

Getting Smart About Artificial Intelligence: Workforce Investment Strategies



Artificial intelligence, machine learning and automation offer innovative approaches for health systems focused on long-term workforce support

COVID-19 provided the tipping point for healthcare's current workforce shortage, and as a result, hospitals and health systems continue to grapple with solutions for recruitment, retention, deployment and the reinvention of care delivery. With 55% of frontline healthcare workers suffering from burnout and up to 47% planning to leave their positions in the next five years, finding solutions that reduce work burden, identify efficiencies and reduce labor needs has moved from "desired" to "required".

Artificial intelligence (AI) and automated solutions have seen meaningful development in recent years and can offer measurable improvements for the workforce and patients. However, technological developments in healthcare are often seen as a double-edged sword with promises of transformation falling short of expectations - especially when solutions are not appropriately vetted, implemented and supported. Moreover, leaders are inundated with options. A survey from Panda Health found 55% of hospital and health system executive respondents reported they receive more than 11 vendor calls and emails from digital health solution vendors per week.

With an abundance of options and a limited framework for testing, clinicians and leaders want to have a thorough understanding of costs, timelines and expected results as well as transparency into how AI platforms make decisions.

Whether automating repetitive work, supporting clinical and operational decision making or identifying risks within the continuum of care, AI has arrived to reduce the myriad of burdens modern healthcare requires.

This analysis explores four key areas where organizations can implement high-impact solutions within the next five years to support their workforce: Revenue Cycle/HR, Ambulatory Nursing, Inpatient Care and Pharmacy.

“ AI is not going to replace leaders (sic), but leaders who use AI are going to replace leaders who don't. ”

Keith Horvath, MD

Association of American Medical Colleges

Terms and Definitions

Although often used interchangeably, many applications use different types of technology. A basic understanding of the following terms helps decode "tech speak" when working with vendor partners:

Artificial intelligence (AI): The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision making and translation between languages.

Machine learning (ML): A type of AI that becomes "smarter" the more it is used to process data. As more data are processed, the AI system has more intelligence to draw from to identify trends and patterns.

Natural language processing (NLP): A type of speech recognition AI that can understand spoken word and convert it into data that can be processed by a computer.

Robotic process automation (RPA): Applications that automate high-volume, repetitive tasks. When combined with AI, tasks can be performed with intelligent automation.

Revenue Cycle & Human Resources

Using AI applications in departments such as revenue cycle and human resources are the jumping-off point for many healthcare organizations. Revenue cycle applications tend to focus on the reduction in bad debt and accounts receivable cycle times, while HR solutions focus on workforce construction and compensation alignment. Such applications can be used as proof-of-concept for wider AI adoption and as a funding source for next-round investments in AI. A recent survey found two-thirds of health systems already use AI in Revenue Cycle Management (RCM) and an estimated 83% of US companies already use AI for HR-related functions. Adoption rates for both are expected to approach 100% over the coming years.

These utilization rates are so high because applications in revenue cycle can quickly increase top-line revenue and decrease costs while HR automation can help optimize labor – the single largest expense in healthcare. Couple those returns with the fact that the data-vastness and rules-driven nature of both revenue cycles and workforce

deployment create rich ecosystems for AI applications, particularly in the space of big data analytics for cash flow and productivity, and the widespread use makes sense.

In addition to this value proposition, external pressures are mounting. As insurers continue to adopt AI to streamline their processes and strengthen fraud detection, providers are increasingly pressured to improve claims accuracy at a time when margins and access to labor are both tightening. Currently, mistakes in front-end eligibility checks account for 40% of claim denials.

Additionally, as workforce shortages become a top challenge, organizations need to evolve their recruitment, retention and variable workforce initiatives in both sophistication and situational sensitivity. This will create an operational environment that can both anticipate and respond to highly volatile patient volume and labor conditions – capabilities that pattern detection and predictive AI can support.

Function	How it will change
Revenue Capture	<p>Patient billing and collections improve with autogenerated information on patient preferences and behaviors, such as preferred communication methods, payment forms, best times to contact or need for financial assistance.</p> <p>Guiding providers through charting helps reduce claim denials by ensuring accurate pre-submission documentation and verification and limiting mistakes in eligibility checks.</p>
Revenue Cycle Workflow Management	<p>Front-end eligibility and back-end denial work can be streamlined through automated and personalized workflows created through machine learning.</p> <p>Coding updates and changes are continually deployed and applied to rule engines, reducing the time needed to research and learn new codes.</p>
Staff Recruitment/Deployment Optimization	<p>Organizations can automate resume screening, interview scheduling and credential verification processes.</p> <p>Customized AI assistants, like chatbots but designed to understand the personality and culture of the organization, can conduct informational interviews, online assessments or prescreens, as well as answer frequently asked questions. The 24/7 availability of these tools increases flexibility for applicants and decreases the time it takes to make a job offer.</p> <p>Predictive analytics allow recruiters and hiring managers to identify potential staff openings and role or responsibility optimization opportunities. For example, lower value tasks can be aligned with lower cost workforce components.</p> <p>AI algorithms can be leveraged to identify and source passive talent.</p>

Considerations

- Opportunities to redeploy RCM staff may be limited without significant investment in retraining given the narrow skill sets of these roles. Options that build on existing skills could include financial counseling, patient navigation and open-enrollment assistance.
- Automating repetitive tasks can free up time that can be spent on high-value, strategic tasks such as proactive outreach to patients in need of financial assistance or affordable preventive health services, as well as people-facing recruitment efforts like final interviews or convincing candidates on the merits of working at the organization.
- Expect a growing number of revenue cycle vendors to integrate AI into their products. Benefiting from size and ability to scale, vendor-based AI systems will rapidly become robust, making it increasingly attractive for provider systems to outsource RCM.
- Organizations must balance HR functions that can be automated and those that require a human touch. Overdependence on AI can potentially depersonalize the recruitment and hiring process, making it difficult for job candidates to fully understand the organization's culture.
- Software has long existed to aid in automating key functions and measures in RCM and HR. However, with the emergence of AI, we can see key insights, root causes and contributing factors. Current technology now allows existing "status level" tools to be expanded to identify not only what is occurring (both positive and negative) but when it is happening, why it is happening and even who is contributing to it. The identification of such patterns allows for both swifter interventions and more targeted and permanent solutions for any identified issues.

Case example:

Facing regional nursing staff shortages and inefficiencies, MercyOne, based in Des Moines, Iowa, looked to retool a cumbersome scheduling process, which required multiple planning meetings each day among charge nurses, staffing managers and unit directors. It implemented Hospital IQ, an automated, AI-enabled staffing solution that generates forecasts up to a week in advance, leveraging predictive analytics to forecast unit census and identify units that will be over-/understaffed. These multiday, unit-level forecasts have significantly improved staff allocation across the system's nine acute care medical/surgical and telemetry units. Unit clerks now coordinate staffing in under 30 minutes. Across all acute care services, shift-based incentive pay declined 70% and overtime spend declined 20%.

Ambulatory Nursing

Sg2's Impact of Change® forecast projects 16% growth in demand for outpatient encounters over the next ten years.

For practices to manage growing, complex patient populations, and meet consumer expectations, it will be essential to automate and augment team-based care with AI. Many clinic team functions could be transformed,

enabling top-of-license care and alleviating the high levels of nursing burnout revealed in the recent [Workforce Intelligence Report](#) from [Vizient®](#) and [Vaya Workforce](#).

Function	How it will change
Managing the inbox	Chatbots deploy standardized responses or route messages to the best recipient (e.g., medication questions to pharmacists), saving significant time. Many systems have implemented chatbots with varying levels of success based on the level of data gathered.
Scheduling/Triage	AI-enabled solutions can support centralized nurse triage and scheduling, improve real-time productivity management, improve work processes and better align labor, which boosts call center and clinic efficiency. Natural language processing (NLP) solutions enable highly automated triage (by specialty and appointment type, including virtual versus face-to-face visits), and machine learning (ML) tools can predict and disrupt staffing/work mismatches, helping organizations avoid and more smoothly navigate capacity constraints. COVID-19 drove an uptick in the use of NLP & ML tools among overwhelmed organizations seeking to manage surges. Now systems need to adopt these tools into their business-as-usual workflows to manage workforce challenges, reduce work burden and ensure safe care within the new normal.
Task Management	By managing the consults of specialty providers and creating efficiency in daily work, software solutions can help the entire care team to prioritize patient needs. These programs can also eliminate redundant tasks, organize work, increase compliance to “best practices”, and automate the reporting of activities and results.

Considerations

Specialty care practices, such as triage, may be a good place to start with AI because specialty care typically follows standardized protocols across a narrow range of conditions.

Case example:

Hartford (CT) HealthCare Cancer Institute's ineffective patient scheduling system drove high peaks and low valleys of patient volumes, complicating nurse staffing. Use of an automated system powered by AI and ML in its infusion center made rebalancing the nursing workload feasible. Patient appointments are now spread more evenly throughout the day, and the system can identify patients who may need a longer appointment or to be rescheduled.

Patient wait times dropped 27% without the institute hiring additional nursing staff even while average daily volumes grew 9%. Time to next appointment also decreased from 14 days to 12 days.

Inpatient Care

Automation can't come soon enough in an environment where inpatients are expected to be sicker and care more complex. Tertiary cases alone are **forecasted** to grow 17% and inpatient days are expected to increase 8%.



Watch: Mpirik CEO Logan X. Brigman describes AI's growth in healthcare and implications for the clinical workforce.

This rising patient acuity is on a collision course with increased scrutiny of outcomes and growing regulatory and payer requirements. Such demands already have increased documentation requirements and added to the complexity of work.

For example, hospitalists report spending an average of four hours every shift using the electronic health record (EHR), contributing to burnout, turnover and work burden.

“ When we look at the volume, variety and velocity of [healthcare] data, it will only continue to increase. So, scalability will be vitally necessary given the combination of clinician burnout, an aging population and this massive increase in data. ”

Logan X. Brigman
CEO
Mpirik

Function	How it will change
Diagnostic Support/Symptom Monitoring	<p>Early detection of deteriorating patient conditions empowers the care team to quickly adjust care protocols. The use of image and pattern recognition solutions can radically reduce response times when a patient's condition changes.</p> <p>While such solutions are well established in specialties such as radiology and neurology to scan images and provide initial diagnosis, they are also available in nearly all acute care environments, such as nursing floors and emergency departments.</p>
Staffing/Workforce Deployment	<p>AI- and app-enabled scheduling tools can better align acute care staffing with demand by leveraging predictive analytics and access to real-time data.</p> <p>AI-enabled solutions exist to determine whether productivity variability is related to staffing, work processes or prioritization.</p>
Task Management	<p>By managing consults, improving turn times, reducing silos or improving length-of-stay (LOS), software solutions can help the entire care team to prioritize patient needs. Like in ambulatory nursing, these programs can also eliminate redundant tasks, organize work, increase compliance to best practices and automate the reporting of activities and results.</p>

Considerations

Prioritizing AI for nurse scheduling can help address staffing and productivity challenges as well as standardize work.

Case example:

Seeing opportunity to free up staff time to manage more complex claims denials and patient cases, a northeastern academic medical center (AMC) adopted Olive, an AI-enabled RCM platform, to streamline its existing manual processes. The tool helps to determine if procedural prior authorization is needed and, if so, to identify and collect supporting paperwork. Current capabilities also include automation of front-load services such as insurance verification. The platform's dashboards show savings and compliance rates. Beyond RCM, the AMC envisions using AI to proactively notify payers of medical admission and improve patient satisfaction.

Pharmacy

We know there is enormous value when organizations move from “order entry pharmacy” to “clinical pharmacy”. As the industry pushes pharmacists to practice at the top of their license, improve pharmacological stewardship, expand consults and optimize medication reconciliation, low-value work still consumes a disproportionate amount of their high-cost time—pharmacists spend an estimated 40% of their time on order verification.

As healthcare continues its multi-decade migration toward value-based, team-based and patient-facing care,

pharmacies will have to redesign work rules, optimize tasks and roles, and effectively measure and monitor new performance indicators that aren’t accommodated by existing systems. A failure to invest in technology that supports such efforts will potentially cost organizations and their patients in expense, outcomes and engagement.

The concept of personalized medicine is core to patient-facing care. This is where the true power of AI in pharmacy shines, including customizing dosing and medications to a patient’s biometrics.

Function	How it will change
Research	<p>A Siri-type application gives pharmacists easy and real-time access to information and resources, such as compounding recipes, that they currently access manually. Early detection of deteriorating patient conditions will empower hospitalists to quickly adjust care protocols.</p> <p>The technology and the data exist, but integration into clinician-facing applications lags.</p>
Supply Chain/Inventory Management	<p>Amazon-type ordering applications can identify potential suppliers and compare costs for drugs and supplies, particularly in times of shortage and crisis.</p> <p>Supply chain can be integrated with clinical and other data sources to manage cost and track inventory to flag unusual activity and identify cases of abuse and theft.</p> <p>This technology is available today but costly. Partnering with or outsourcing to third-party vendors may be options.</p>
Role/Process/KPI Optimization	<p>Process component analysis and insight reporting technologies identify “what is”, “what is optimal” and “what is contributing to deviations”. This allows organizations to evolve roles, responsibilities and measures to reflect the results of desired value-based outcomes.</p> <p>Component cycle-time monitoring with pattern detection is a fast-growing segment of ML adoption within pharmacy. This technology helps an organization know how long sub-components are taking, for whom, why and with flags that trigger real time alerts when boundaries are violated. This level of monitoring is becoming a standard practice for operators who want to avoid “rear view mirror” management.</p>
Performance/Costing Monitoring	<p>AI monitoring of activities, flagging of potential risks and monitoring of contributing factors allows for rapid and targeted interventions, moving organizations from being expert at responding to failure to planners who avoid failure. These ML supports allow for rapid migration away from traditional status measures to measures that matter.</p>

Considerations

- As costly specialty drugs become more prevalent, payers will require assurances that the drugs will work before agreeing to pay for them. AI will play a crucial role in the future of pharmacy payments.
- As work complexity and labor shortages continue to increase, it will become increasingly important to optimize high-cost resources against high-value work.
- Optimizing work in any department or function often requires the development of new measures of work that align with the value outcomes desired. For instance, measuring the number of prescriptions entered for pharmacists who currently spend 80% of their time in higher-value activities risks painting a picture unrelated to the actual desired outcomes.
- In surgical services, variability often equates with higher costs and worse patient outcomes. This variability can be driven by either the breadth of options available, incentives provided, preferences developed or any combination of the above. As a result, detailed analysis of variance with ML pattern overlay, score-carding, and margin and impact analysis are typical prerequisites of any AI deployment.

Case example:

Mount Sinai Health System in New York uses a drug diversion monitoring technology to identify and remediate drug diversion. The technology system flags unusual activity using AI and ML to detect potential cases of drug diversion. Mount Sinai adopted the system in 2014 after a pharmacy director diverted more than 200,000 doses of oxycodone over a five-year period.

Looking Ahead: Use Cases Beyond the Next 5 Years

Chronic Disease Management

AI platforms identify patients at risk of developing an avoidable condition or clinical decompensation, working to curtail avoidable emergency room visits and admissions. Not all pilots in this arena have proven ready for primetime. Next-generation applications will be more widespread because of increased usability and accessibility of data.

Auto Population of Patient Charts

NLP could record and transcribe bedside conversations, capturing symptoms, diagnoses and treatments. Extending such use into decision support and development of individualized care plans is the logical next step. Improved accuracy of NLP applications has sparked interest from technology powerhouses such as Microsoft.

Medication Compliance

AI-powered predictors of when a patient will become noncompliant can prompt early outreach and course correction. This technology requires integration of multiple data sets, including patient identifiers, to work effectively.

Pharmacy Order Verification

The query- and task-driven nature of the verification process is ripe for automation. Interconnected data sets, including patient health and medication history, contraindications and formularies, can be leveraged to reduce the amount of manual labor. Data collection and access processes will need to be improved before it is widely deployed.

Personalized Medicine

Algorithms pulling data from numerous sources could be used to tailor treatments and therapies on an individual basis, leading to better outcomes at a lower cost. To be effective, these systems need access to large data sets, data scientists to create the algorithms used to cull the data, and high-performing computers and storage solutions to process the multiple data sets. This has proven to be a heavy and costly lift.

Next Steps: 8 Areas to Address in Implementation

Multidisciplinary teams of champions led by a chief medical informatics officer (CMIO) should own clinically focused AI implementation. The CMIO will need not only advanced technical skills but also a seat at the leadership table and the ability to articulate how AI can help organizations meet their financial, clinical and patient satisfaction goals. Willingness to deftly tackle concerns in the following areas will also be key:

- 1. Staff job security.** Unlike in the manufacturing sector, AI will not spur dramatic workforce reductions. Emphasize to staff that adoption instead helps augment the three levers for workforce optimization: change who does the work, make the work more efficient and eliminate unnecessary work.
- 2. Decision-making authority.** Clinician champions are best positioned to articulate the benefits of balancing autonomy and standardization. To gain support from data-driven clinicians, organizations need to show transparency into AI algorithms and thorough vetting of the technology.
- 3. Applicability to real operating environment.** Make sure that measures, reporting components, and reporting frequency, accessibility and understandability, reflect organizational needs to ensure both adoption and value creation.
- 4. Conversion of clinical notes.** Competent data scientists, secured through partnerships or employment, are needed to convert information from text form (e.g., progress notes, visit summaries, discharge summaries) into discrete data.
- 5. Data governance.** An enterprise-wide data governance plan is essential to enhance security and integrity, such as guarding against biases originating in clinical trials that lack diversity among cohorts.
- 6. Platform interoperability.** Add-on solutions rather than building capabilities through the organization's existing EHR could exacerbate data governance issues. Prepare to make informed choices among best-in-class options versus an easy-to-implement solution.
- 7. Data storage and processing.** AI relies on an abundance of data. A cloud-based data storage plan with adequate capacity and processing power is required.
- 8. Diversity and inclusion.** Ensure AI algorithms support and do not hinder the organization's goals for a diverse and inclusive workforce.

Sources: Sg2 Executive Briefing: Strategic Workforce Investment: The Case for AI and Automation. Published Nov. 5, 2021. Accessed Dec. 13, 2022.; Get out of crisis mode: How MercyOne Des Moines used predictive analytics. YouTube. January 20, 2020; Krueger R. Addressing a hospital's staffing challenges with Hospital IQ's workforce solution. Healthcare Innovation. January 23, 2020; Siwicki B. Hartford HealthCare uses machine learning and predictive analytics to improve chemo care. Healthcare IT News. July 20, 2021; Sg2 Interview with Jefferson Health, June 2021; Imprivata. From newsworthy diversion to proactive protection: Mount Sinai Health System's story of drug diversion monitoring. February 2021.



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