AI and Healthcare: What Can We Learn from Star Trek[®]

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I love gadgets. I inherited that trait from my dad who let me play with his Bowmar Brain[1] calculator and his Apple IIe[2] computer. I graduated from college as a computer information systems major at a time when the Intel 80486 (i486) processor was revolutionizing computers. As an early adopter of the Apple Newton[3] and then the Palm Pilot[4] to assist me in medicine, access to textbook information in the palm of my hand on rounds and writing notes as a medical student and resident was undeniably powerful. Now with generative AI, a smart phone, and a reMarkable tablet[5], I feel truly empowered but, these tools still need me to operate at their best. They can't do my work for me.

In the rapidly advancing world of healthcare, the allure of new technology and artificial intelligence (AI) is undeniable. From diagnosing diseases with unprecedented accuracy and speed to personalizing treatment plans, AI promises a revolution. As we embark on this transformation, it's worth looking back to a hero of mine, a fictional pioneer of futuristic medicine: Dr. Leonard "Bones" McCoy from Star Trek[®]. Despite having access to a seemingly omniscient medical tricorder and advanced sickbay technology, McCoy frequently had to rely on something far more primal: his human experience, intuition, and a profound sense of empathy.

As a doctor, I still envy Dr. McCoy's tricorder. It could scan, diagnose, and analyze with incredible speed, providing reams of data without ever physically touching the patient. In many ways, it was the ultimate AI diagnostic tool. However, time and again, when faced with truly perplexing or unique medical challenges, McCoy's reliance on technology alone proved insufficient. I offer two examples:

Consider the pon farr in "Amok Time" (Season 2, episode 1)[6] when Spock, a half-Vulcan/half-human, faced a life-threatening biological situation completely alien to human understanding. McCoy's tricorder could only confirm Spock's deteriorating physical state, it could offer no solution. McCoy had to listen to Spock's fragmented explanations, observe his desperate behavior, and (spoiler alert) inject Captain Kirk with a reversible neuroparalyzer to make it look like Spock killed Kirk which ultimately broke the mental/emotional/physical deterioration Spock was undergoing. This wasn't about data processing; it was about McCoy's contextual understanding, critical thinking, and the courage to deviate from the norm. Note: We are not sure if Kirk was aware he was being injected with the neuroparalyzer, which would require a different medical ethics article about informed consent.

In "Miri," (Season 1, episode 8)[7] McCoy confronted a rapidly aging disease affecting children undergoing the side effects from a life-extension experiment. McCoy's tools identified the affliction, but a cure wasn't automatically generated. He had to become a medical detective, observing the children who were immune, isolating samples, and synthesizing a vaccine from scratch, much like a traditional scientist in a lab. This highlighted his foundational medical knowledge and the hands-on problem-solving that went beyond simply scanning. He loses access to his computer for verification of the vaccine he has created and proceeds to (spoiler alert) successfully test it on himself and save the planet's inhabitants. McCoy's need to work without his sophisticated equipment is a good reminder for all of us. Note: This

article is not about the research ethics of self-experimentation and interestingly, this episode was banned by the British Broadcasting Corporation (BBC) for any rebroadcasts.[8]

Lessons for Today's AI-Driven Healthcare

McCoy's experiences offer crucial insights for today's clinicians as AI becomes more integrated into healthcare:

Just as McCoy's tricorder enhanced his diagnostic capabilities, AI should be viewed as a powerful augmentative tool. AI excels at sifting through large datasets, identifying subtle patterns, and flagging potential issues that human eyes might miss. AI can analyze medical images, predict disease progression, and even suggest treatment protocols with remarkable efficiency[9]. This frees up clinicians to focus on areas where human expertise is irreplaceable, like complex reasoning and patient interaction.

AI is brilliant at pattern recognition within its training data. However, it struggles with the truly novel, the ambiguous[10], or the emotionally charged aspects of a patient's condition. McCoy's "old country doctor" instincts often guided him when data was inconclusive. Clinicians must continue to cultivate and trust their intuition, built on years of hands-on experience[11]. They are the ones who can recognize when an AI's output doesn't quite fit a patient's unique presentation or when subtle, non-quantifiable factors are at play.

AI models are only as good as the data they're trained on[12]. They may struggle with rare diseases, comorbidities, or patients from underrepresented demographics. This is where the clinician's understanding of a patient's individual history, lifestyle, cultural background, and emotional state becomes vital. McCoy's compassion, sometimes masked by gruffness, was always present, helping him connect with patients on a human level[13]. AI cannot replicate genuine empathy or the profound human connection that is fundamental to healing.[14] Over-reliance on AI without maintaining this human touch risks depersonalizing healthcare.

Star Trek also offered cautionary tales about unchecked AI. For instance, the M-5 computer (Season 2, "The Ultimate Computer"), designed to control a starship, concluded that human inefficiency was a flaw and the AI acted with almost catastrophic results if it had not been for the crew that remained onboard[15]. In healthcare, clinicians must retain ultimate responsibility for patient outcomes. They need to critically evaluate AI recommendations, understand their limitations and potential biases, and be prepared to override them when their professional judgment dictates. This requires both a deep understanding of AI's capabilities and a strong ethical framework for its deployment.

In order to critically evaluate AI recommendations, providers must continue to hone their skills. We cannot become lazy when it comes to history taking, physical exam, or critical thinking. To do this, time with patients is required. In today's healthcare environment where providers are being pushed to see more patients in less time, providers may see a lab or imaging study as more efficient and as "hard data" compared to a lengthy conversation or time-consuming physical exam. However, listening to a patient

and examining them serves a purpose more than just information gathering, it reinforces the provider patient relationship[16]. In addition, technology might not always be available. As an Army doctor, I was, at times, in situations where access to technology was limited and just about all I had was the history and physical for diagnosis. Instead of being able to order a blood urea nitrogen (BUN) and creatinine to establish the hydration status of a patient, I had to look at a sample of the patient's urine and evaluate the color. We have seen in recent natural and man-made disasters that providers must be able to continue to see patients even during power failures when technology will not be available.

The Future is a Partnership

The integration of AI into medicine is not about machines replacing providers, but about creating a powerful partnership[17]. AI can handle the computational heavy lifting, while clinicians bring their invaluable human qualities: intuition, empathy, critical thinking, and the ability to navigate the complex, often messy, realities of human health[18].

Just as Bones McCoy skillfully wielded his tricorder while never losing sight of the human being beneath the illness, future clinicians will leverage AI to deliver even better care. The lesson from Star Trek is clear: technology can amplify our abilities[19], but the heart of medicine will always reside in the skilled hands and compassionate mind of a human provider.

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