

Artificial Intelligence and the Future of the Clinical Workforce

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Author: Dhruv Khullar, M.D., M.P.P. <https://orcid.org/0000-0002-0053-9028> [Author Info & Affiliations](#)

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[Interview with Dhruv Khullar on concerns about displacement of clinicians by artificial intelligence and counterarguments based on economic theory.](#) 9m 23s [Download](#)

Concerns about technology disrupting the work of clinicians have existed for decades, but they have intensified in recent years amid the growing sophistication of artificial intelligence (AI) tools and their rapid adoption in health care. AI has increasingly outperformed clinicians on complex clinical tasks, and the federal government recently announced an initiative to develop agents that can autonomously provide care to patients.¹

Some experts have predicted that AI will take over clinical tasks to such an extent that there will be fewer employment opportunities for clinicians, especially in specialties such as radiology, pathology, psychiatry, and primary care. Counterarguments often emphasize technological, regulatory, and humanistic factors: it is possible, for example, that AI agents

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won't be as effective in the real world as they have been in benchmarking studies, that regulatory requirements will slow the implementation of AI tools or limit their applications, and that patients will continue to highly value empathic, relational care. Although each of these considerations has merit, economic theory and history offer distinct and possibly more structural reasons to believe that in the long run, adoption of AI agents — even models capable of performing some forms of cognitive work — could lead to an expansion, rather than a contraction, of the clinical workforce.

Health care has long been subject to a phenomenon known as “cost disease,” whereby wages in labor-intensive sectors of the economy increase in parallel with wages in sectors that experience greater efficiency gains, such as manufacturing and technology.² Service industries cannot easily automate tasks or increase productivity, but employers must still increase wages over time, since new workers can choose to enter other sectors and existing workers can move between sectors. This phenomenon partly explains why the cost of health care and education has risen dramatically while the cost of clothing, computers, refrigerators, and televisions has fallen. Some commentators have argued that the key to ameliorating health care's cost disease is transforming services delivered by clinicians into software-based goods.³ Employing a string quartet to play music (a service) is costly and limited by the availability of talented musicians, but digital recordings (a good) are ubiquitous and inexpensive.³ It is possible that AI will drive a similar transition in health care. For example, AI agents might eventually provide urgent or behavioral health care that was previously delivered by humans.

There are, however, at least three reasons to believe that AI won't reduce the need for clinical labor. The first is the Jevons paradox, whereby technological advances that enhance the efficiency with which a resource is used can lead to an increase — rather than a decrease — in use of that resource. This concept was introduced by 19th-century economist William Stanley Jevons, who observed that the introduction of steam engines that burned less coal than previous models didn't lead to a reduction in coal consumption; instead, it led to higher demand for steam engines and greater use of coal. Versions of the Jevons paradox have been demonstrated for lighting, air travel, and computing. In health care, technological advances that made procedures such as cataract surgery and joint replacement more efficient by reducing the amount of clinician effort necessary to perform them, shortening recovery periods, and improving safety enabled more patients to undergo those procedures. Decreases in the cost of genetic testing and magnetic resonance imaging have coincided with growing use of these technologies within and outside conventional medicine. There are more radiologists working in the United States today than there were a decade ago, and radiologists have higher average incomes and larger workloads than they did in the past.⁴

The extent to which AI agents increase demand for health care will depend in part on their price and the distribution of benefits associated with enhanced productivity. AI systems that are priced near their marginal cost and those that reduce the effective cost of delivering care are likely to stimulate greater demand than systems sold at prices that allow vendors to

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capture much of the value they create. Uptake of new technologies in health care is influenced by many factors beyond price, however, including clinical guidelines, insurance coverage, and patient preferences. More generally, if AI makes clinical expertise, imaging analysis, and medical services more widely available, it may shift cultural expectations about how much care is appropriate, how frequently testing should be performed, and what symptoms merit medical attention.

Second, expectations about AI-driven job loss are sometimes influenced by the “lump of labor” fallacy — the idea that there is a fixed quantity of work to be done, when in fact both the type and amount of work change over time in response to technological advancements. The lump of labor concept is usually used to describe labor changes at the level of the economy as a whole, but it may have particular relevance in the health care sector. Currently, demand exceeds supply in some areas of medicine — for example, approximately one quarter of Americans live in primary care shortage areas. In the short term, useful AI agents will therefore probably extend, rather than substitute for, the work of clinicians. In the future, however, advances in AI may allow clinicians to prevent or treat conditions in ways that aren’t currently possible — or even imaginable. It would have been difficult for early 20th-century physicians to foresee the need for radiologists or for mid-century oncologists to conceive of eventually administering and managing new immunotherapies. AI may increase the demand for new professional capabilities by creating new treatments, care modes, and opportunities for specialization.

Third, labor economists distinguish between tasks and skills.⁵ Tasks refer to specific activities needed to carry out productive work. They can be abstract, manual, or routine, and have varying degrees of vulnerability to automation. A surgeon needs to decide whether to operate (an abstract task), carry out the operation (a manual task), and document both activities (a routine task). By contrast, skills refer to a person’s abilities to perform new and existing tasks. Although AI has increasingly become capable of automating clinical tasks such as visit documentation and electrocardiogram analysis, the practice of medicine requires many skills that enable a large number of interrelated activities, such as interpreting test results, managing uncertainty, consulting colleagues, negotiating treatment plans, motivating behavior change, and leading teams.

The automation of tasks won’t necessarily translate into the automation of jobs. In fact, if AI automates some clinical tasks, the value of nonautomated, human tasks may increase. According to “O-ring theory,” which gets its name from the faulty rubber seals that caused the Space Shuttle *Challenger* catastrophe, complex processes can be compromised because of an error at any step. As systems become more expensive and more effective, small mistakes become more costly. A missed diagnosis is less consequential when no useful treatment exists than when a cure is readily available, for example. O-ring dynamics are omnipresent in health care, since outcomes are often contingent on the performance of a series of interdependent steps and failure at any stage can dramatically undermine quality. In addition, in certain instances, AI agents acting independently might perform better than humans on

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safety-related measures, but their adoption could nonetheless be delayed or restricted owing to societal discomfort with autonomous systems, as has happened with self-driving cars.

Clinical roles will undoubtedly change in the AI era, and some types of health care jobs could be replaced. Nonetheless, these economic arguments challenge straightforward narratives about clinician displacement. Assumptions about the size and nature of the clinical workforce required to meet the public's needs influence decisions about training programs, payment policy, biomedical investment, and funding for health care infrastructure, as well as the expectations of future generations of clinicians. In some cases, predictions can be self-fulfilling: if people believe that a particular scenario is likely, they may behave in ways that ultimately make it a reality. Developing a clearer sense of the range of possible futures for AI and the clinical workforce is an essential step in bringing about the future we want.