

The Future of Work: A Human and Machine Mindset

Kaveh Safavi, MD, JD, and Maureen O'Neal, RN, BSN, MBA

“The Future of Work: A Human and Machine Mindset” is a perspective on the nursing shortage that introduces a human + machines mindset solution. There is a mismatch between demand (too much) and supply (not enough). Traditional methods such as recruiting, hiring, flexible scheduling, and retention bonuses won't solve the problem. We address transforming nursing tasks—identifying tasks best suited for people or technology as well as remodeling the work of the nurse to run in tandem with technology. If industry leaders embrace this mindset, with some tasks shared by technology and people, nurses are empowered to better serve patients.

Although the drivers behind the nation's nursing shortage have been well documented, there are larger, often overlooked, issues at play. Health care is a highly labor-dependent industry, yet there aren't enough working-age people to fill needed clinical roles. This problem will only worsen as the nation's aging population requires increasingly more health services.

Although shortages of physicians and nonclinical positions are also likely, addressing the nursing shortage is perhaps most critical because it significantly impacts patients' access to care. That, in turn, impairs hospitals' revenue streams. Unable to fill beds and operating rooms due to insufficient nurse staffing, hospitals face dwindling revenues. Health care executives, long accustomed to thinking of nursing as an expense, need to reconsider it as a revenue source.

The path to increasing access to health care and preserving revenues requires a new mindset. Organizations need to rethink the work being done by nurses, divide tasks between nurses and technology that augments human capacity, and then reconsider what work is like when humans and machines work together. While these concepts are not new—many other industries have adopted them—they are challenging to adopt. In health care, the conventional wisdom has been that, in the absence of an access crisis, the costs often outweighed the benefits. But today, the industry has reached an inflection point. The demographics support a case for rethinking work because doing nothing will result in patients waiting an unacceptably long time for care.

We call this the human-machine mindset. It involves understanding how some aspects of work that

are done solely by humans today can be accomplished by humans and machines together in the future. By introducing technology, reallocating tasks, and remodeling nursing jobs, nurses can devote more time to patient care, which in turn will improve access and ease the strain of the nursing shortage. This paper addresses the transformation of nursing work, not just the workforce side of the equation.

The industry, of course, isn't sitting still, waiting for change to happen. Many health care organizations are already making progress by adjusting their models to improve patients' access and experience, relieve pressure on nurses, and enhance the delivery of care. For example, some have introduced virtual nurse programs; others are increasingly recruiting a variety of skilled staff such as licensed practical nurses and establishing career paths for them. Still others are

KEY POINTS

- **The nursing shortage is impairing patients' access to care.**
- **There aren't enough working-age people to serve the growing demand.**
- **Nurses' work will be remodeled via a human + machine mindset in which some tasks are done by technology and people of various skills, enabling nurses to better serve patients without adding more staff.**
- **By relieving nurses of some tasks, technology can improve job satisfaction and attract more people to a nursing career.**

leveraging innovative technologies to empower nurses. Going forward, however, the reimagination of nursing work will require more comprehensive change at a faster pace.

DEMOGRAPHIC CHALLENGE

Health care has both a demand and supply problem. Over the next 20 years, the segment of the population 65 years old and over—the highest utilizers of health care services—will continue to rise. There are approximately 56 million people in this cohort now, but the number will grow by 44% to almost 81 million by 2040.¹

Compounding this problem, there simply aren't enough people to work as health care providers to meet the growing demand. By 2030, there will be only 2.9 working adults for every senior person, down from 3.5 persons today (a 17% decrease), to serve a segment that will have grown substantially.¹ The health care industry faces a unique dilemma: inevitably, every retiree shifts from the supply side to the demand side of the ledger. Thus, health care's challenge is getting bigger and growing faster than any other industry.

On the positive side, job growth in the health care industry has far outpaced the rate of job growth in the overall economy in recent years. Looking ahead, overall employment in health care occupations is projected to grow 13% from 2021 to 2031, much faster than the average for all occupations, according to the Bureau of Labor Statistics.²

Although there are roughly 3 million nurses working today, it is estimated that 3.3 million will be needed by 2030. Yet approximately 600,000 nurses are projected to retire by then, leaving a shortfall of 900,000. Nursing school graduates—about 100,000 annually—will certainly help fill this gap. But many of those graduates pursue advanced degrees, teaching, and other avenues. That will leave a 10-15% shortfall in terms of the nation's requirements for nurses by 2030 (Accenture analysis, unpublished).

Another problem: nearly 92,000 qualified applicants to US nursing schools were turned away in 2021 due to faculty shortages, a lack of classroom space, and budget constraints, according to the American Association of Colleges of Nursing.³

Hospitals are feeling the impact of the nursing shortage in 2 ways:

- To stave off the exodus of burned-out nurses, many are raising salaries and paying bonuses. Not surprisingly, hospital labor costs jumped more than 19% through 2021 compared to 2019 levels.⁴
- Many hospitals don't have enough staff to fill existing physical capacity, resulting in a revenue shortfall, which is a particularly difficult problem because hospitals are saddled with a large, fixed cost base.

The net effect of these forces is operating income losses. According to an American Hospital Association report, hospitals are likely to have incurred billions of dollars in losses last year, with more than half projected to have negative margins (up from 34% in 2019).⁵

Given the mismatch between demand (too much) and supply (not enough), the problem can't be solved solely by relying on traditional methods such as recruiting, hiring and retention bonuses, flexible scheduling, and additional time off.

That leaves the health care industry with an option that many other sectors of the economy facing similar challenges are embracing—relying on technology to help human workers manage their jobs while repurposing the jobs themselves to enable greater productivity and customer focus. Embedding technology into the nursing workforce can help reduce stress while enabling nurses to spend more time engaging with patients—the reason many of them choose their profession in the first place.

Nonclinical activities consume an inordinate portion of nurses' days. Direct care clinical nurses spend only 35% of their time directly interacting with patients, with between 26% and 41% of their time spent either creating or reviewing clinical documentation. An additional 16% of time is taken up with locating physicians, colleagues, and resources. And increased use of external agency nurses typically ties up veteran direct care clinical nurses with upskilling these colleagues.⁶

The goal is for nurses, like any clinician, to operate at a level commensurate with their experience. Activities that don't leverage their expertise and skills, like bringing food to patients, should be shifted to others such as machines or support staff.

RETHINKING WORK

Meeting the growing demand for health care services requires rethinking work—specifically tasks, not jobs. Some tasks can be done by people on an as needed basis only—so-called “adaptive workers.” Some tasks can be done by people who are less extensively trained and in greater supply, and some tasks can be done by technology—either physical or cognitive robots. Rethinking work will result in a workforce that is a combination of these 3. Not all jobs are the same, of course, and the allocation of tasks will need to be done on a job-by-job basis.

Leveraging technology—that is currently available or approaching market readiness—we modelled the potential clinical workforce of tomorrow (*Figure 1*). Today's unit of 10 registered nurses all doing similar tasks would look quite different: a fixed workforce of 4 nurses doing similar work as they do today; 2 specialized nurses needed only at specific times for specific reasons (adaptive workers); and 4 technologies—physical or cognitive robots.

POTENTIAL FUTURE CLINICAL WORKFORCE

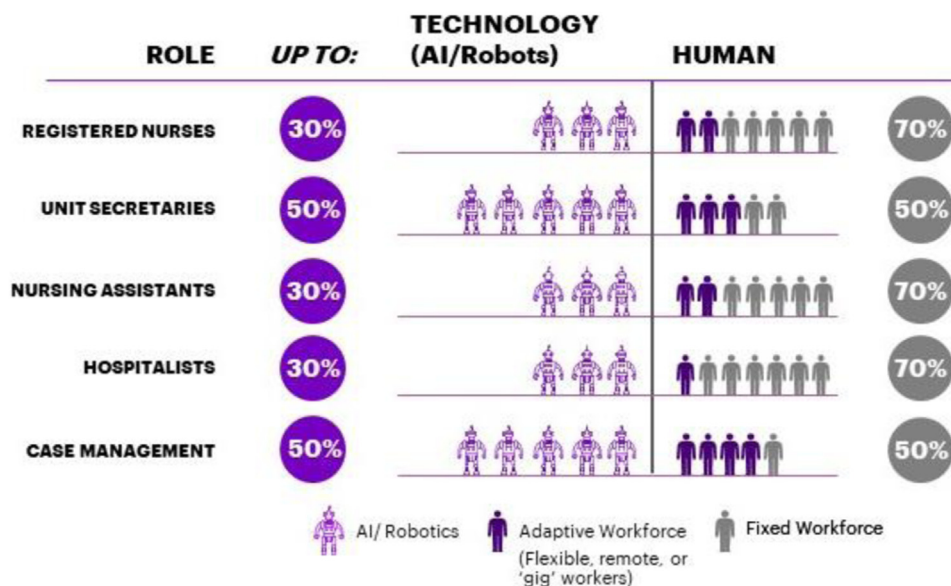


Figure 1. Accenture Analysis 2022

Our model revealed different mixes of human, adaptive and technology workers depending on the particular clinical role. Thus, the model showed nursing assistants relying less on artificial intelligence and robots than did registered nurses. Clearly, a one-size-fits-all approach won't be applicable. Each role must be crafted based on physical and cognitive needs, available technology, and the projected demand over time for each specialty.

Automating or shifting nonclinical tasks away from nursing staff raises the question—what can nurses do with the time they get back? Even with just several minutes a day free, nurses can reclaim that time for themselves, which can help make their jobs more tolerable, resulting in improved job satisfaction and lower turnover. Another potential benefit: improved patient experience as nurses spend more time with patients, or even improved quality of care due to better documentation, fewer distractions leading to fewer errors, and more time to determine the best course of action.

As more time becomes available, the paradigm shifts towards repurposing time such as being able to serve more patients. The system will generate more productivity and reduce barriers to accessing care.

The new workforce will be defined by several different jobs. Some jobs will be similar to today's jobs, such as nurses on site doing a variety of physical and cognitive tasks. As simple tasks are shifted to technology, nurses' remaining tasks will be more complex, but it won't make sense for all of them to do the same tasks. Some tasks will be best performed by adaptive workers on an as needed basis. An adaptive workforce provides

access to a larger workforce pool. For example, work models are developing that allow documentation—which consumes a significant portion of nurses' days—to be completed by technology and a nurse in a remote location observing the work (sometimes called "virtual nursing").

Today, some hospitals leverage virtual nurses in which bedside and virtual nurses collaborate as part of patients' care team. Virtual nurses perform a variety of tasks such as assisting with admissions, monitoring patients' status, documenting changes in condition and communicating with other team members, typically engendering positive feedback from both patients and staff.

In other cases, follow-up tasks such as phone calls can be performed at remote locations by staff who may not need the same level of licensure as nurses, as long as they are coordinated with the care team. In other instances, highly specialized work will require an experienced clinician who only needs to be engaged at select times and who may not need to be in physical proximity to the patient or other nurses. For example, oncology protocols that are highly specialized with episodic demand may be served best by an adaptive and highly skilled workforce. Although not all tasks can be transformed this way, remodeling work will make the nursing workforce more productive and improve access to care.

NURSES AND MACHINES AS COWORKERS

In manufacturing and other industries, humans and machines increasingly work alongside each other as coworkers. As the health care industry evolves, so too

will nurses collaborate with intelligent machines and artificial intelligence. This will require a set of skills that don't exist today—skills that recognize how humans and technology will interact.

Defining these skills—what we call the “missing middle”—will become especially important because, as technology systems become more sophisticated and learn on their own, nurses' interactions with them, in turn, will evolve (*Figure 2*).⁷

These technology coworkers involve artificial intelligence—technology that can change itself without explicit programming because it learns from prior use. Thus, how a nurse engages with a cognitive or physical robot will influence how that robot reacts the next time it is used. For example, the middle skill known as “Intelligent Interrogation” means that the answer or effect you may get from a robot varies by how you ask it questions or set up an environment. Another skill—“rehumanizing time”—addresses how people reuse the time they get back from their bot coworker's effort, such as doing their tasks more effectively, or taking on more or different tasks.

As much as 30% of nurses' tasks can be shifted to automation.⁸ This shift will come with challenges—some are known, such as the middle skills discussed above, and some are unknown. In all cases, however, the answers will need to be learned by the clinical teams as the work evolves, rather than simply following a protocol. For example, if routine, relatively easy tasks are all handled by machines or less trained colleagues, nurses' jobs will be more difficult because they will be left entirely with harder tasks that rob them of opportunities for cognitive breaks. This phenomenon has been demonstrated in other jobs even without the use of technology. Thus, nurses' workdays may need to be reimaged. But the solution won't be the same for all nurses. Given this limitation, attaining that 30% shift to automation is unlikely, but getting even halfway there—15%—will solve the access gap.

The net effect of these unknowns requires organizations to adopt a “test and learn” approach to work. This is very different from what clinical staff has been asked to do over the last 20 years—eliminating process variation to reduce errors and inefficiencies. Moving from “follow the protocol” to “test and learn” is a leadership challenge. Test and learn will require nurses to focus on the outcomes of their work and realize that each human and machine pair will work slightly differently based on how the human cues and responds to the technology—much like a human coworker. Ultimately, this will lead to reliable outcomes, not just reliable processes.

ATTRACTING TALENT

Of course, whereas technology can relieve nurses of some tasks, the industry will remain heavily dependent on human labor, so it must continue to relentlessly hire and retain new talent. Health care organizations will

Human and machine hybrid activities					
Humans complement machines			AI gives humans superpowers		
TRAIN	EXPLAIN	SUSTAIN	AMPLIFY	INTERACT	EMBODY
Rehumanizing time			Intelligent interrogation		
Responsible normalizing			Bot-based empowerment		
Judgment integration			Holistic melding		
Reciprocal apprenticing					
Relentless reimagining					

Figure 2. Fusion Skills for the Missing Middle⁷

need to attract more than their fair share of available human talent. But it will take a deep understanding of why people work and who they work for.

It's well established that people are motivated to work for a myriad of reasons, including but not limited to, compensation and professional development. Increasingly, driven by the pandemic, they seek to work for organizations that care about them holistically and provide them a feeling of belonging. Many people are reassessing careers, professional goals, and work/life balance. Thus, to entice people to work in health care, the industry must earn their trust by understanding and accommodating their motivations.

With nurses in great demand, they have many options including: whether to take a traditional nursing job or join a related field such as administration or teaching; become a travelling nurse; or pursue another career. One measure of the appeal of a job is known as “net better off” (NBO). It is a holistic approach to employee satisfaction that gauges several factors: financial; emotional; relational; physical; purposeful; career mobility.

Our research demonstrates that the health care industry faces a major challenge in attracting and retaining workers. The health care workforce NBO score ranked last among the 7 industries we studied. In short, health care workers don't feel like they belong.

We found that the gap is largely due to a misunderstanding of what exactly drives employee satisfaction and net better off feeling. Health care employers seem to be neglecting some important dimensions. For example, health care chief experience officers believe that the “hard” dimensions (financial and employable) are sufficient, but they are failing to deliver on the human dimensions, which are just as important.⁹

One path to improving NBO is for health care organizations to develop new approaches to training nurse leaders so they can help care teams learn how to work differently and collaborate with their coworkers, whether human or machine.

CONCLUSION

The challenge facing health care is not a workforce issue, it is a work issue. Health care organizations won't be able to serve the rising demand in the coming years by conducting business as usual—relying on people to do everything. It's time to rethink work. That will, in turn, change the nature and meaning of work, requiring a re-examination of how nurses are trained, recruited, and retained.

REFERENCES

1. Vespa J, Medina L, Armstrong D. *Demographic Turning Points for the United States: Population Projections for 2020 to 2060*. Current Population Reports. P25-1144. Washington, DC: US Census Bureau; 2020.
2. US Bureau of Labor Statistics. *Occupational Outlook Handbook: Healthcare Occupations*. Washington, DC: US Bureau of Labor Statistics; 2022.
3. American Association of Colleges of Nursing. AACN Fact Sheet - Nursing Faculty Shortage. 2022. Available at: <https://www.aacnursing.org/news-information/fact-sheets/nursing-faculty-shortage>. Accessed January 10, 2022.
4. American Hospital Association. *Massive Growth in Expenses and Rising Inflation Fuel Continued Financial Challenges for America's Hospitals and Health Systems*. Washington, DC: American Hospital Association; 2022.
5. KaufmanHall. *The Current State of Hospital Finances: Fall 2022 Update*. Chicago, IL: Kaufman, Hall & Associates; 2022.
6. Schenk E, Schleyer R, Jones CR, Fincham S, Daratha KB, Monsen KA. Time motion analysis of nursing work in ICU, telemetry and medical-surgical units. *J Nurs Manag*. 2017;25(8):640-646.
7. Daugherty P, Wilson HJ. *Human+Machine: Reimagining Work in the Age of AI*. Boston, MA: Harvard Business Review Press; 2018.
8. Muro M, Maxim R, Whiton J. *Automation and Artificial Intelligence: How Machines Are Affecting People and Places*. Washington, DC: Brookings; 2019.
9. Shirodkar S, Hines K, Blanchard S, Hammond J, Murtaugh C. Caring for employees = caring for business. Accenture. 2021. Available at: https://www.accenture.com/_acnmedia/PDF-157/Accenture-Health-Caring-for-Employees-and-for-Business-AU.pdf. Accessed January 10, 2022.

Kaveh Safavi, MD, JD, is Senior Managing Director-Consulting, Global Health, at Accenture in Chicago, Illinois. Please address correspondence to Patti S. Becton, Accenture Marketing Director, Global Health, in Irving, Texas. She can be reached at patti.s.becton@accenture.com. Maureen O'Neal, RN, BSN, MBA, is Principal Director-Consulting, Global Health, at Accenture in Boston, Massachusetts. Please address correspondence to Patti S. Becton, Accenture Marketing Director, Global Health, in Irving, Texas. She can be reached at patti.s.becton@accenture.com.

Note: This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

1541-4612/2023/

Copyright 2023 by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.1016/j.mnl.2023.02.011>