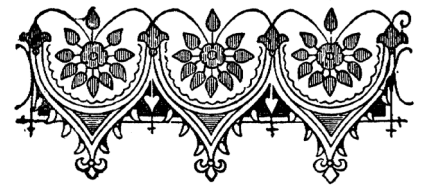


# Health & Wellness



## Using Artificial Intelligence in Medicine—The Future is Here



Dr. Kate Thomsen and Silky

The practice of medicine is a privilege. It demands attention to detail, skilled observation, intuition, open-mindedness, confidentiality, and awe at the magnificence of human physiology in its strengths and its frailties. It demands an amount of knowledge and experience of medical conditions that seems impossible to attain. A physician starting practice in 1950 would see medical knowledge doubling by the time they retired. Currently medical knowledge is doubling every 72 days!!!! Being a physician requires a lot of time - enough time with the patient for meaningful insights to occur, and time that patients never see: Seven to ten or more years in training (with little or no pay), time for continued learning of the new medical knowledge, and time for chart review, visit documentation, order entry, billing and coding, refilling prescriptions, communication through the patient portal and other administrative tasks. Most of this time is spent in critical thinking, with continual clinical decision making.

Recent survey data reports that most U.S. physicians spend less than 17 minutes with their patients. Half of that visit time is spent in the electronic health record (EHR). Overall physicians are spending almost 6 hours of an 11-hour workday in the EHR: 4.5 hours in the clinic and 1.5 hours at home. Primary care physicians report spending 2 hours on EHR tasks per 1 hour of direct patient care. Most healthcare workers agree that the EHR workload has been the cause of the high (greater than 50%) of physicians reporting "burn-out". 7% of the total U.S. active physician workforce left the field in

2021 and 2022. That's 145,000 healthcare professionals! Makes sense then why it takes so long to get a doctor's appointment.

In 2009 the government used a financial stimulus package to support the transition from paper to electronic medical charts. This EHR was supposed to make life easier, workflow faster, quality of care better and patients lives healthier. In 2019 Kaiser Health News and Fortune Magazine investigated why, 10 years and 36 billion dollars later, the EHR has never delivered on its promise. First, there has been patient harm caused by software glitches and user errors. These have been silenced as buyers of the software are prevented from speaking out on safety issues due to vendor gag clauses. The data on these system flaws have been reported but never triggered a government quality improvement study. Secondly, there has been software manipulation to "upcode" or overcharge, permitting acts of fraud against Medicare and Medicaid. Third, the EHR was never "universalized". With free market competition, companies sell unique software systems which are unable to communicate with other systems, continuing the fragmentation of healthcare. Fourth, the enormous amount of data entry by healthcare professionals has not made life easier. Instead, it has contributed to burn-out and drop-out. No worries, though – there is a new solution on the horizon, promising to revolutionize health care - Artificial Intelligence!!! It certainly has much to offer but the rapid implementation without guidelines, planning, regulations, transparency, and ethics has the potential to make something so powerful into another debacle.

The first AI program was developed in 1951 by British computer scientist Christopher Strachey. In 1956 an American computer scientist, John McCarthy, applied the term, "Artificial Intelligence" to the field of computer science that aims to create machines that can perform tasks that typically require human intelligence. In the 1980s and 1990s research-

ers developed Machine Learning (ML) where machines could learn from data and improve their performance over time. In 1997 Deep Blue, (ML created by IBM) defeated world chess champion Garry Kasparov. In the 2000s the field of Natural Language Processing (NLP) was developed. NLP is a branch of AI that focuses on the interaction of computers and humans through understanding, interpreting, and generating human language. It allows for speech recognition, analysis of sentiments, and machine translations. Virtual Assistant products (Siri by Apple in 2011 and Alexa by Amazon in 2014) were the first commercially available products able to understand and respond. But they were only able to understand a finite list of questions and requests. GPT-3 from Open AI also uses NLP. But GPT-3, introduced in 11/2022, is considered a Chatbot, a Large Language Model (LLM) AI capable of generating human-like responses to text-based queries. Large Language Models are a type of AI algorithm that uses deep learning techniques and massively large data sets. They are designed to understand, summarize, generalize, and predict new text-based content. Also called generative AI because they create or generate something new and can do this in audio, video, images, text, etc. The new Rabbit R1, currently launching, is a pocket-sized AI Assistant that uses Large Action Model (LAM) AI to execute more complex tasks than turning off your lights. The device brings words to action by using the LLM AI GPT-4 and connecting to one's personal apps (Uber, Expedia, Amazon...) in the cloud via a rabbit hole web portal. From there it performs tasks like ordering groceries, scheduling appointments, and planning vacations (even purchasing the tickets).

So what will medicine be like in the age of this kind of Artificial Intelligence? The patient visit will start with an eCheck-in, a station to self-scan identification and insurance documents. The entire medical visit will be recorded by a Chatbot

Virtual Assistant including: the physician-patient conversation and history taking, the physical exam (which will be articulated by the physician), the assessment and the plan of action. The bot will summarize and organize just the medical information and the audio file will be linked to the office visit note. The bot can perform language or educational level translations of the data for the patient, pre-authorize tests if needed, make appointments for tests and follow-up, prepare billing and receive the physician directed program for home care when needed. I don't know one physician who would complain if they were liberated from their keyboard by this kind of visit.

Improved medical imaging and enhanced diagnostic accuracy with AI are already reported in the literature. Currently the estimated number of Americans dying or being permanently disabled due to a diagnostic error is 800,000 per year. 5% of adults experience a diagnostic error each year and most people will experience at least one in their lifetime. No physician can have immediate cognitive access to the variable patterns seen in 10,000 human diseases. But the bots, with a complete and exhaustive knowledge of the medical literature (ChatGPT passed the US Medical Licensing Exam) have instant access to what would be billions of hours of clinical experience. Recent research has shown AI supported mammography, AI aided colonoscopy and AI assisted dermatologic exams to be superior to physician only testing. AI used in retinal scans has been shown to predict cardiovascular disease, Parkinson's disease and Alzheimer's disease—conditions we had no idea could be predicted by looking at the back of the eyeball.

A personalized treatment plan informed by a complex data set of symptoms, genomics, environmental, lifestyle, test results and biomarkers will be generated. The Chatbot Virtual Assistant will monitor health status at home (heart rhythms, vital signs...), provide medication or other interven-

tion reminders, identify what might be causing new symptoms, provide medical advice and contact medical care if needed.

How do we choose which AI supports to use? There will be a financial investment to be made by the healthcare system or the individual physician. It will, no doubt, carry some liability so it should be vetted well. Personally, I would like AI "scribe" support with Medical Virtual Assistant AI during the visit. I could support patients' use of Virtual Assistants at home. I would like to be able to offer patients high quality predictive or diagnostic generative AI software. But I would like it to be able to offer personalized treatment plans that include options other than "the best drugs for this case." I would like the output to include things like: the best lifestyle plan (including diet, exercise, stress reduction and sleep), toxins that may be responsible for the symptoms, the best detox protocol, particular foods or other exposures that should be avoided, superfoods best in this scenario, the most beneficial natural treatments for the symptoms, and the best pharmaceuticals if the situation demands it. There is a free, open source LLM being trained on holistic and natural health material being developed. I hope there is more to come.

In the next issue I will share my fears about AI. There were so many, I ran out of room (no surprise there!!)

For fun: [www.youtube.com/watch?v=YvT\\_gqs5ETk](https://www.youtube.com/watch?v=YvT_gqs5ETk)

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