

WHITE PAPER

The Rise of Augmented Intelligence: Insights for Healthcare Leaders

Health Catalyst Editors

Introduction

In recent years, the healthcare industry has observed significant adoption of advanced technologies, including augmented intelligence (AI), to improve patient outcomes and streamline processes. In the retail and marketing space, companies like [Amazon](#) and Netflix have turned to machine learning, augmented intelligence, and artificial intelligence tools to gain a competitive edge and enhance customer experiences and buyer decisions. These intelligent solutions are helping industry giants transform key areas of their business that may be lacking in accuracy and efficiency, such as customer service and fraud detection. Their applications in various domains may vary, but they undoubtedly shape our lives and industries. In e-commerce, algorithms and statistical models rapidly generate personalized content or recommendations based on users' digital patterns and behaviors within an application. AI integration in healthcare is equally transformative.

Consumers leave digital breadcrumbs when they surf the internet, buy things online,

and make virtual appointments. Similarly, a patient's digital footprint is ever-expanding today as their healthcare experiences become more digitized. Clinicians now have access to extensive patient information — from electronic health records, medical exam results, wearable medical devices, and satisfaction surveys. Transitioning patient records from paper to electronic systems, coupled with the push for system interoperability, has resulted in a deep and vast reservoir of data points across healthcare systems.

Technological advancements have no doubt increased the amount of information available to healthcare providers and decision-makers for the better. But infinite data sources and a lack of effective healthcare analytics can obscure important facts about patient populations and the effectiveness of a healthcare system's operations. Executives are left wondering how to make sense of this overwhelming volume of data. In response, some organizations will hastily ramp up their data-reporting efforts using manual methods or tools with limited functionality. Yet, many are finding that traditional business intelligence (BI) tools can't keep pace. Their

usual BI tools fail to meet today's data processing and self-service analytics needs. These BI tools overlook hidden patterns or correlations that executives can swiftly act upon. Complicating matters are the healthcare system's reluctance to adopt more sophisticated and robust tools, which burdens today's healthcare workforce, who are already struggling with burnout and fatigue.

Could AI be applied in healthcare to influence decisions and behaviors, similar to its application in e-commerce? Many healthcare executives believe so and have demonstrated its efficacy, leveraging AI-powered solutions to enable better decision-making and improve health equity. By gaining new insights, healthcare leaders acknowledge that incorporating AI in healthcare is relatively simple and can yield remarkable improvements in outcomes.

While the concept of scouring big data to analyze, target, and predict future patterns and govern critical decisions isn't groundbreaking, there is still much to discover about the application of augmented intelligence solutions in the healthcare industry.

Intelligent Tools in Healthcare: Challenges and Opportunities

The combination of augmented intelligence and human insights can assist healthcare organizations in extracting vital information from vast datasets to address business concerns related to revenue, costs, operations, and quality of care. However, it is imperative for executives and other stakeholders to distinguish between these



tools since applications of machine learning, artificial intelligence, and augmented intelligence in this field are relatively new. Differentiating between the available tools can also lay the groundwork for their adoption by helping executives eliminate confusion and allay concerns.

Although artificial and augmented intelligence, both known as AI, share common objectives, they employ different methods to reach the user's goal. Both technologies possess [machine learning capabilities](#). Yet, artificial intelligence aims to replace human decisions entirely through a full-device approach, whereas augmented intelligence maintains the human aspect.

In other words, artificial intelligence refers to an application's ability to perform tasks that typically require human intelligence, such as speech recognition or problem-solving, autonomously. One striking example is self-driving cars, which utilize sensors and complex algorithms to navigate roads without human involvement. On the other hand, augmented intelligence is a concept where human intelligence is enhanced or amplified by leveraging computational technologies. What's more, augmented intelligence empowers individuals rather than renders them obsolete.

What Is Artificial Intelligence?

Gartner defines [artificial intelligence](#) as applying “advanced analysis and logic-based techniques, including machine learning, to interpret events, support and automate decisions, and take action.” Many clinicians and clinical executives are hesitant to adopt artificial intelligence in medical settings because it relies heavily on the machine's ability to evaluate data and suggest treatment plans without considering other factors. Therefore, the fear that artificial intelligence would replace human decision-making is valid. Such sentiments, however, hinder widespread adoption and raise ethical concerns.

What Is Augmented Intelligence?

Gartner defines [augmented intelligence](#) as “a design pattern for a human-centered partnership model of people and artificial intelligence (AI) working together to enhance cognitive performance, including learning, decision making, and new experiences.” Ideally, technological solutions in healthcare should equip providers with forecasts and analysis while adhering to ethical guidelines and principles of high-value patient care. [Augmented intelligence](#) can complement

Artificial intelligence aims to replace human decisions entirely through a full-device approach, whereas augmented intelligence maintains the human aspect.

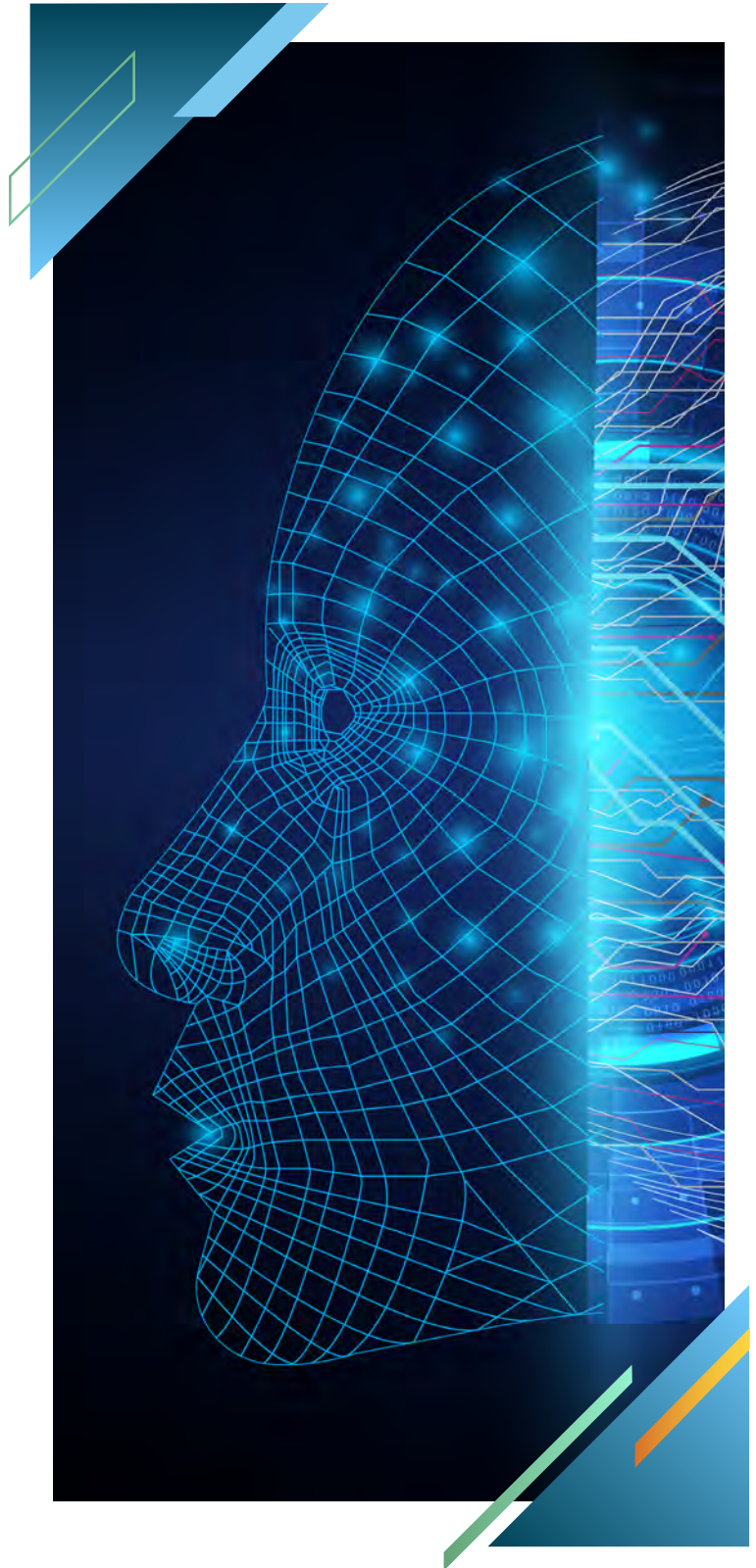
the clinician's awareness of, for instance, a patient's social determinants of health or help them recall conversations during care visits. Speed, accuracy, and predictability are key differentiators for augmented intelligence, making this tool the preferred AI solution for healthcare entities.

Furthermore, augmented intelligence:

- Generates reports or data analysis nearly instantaneously, or within minutes, reducing manual labor.
- Requires few resources and is known to supercharge existing reporting processes and outcomes.
- Removes unintentional bias for more ethical operational, financial, and clinical decisions.
- Sets executive compensation KPIs that are meaningful, relevant, and fair across hospitals of different sizes and resources.
- Conducts systematic equity analysis that will address the root cause driving healthcare disparities.

[Carle Health](#), a world-class healthcare provider in Illinois, became an early adopter of augmented intelligence. Leadership outlined objectives to tackle the complexities of COVID-19, improve sepsis management, and accurately forecast patient outcomes and associated costs based on historical and current data. Carle Health laid a strong data foundation to support effective AI integration and healthcare analytics for near- and long-term success.

While early adoption stories such as this are becoming more common, ethical concerns still cause healthcare systems to stall efforts to adopt augmented intelligence.



Ensuring AI Integration in Healthcare Meets Regulatory and Ethical Standards

Upholding regulatory compliance and ethical considerations are essential when implementing any new technology, especially emerging technologies like AI. Regulatory compliance ensures that the use of augmented intelligence in healthcare adheres to laws, regulations, and standards set by governing bodies and industry organizations. This includes safeguarding patient privacy, data security, and informed consent.

Ethical considerations must also align with principles that protect fairness, transparency, and accountability and avoid bias in the delivery of care. Therefore, it is critical to mitigate any potential harm caused by biased algorithms or discriminatory practices in AI-based decisions or processes. To ensure regulatory compliance and address ethical concerns, health systems must establish clear policies and guidelines for AI usage. They should conduct comprehensive risk assessments to identify potential legal or ethical challenges associated with using AI technologies before implementation. Additionally, health systems need to continuously monitor their technology usage and performance to detect any instances of non-compliance or unethical behavior.

How AI in Health Systems Improves Upon Traditional Business Intelligence Tools

[Healthcare industry complexities](#), such as labor costs, overworked resources, and inadequate technology, are major concerns for healthcare leaders who strive to prioritize how

data is accessed and managed across teams and departments. Aligning clinical and financial information at the organizational level to make strategic decisions is one of healthcare's biggest challenges.

Historically, executives managed data using separate tools, including the following:

1. **Business intelligence (BI) solutions:** Consolidates structured data from multiple sources and employs basic statistical measures to provide a comprehensive view of key performance indicators, such as population health, operational and fiscal performance, and clinical outcomes.
2. **Advanced predictive analytics applications:** Manages both structured and unstructured data from various databases across a healthcare system, as well as real-time data, to anticipate future trends and enable data-driven decisions.

What's missing from BI and advanced healthcare analytics tools today is the ability to extract data insights from a single clinical or business decision and apply these insights to the healthcare organization. That's where AI becomes the linchpin of outcomes improvement. AI analyzes large datasets to extract the most relevant insights in the form of patterns, anomalies, and potential risks that fly under the radar, going unnoticed by clinicians, analysts, or data scientists. The healthcare industry has strived to enhance performance and quality for decades. Now, with the power of AI, healthcare leaders can make decisions with greater speed and accuracy.

AI capabilities enable rapid processing of incoming data – whether it's operational, patient-generated, clinical, or administrative and billing. Such tools can calculate and

analyze big data with precision and without bias in the fraction of the time it used to take, which could be months or even longer, which ties up precious resources. In addition, the [cost savings](#) that AI yields are an estimated \$150 billion in 2026 — an important driver for leadership buy-in.

When applied correctly, AI should act as a collaborator—not a replacement—in human decision-making so that the tools are ethically applied and leveraged correctly throughout the organization. Some healthcare provider organizations are eagerly [embracing AI](#) due to its seamless integration into their current technology infrastructure and effectively solving their unique clinical and financial challenges, including:

1. Reducing unnecessary tests for improved clinical pathway adherence in areas like urgent care settings.

2. Enhancing decision-making at the C-suite level by selecting appropriate incentive metrics for setting executive compensation packages.
3. Improving health equity by removing unintentional bias and upholding fair and more inclusive practices.
4. Identifying patients at high or rising risk for unnecessary or preventable healthcare utilization.
5. Protecting data privacy and safeguarding sensitive patient information.

By combining human knowledge and skills with AI computations and analysis, AI creates endless opportunities for healthcare executives and providers to make an impact faster and with analytic precision.

Additionally, health systems need to continuously monitor their technology usage and performance to detect any instances of non-compliance or unethical behavior.



Advancing Health System Objectives Using Augmented Intelligence

Healthcare providers navigate highly complicated challenges where the lives of patients are often in jeopardy. Yet, augmented intelligence functionality can be used in acute and chronic care settings. Legacy data analytics tools, compared to AI, are slow and cumbersome to use, often requiring manual input and analysis, which can be time-consuming for healthcare professionals. Yet, AI allows health systems to answer meaningful questions about the quality of care and areas of improvement, such as:

- Is this care management program cost-effective and effectively improving utilization rates?
- Are we adequately reaching patients in need of our care management program?
- What social factors affect a patient's ability to follow and adhere to care plans?
- Should I remove this expensive drug from the formulary?
- How can I prove that changes are needed in surgical or prescription habits?

In a word, augmented intelligence yields more meaningful, actionable data. However, leaders and providers must turn a keen eye toward the data required to apply AI in healthcare and believe the tools can advance healthcare objectives at multiple levels.

How Augmented Intelligence Transforms Healthcare Practices: Case Studies

The benefits of augmented intelligence in healthcare abound.

#1: AI has the potential to greatly improve the accuracy and efficiency of diagnoses. By analyzing vast amounts of patient data and medical literature, AI algorithms can assist clinicians in making more informed decisions, leading to accurate diagnoses and personalized treatment plans.

#2: AI can automate mundane and repetitive tasks that often consume a significant amount of a healthcare provider's time. Clinicians can focus on higher-value activities like patient interactions and critical thinking. By streamlining administrative processes, healthcare systems can also reduce costs and improve overall productivity.

#3: AI can adapt and evolve to a healthcare system's needs over time. By continuously learning from new data inputs, real-world outcomes, and current best practices, AI solutions adjust to provide more relevant, up-to-date recommendations and analysis.

As a result, AI not only aids clinical decision-making but also contributes to ongoing professional development within the health system's medical community and inform leaders' strategic planning.

The following use cases explore how health systems have seamlessly integrated AI into their current technological infrastructure to produce a comprehensive analysis to improve healthcare coordination, enhance diagnostic accuracy, modify leadership compensation, and optimize resource allocation.

Urgent Care Meets AI: Unlocking Better Patient Outcomes

By implementing advanced technologies like machine learning and predictive analytics, AI assists in the accuracy of diagnoses, personalized treatment plans, and improving outcomes for quality and financial gains. As a result, AI integration represents an important step toward improving patient outcomes. Unnecessary testing in healthcare inflates the cost of care for patients and the cost of care delivery for providers. For one example, overprescribing antibiotics for common infections, such as Group A strep pharyngitis or strep throat, is a well-known drain on a hospital's economy.

To mitigate the accumulating costs of medical tests, [WakeMed Health & Hospitals](#) (WakeMed) established an evidence-based care pathway and sought a data-informed approach to reduce unnecessary testing, improve urgent care efficiency, and relieve providers of the burden of non-value-added work. With AI and other data governance tools, WakeMed realized the following results:

- Achieving a 93.3 percent clinical pathway adherence rate, resulting in >1,800 strep

cultures and \$40K in cost savings in one year.

- Readmissions to urgent care within five days remained under 5 percent for baseline and performance improvement periods.

Leveraging Augmented Intelligence to Bolster Health Equity

Health inequities have become more apparent today as widespread diseases, such as COVID-19, exacerbate and shed light on disparity gaps due to race, religion, socioeconomic status, and other demographics. Unfortunately, these inequities cause patients to experience unintentional bias in medical settings. What healthcare providers have been working to prove is that when bias is removed from the decision-making process, everyone involved benefits, regardless of whether the bias was intentional or not. Fortunately, health equity programs that leverage AI solutions produce promising results. [ChristianaCare](#) utilized AI to overcome disease testing disparities and increase access to care.

“ Health equity and AI are interconnected.

Technology and AI need to help reduce health disparities, not exacerbate them.”

—Edward Ewen, MD, Director, Clinical Data and Analytics, Center for Strategic Information Management at ChristianaCare

A [framework](#) to achieve health equity success includes AI technology applied across an organization's data foundation, a commitment to quality, and a collective leadership effort. Addressing three technical barriers can overcome health equity challenges through AI.

1. *Is my data foundation sufficient?* AI can be applied to a healthcare organization's data and reports almost immediately, regardless of perceived gaps in data collection, disparate source systems, insufficient analytics, or lack of measurable goals.
2. *Are we aware of our unintentional or unrecognized bias?* AI algorithms are trained on biased data, and the results show that AI removes bias early in the equity journey. Reducing bias should create consistency in data collection and access.
3. *Do we have the right data measures and characteristics to analyze?* When leaders see the financial and clinical results of data collection and documentation efforts, capturing social factors or additional race or ethnicity features becomes a priority. AI uses an organization's data to remove

unintentional bias and guide providers toward unique and valuable care for patients.

Adopting AI to Improve Leadership Decisions and Facilitate Change

Similar to how Netflix provides recommendations to influence what users watch, AI can also be applied to modify clinician or executive behavior through analysis that considers data elements hidden from normal view. Moreover, [AI tools](#), such as benchmarking, Observed/Expected (O/E) reporting, and forest plots, which are a graphical representation of the statistical similarities and differences between measures, groups, or other dimensions in order to better understand performance and identify opportunities for improvement. These features can transform vast data stores into actionable insights that leaders can use to identify goals to move their organizations forward and improve outcomes. For example, INTEGRIS

“ When healthcare organizations have the tools to advance health equity, moving the needle will require not only quality but also improving relationships with patients. This means eliminating bias and opening the door to meaningful change.”

-Melissa Welch, MD, MPH, Health Catalyst Chief Medical Officer

Health collaborated with Health Catalyst to explore how augmented intelligence could assist in setting executive compensation plans. To achieve the desired results, the team listed the tasks that needed to be performed and then sorted them into three categories:

1. Tasks that humans should always complete.
2. Tasks that computers can do better than humans.
3. Tasks best accomplished by human efforts combined with AI.

After clarifying the role of AI-assisted decision-making in leadership, INTEGRIS Health zeroed in on improvement opportunities and established equitable goals through AI-powered insights while increasing adoption through cascading training models.

Managing Chronic Conditions with Highly Intelligent Solutions

[UnityPoint Health](#) recognized patients with complex chronic health conditions were undergoing excessive or unnecessary services, tests, and treatments, particularly when transitioning from hospital admission to an ambulatory care setting. Yet, despite having access to large volumes of data, clinicians lacked timely insight into care provided across ambulatory settings. To enhance healthcare utilization rates, they needed to enhance their healthcare data warehouse and harness AI to predict which patients would benefit from enrolling in a new care management program.

UnityPoint Health used numerous AI tools that incorporate chronic health data, social data, the probability of admission, and readmission risk after discharge from the hospital to risk-stratify patients and predict which patients are at high or rising risk for unnecessary healthcare utilization. In the 30 months since

the care management program's inception, UnityPoint Health substantially decreased unnecessary healthcare utilization and costs associated with caring for patients enrolled in their program. The organization reported the following outcomes:

- \$32.2M in spending reductions thanks to a 54.4 percent relative reduction in hospital admissions and a 39 percent relative reduction in ED visits.
- Patients gained 11,000+ more days at home and had nearly 2,000 fewer ED visits.

These examples demonstrate that with accurate [interpretation of analytics](#), healthcare leaders gain data-driven insight to know how to strategically improve and measure wins and losses. AI tools, like [Healthcare.AI™](#) from Health Catalyst, make interpretation simple with pre-built algorithms for executives and data science leaders.

Reshape Tomorrow's Healthcare: Adopting AI Tools with Confidence

The fusion of machine learning technologies and human expertise will continue to solve quality and cost challenges for the healthcare industry. AI ensures that analytical insights are precise, accurate, and consistent while also facilitating swift integration of data science into existing healthcare analytics, strategies, and operations. Additionally, AI helps tackle the issue of scarce resources since pre-built algorithms simplify data extraction and interpretation for executives and data science leaders.

[Healthcare.AI](#) aims to help organizations wanting to expand the easy use of self-service AI in their mainstream analytics, improve

success rates for advanced AI use cases, and use AI for purposes beyond predictive analytics. A collaborative partner provides health systems with a layer of accountability while upholding privacy, regulatory, and clinical quality standards, which could not be achieved with off-the-shelf BI tools or a standalone AI solution. With the Healthcare. AI offering, leaders can uncover additional opportunities for growth and improvements across their organization. Also, the use of AI-driven analyses promotes fair and equitable decision-making, leading to improved outcomes.

Health systems can streamline the adoption and utilization of AI tools by leveraging the strategies employed by similar organizations. Despite being traditionally slow in adopting technological advancements, forward-thinking executives and clinicians can adopt AI to demonstrate that such innovation is not exclusive to tech giants and that its benefits have significant and far-reaching impacts on healthcare systems and the communities they serve.



About Healthcare.AI™ from Health Catalyst

Healthcare.AI dramatically expands the effective use and use cases for AI throughout your organization with an embedded blend of well-established and cutting-edge statistical and machine learning techniques that can integrate into your existing BI tools, applications, and workflows with one click. The solution can dramatically increase the accuracy and quality of your insights in a fast and consistent manner, from an end user at the bedside to an analyst fulfilling a backlog of requests, to an executive needing to understand the performance between facilities. Let Healthcare.AI help you separate the signal from the noise with clear and transparent insights that build long-lasting confidence in your revenue, cost, and quality improvement initiatives.



Learn more at healthcatalyst.com

