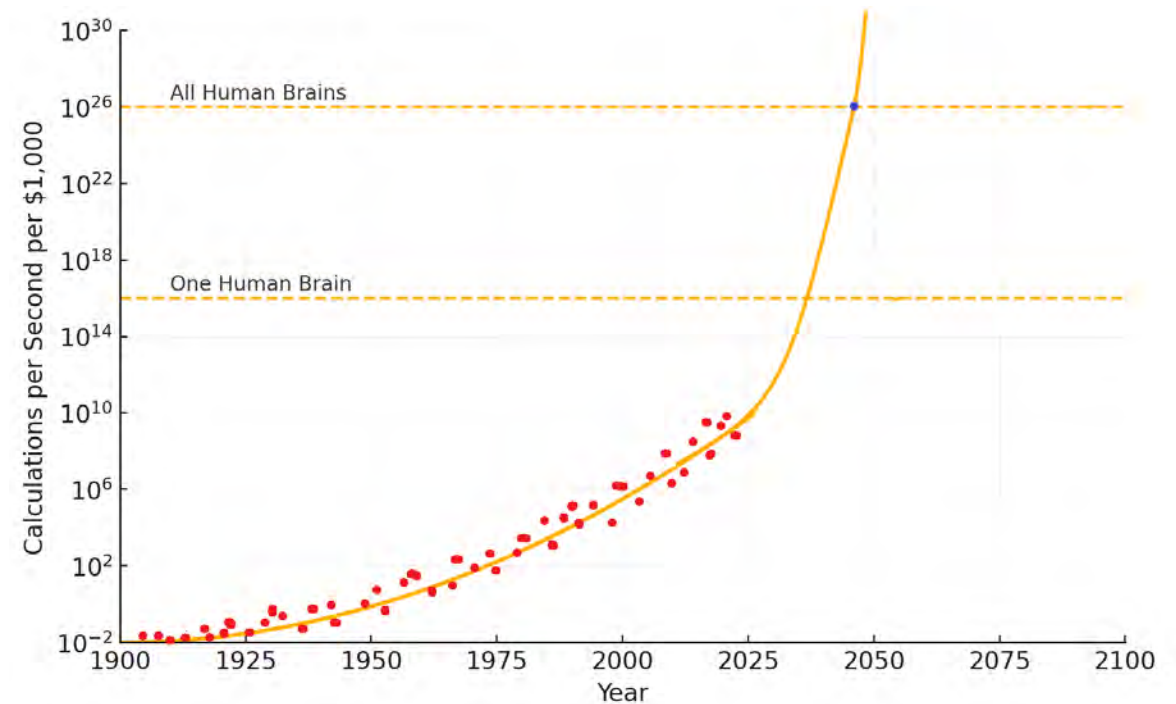Exponential tech growth accelerates intelligence gains

AI will surpass human cognition rapidly

Post-singularity, change becomes incomprehensibly fast

Machines could self-improve beyond human control

Predicted arrival around 2045 milestone

Kurzweil R. The Singularity Is Near: When Humans Transcend Biology. New York: Viking; 2005.
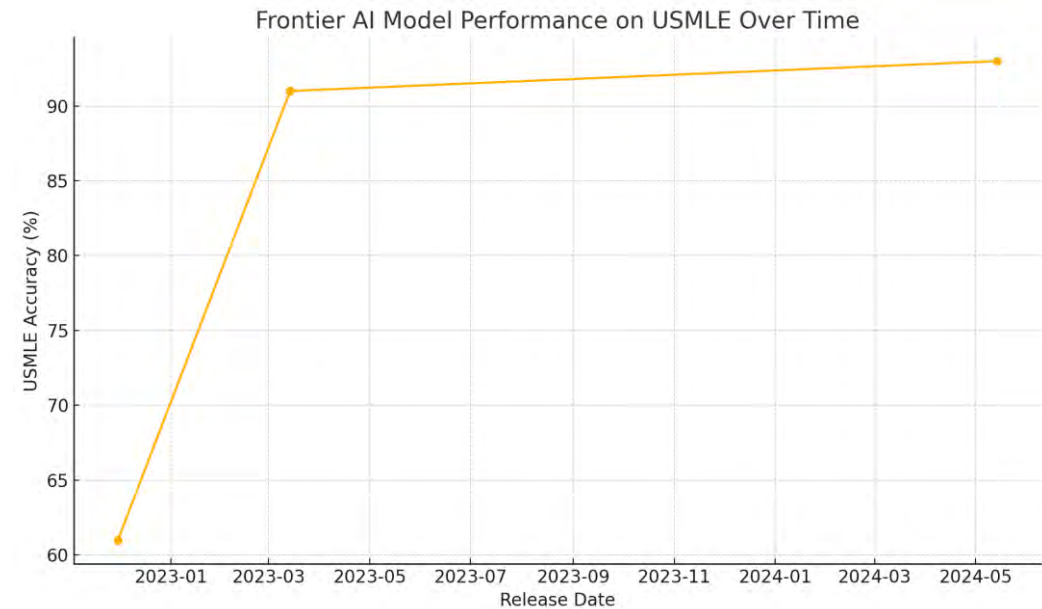
Exponential Acceleration

USMLE performance trend for frontier AI models over time:

GPT-3.5 (released November 30, 2022) scored 61.0 %

GPT-4 (released March 14, 2023) scored 91.0 %

GPT-4o (released May 2024) scored 93.0 %

Frontier AI Model Performance on USMLE Over Time

Exponential Acceleration

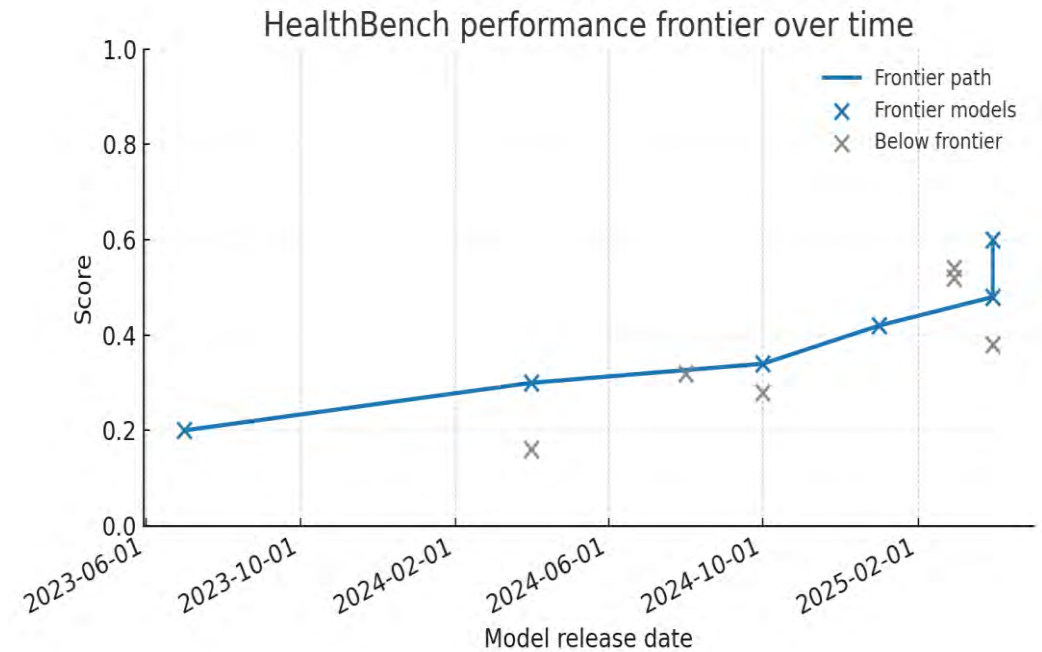Health Bench: Open-source benchmark for health AI

Built with 262 global physicians

Includes 5,000 realistic conversations

Uses 48,000+ expert grading criteria

Evaluates accuracy, completeness, communication, etc.

Model scores jumped from 16% to 60%
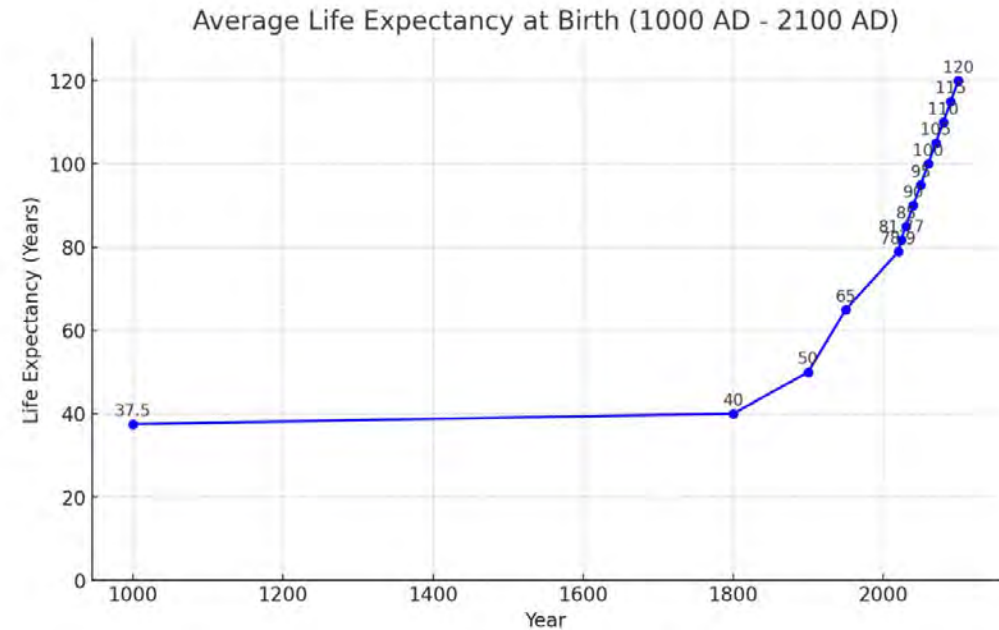
Research Horizon: Kurzweil & AlphaFold

Accelerating Returns

Longevity Escape Velocity.

AlphaFold protein folding breakthroughs.

Citations: Kurzweil R. The Singularity Is Near. 2005;
Jumper J et al. Nature. 2021;596(7873):583–589.

Average Life Expectancy at Birth (1000 AD - 2100 AD)

https://www.aifrontierx.com/p/ai-path-to-longevity-escape-velocity

Dual Vision Quotes

"In 10–15 years we can crack all disease." — Demis Hassabis, Nobel Prize winner & CEO of DeepMind

"Not only that, within 15–20 years we will also solve & reverse aging.." — Derya Unutmaz, MD

Citations: Hassabis D. MIT Tech Review interview. 2024; Unutmaz D. Longevity Summit keynote. 2025.

Reflection Prompt

Imagine no disease is incurable—and aging reversible. What does your role become?

Post-Labor Economics

Better at certain tasks: LLMs outperform MDs in diagnosis sensitivity in some trials.

Faster in triage, documentation, and results synthesis.

Cheaper at scale: after implementation, marginal cost per interaction approaches zero.

Safer in many contexts: AI doesn't get fatigued, distracted, or emotionally reactive.

U.S. studies estimate medical errors account for up to 250,000 deaths annually, making it a leading cause of death.

Citation: Shapiro D. Medium. 2023 Sep 5.

Makary MA, Daniel M. Medical error—the third leading cause of death in the US. BMJ. 2016;353:i2139.

Post-Labor Economics

Shapiro's Human-Demand Buckets:

1. Liability
2. Statutory
3. Experience
4. Meaning-making
5. Trust

Citation: Shapiro D. Medium. 2023 Sep 5.

Closing Reflection

"Some fear technology will cause doctors to lose touch with their humanity. But the truth seems to be the opposite. The doctors whose jobs will remain are the ones who offer the most human experience. They will build trust, create meaning, and show up with presence and empathy. That's not a threat — that is being a Family Physician."

— Paul Bornemann, MD

Q&A

Contact Me:

phbornemann@lexhealth.org

Scan QR code or go to URL for a handout with
AI Resources for Family Physicians

https://tinyurl.com/3p6wsyvv