INTRODUCTION

Healthcare organizations are navigating an era of unprecedented data growth. From electronic health records (EHRs) and diagnostic imaging to wearable technology and genomic data, the sheer volume and variety of information offer both immense opportunities and significant challenges.

The promise is clear: harnessing data can transform patient care, streamline operations, and drive innovation. Yet, this promise comes with risks. Concerns about data quality, privacy, and security — paired with the complexities of adopting advanced technologies — create a formidable tightrope for healthcare leaders to walk.

Driven by the 2024 CHIME Fall Forum education track, "Data Mastery in Healthcare: Transforming Insights into Action," this report explores how healthcare organizations can achieve data mastery by transforming raw data into actionable insights that drive the future of care delivery and patient engagement. We will address key components of data mastery, the technologies enabling it, and the challenges healthcare leaders must overcome to succeed.

DEFINING DATA MASTERY IN HEALTHCARE

Data mastery is more than just managing and analyzing information. It encompasses a culture of using data as a strategic asset to drive better outcomes, foster innovation, and ensure operational excellence. Key components include:

- Data Governance: Establishing policies to ensure quality, security, and compliance.
- Data Quality: Ensuring data accuracy, completeness, and relevance.
- Data Literacy: Empowering staff at all levels to understand and utilize data effectively.
- Advanced Analytics: Applying AI, machine learning, and predictive analytics to extract actionable insights.
- Data Visualization: Presenting complex data in accessible formats to inform decision-making.

Healthcare is awash in data, creating both unprecedented opportunities and significant challenges for organizations navigating the digital health revolution. Fueled by the explosion of data and the emergence of new technologies like artificial intelligence (AI), this data-driven revolution creates opportunities for healthcare organizations to improve patient care, optimize operations, and drive innovation.

From electronic health records (EHRs) and medical images to claims data and patient-reported outcomes, healthcare organizations generate and collect data at an unprecedented rate. This flood of data is driven by several factors, including widespread adoption of EHRs, increasing use of medical imaging and other diagnostic technologies, the rise of wearable devices and remote patient monitoring, and the growing availability of genomic and other -omics data.

This abundance of data presents opportunities for healthcare organizations to gain insights into patient populations, identify trends, and make more informed decisions. However, it also presents challenges in terms of data management, analysis, and governance.

TECHNOLOGY DRIVING DATA MASTERY

Technological advances are the backbone of data mastery in healthcare. Each innovation addresses specific challenges while opening new opportunities for care delivery and operational efficiency.

AHEAD

CLOUD COMPUTING

The shift from on-premises enterprise data warehouses (EDWs) to cloud-based solutions offers scalability, cost-efficiency, and support for advanced analytics. However, hybrid cloud strategies are crucial to address data integration and accessibility challenges.

The enterprise data warehouse (EDW) is the central repository of an organization's data. It is used to store, manage, and analyze data from various sources, including EHRs, claims systems, and financial systems. Traditional EDWs are often on-premises and built on legacy technologies. These systems can be expensive to maintain, difficult to scale, and lack the capabilities needed to support advanced analytics and AI.

Cloud migration is no longer a question of if but how. "I think cloud is the perfect use case because it allows us to not only provide rapid prototyping but also allows us to take use case ideation and fail fast," said Andy Sajous, Field CTO at AHEAD, in a track session called EDW: On-Prem to Cloud Enablement of Enterprise Analytics.

To address these challenges, healthcare organizations are modernizing their EDWs by migrating to cloud-based solutions. Cloud-based EDWs offer several advantages, including scalability and flexibility, cost-effectiveness, enhanced security, and support for advanced analytics and AI.

However, IT leaders must avoid simply replicating on-prem challenges in a new environment.

"Hybrid cloud is still going to be here for a while, right?" Sajous reasoned. "So, our focus is on how to handle that data in a hybrid cloud manner with high-speed connectivity, how to rethink about networking and, more importantly, data accessibility."

Further, modernizing the data foundation requires breaking down data silos and fostering a culture of data sharing. As far as data accessibility is concerned, empowering users with self-service analytics while maintaining data governance is a key challenge.

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> Field CTO
> AHEAD

AI: MOVING BEYOND THE HYPE CYCLE

AI is rapidly transforming the healthcare industry. From clinical decision support and medical image analysis to drug discovery and revenue cycle management, AI-powered solutions improve patient care, optimize operations, and drive innovation.

One of the most promising applications of AI in healthcare is in ambient clinical intelligence (ACI), which uses natural language processing (NLP) and machine learning (ML) to capture and interpret clinical conversations, providing clinicians with real-time insights and decision support. ACI solutions can help clinicians reduce documentation burden, improve clinical decision-making, enhance patient engagement, prevent medical errors, and increase efficiency.

- Natural language processing (NLP) enables the extraction of actionable insights from unstructured data, such as clinical notes, facilitating improved decision support and patient engagement.
- Machine learning (ML) employs algorithms to analyze and interpret complex datasets, uncovering hidden patterns and generating predictive models that support clinical decision-making and personalized treatment strategies.

"We're all very excited about what AI can do for the future of AI … for our providers and those caring for them," Jackie Rice, Vice President and CIO at Frederick Health, in a session called Innovators Panel: Making AI Stick and Scale in the Real World. "We're also a little worried, because of all the concerns we hear about accuracy, hallucinations, cybersecurity, data integrity and equitability in pulled data."

While the hype around AI in healthcare is undeniable, realizing its true potential requires a pragmatic approach supported by solid AI governance.

"You have to have a very intentional thought process on how you're going to move forward with AI," said Dr. Lance Owens, CMIO at University of Michigan Health-West, in the Making it Stick session.

This means moving beyond pilots and POCs to achieve true integration and scalability. Key considerations for IT leaders include:

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- Accuracy and Trust: Providers need solutions that deliver consistent and accurate results. "Gen AI's potential for inaccuracy or hallucinations [pose] a risk in clinical settings where accuracy and trust are paramount," said Leyla Warsame, Associate CMIO of Advanced Clinical Decision Support and Digital at Fairview Health Services, in the session on "Actionable Generative Intelligence: Mastering Data Transformation."
- Change Management: AI adoption requires a workforce transition. "We want people to adopt the technology and use it and make them much more efficient," Warsame advised.
- Value Realization: "You have to be creative about creating a business case for AI solutions," Warsame advised. "This can include proxy measurements." Demonstrating ROI, whether through improved patient outcomes, cost savings, or increased efficiency, is crucial for securing continued investment.
- Data Governance: Robust data governance is no longer optional. It is the bedrock upon which trustworthy AI is built. It is a framework of policies, processes, and standards that ensures the quality, integrity, and security of data. Effective data governance is essential to ensure accuracy and reliability, to protect patient privacy and confidentiality, and to comply with regulatory requirements.

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BUILDING A RESILIENT HEALTHCARE SYSTEM

The Change Healthcare cyberattack served as a stark reminder of the vulnerability of critical healthcare infrastructure. In a Fall Forum session entitled Revenue Cycle Disaster Recovery: Mitigate the Risk of Cyberthreats to Payer Downtime, John Bennett, Director of Healthcare at RSM, recounted his prior experience with a total health system outage, including the EHR, data center, and anything not in the cloud. "I didn't think I would ever see something like that happen again," he said. "And then in February of this year, we saw the hack and ransomware attack on Change Healthcare that shut down many systems — we didn't realize all the areas of revenue cycle it had impacted."

In the same session, Steven Kos, Senior Director Revenue Cycle Application Support for Baptist Health, noted the impact from the Change Healthcare incident on his organization weren't direct, but there were some negative consequences. "The biggest impact was around pharmacy- and infusion-related claims processing," he noted. "So, we shut down all of our connectivity to [Change Healthcare] to protect ourselves."

This was a common action taken by many organizations connected to Change to any degree, and it highlights the need for IT leaders to prioritize building resilience into their systems.

This includes:

- Disaster Recovery: Having robust disaster recovery plans that include backup systems and manual workarounds is essential.
- Cybersecurity: Investing in cybersecurity infrastructure and training to mitigate the risk of cyberattacks.
- Vendor Management: Carefully evaluating vendors' security protocols and disaster recovery plans.

CHALLENGES IN ACHIEVING DATA MASTERY

While the benefits are compelling, several obstacles impede progress:

1. Data Silos: Fragmentation of data across systems limits accessibility and interoperability.
2. Data Privacy and Security: The increasing complexity of protecting patient information in a regulatory environment.
3. Talent Gaps: The shortage of professionals skilled in data analysis, governance, and advanced technologies.
4. Change Management: Resistance to new workflows and technologies among staff.

OPPORTUNITIES THROUGH DATA MASTERY

Organizations that overcome these barriers can unlock transformative opportunities, including:

- Enhanced Patient Care: Personalized treatments and proactive interventions.
- Operational Efficiency: Reduced costs and streamlined workflows.
- Innovation: Rapid prototyping and "fail fast" approaches in hybrid cloud environments.
- Scalable Analytics: Democratizing data access with self-service analytics tools.

BEST PRACTICES FOR HEALTHCARE DATA MASTERY

- Develop a Comprehensive Data Strategy: Align data initiatives with organizational goals.
- Invest in the Right Technologies: Prioritize solutions that address scalability, interoperability, and security.
- Empower End Users: Foster data literacy and provide intuitive tools for clinicians and administrators.
- Strengthen Data Governance: Build trust by ensuring data quality, security, and compliance.
- Measure Success: Use KPIs to track improvements in areas like data accessibility, completeness, and impact.

THE EVOLVING ROLE OF HEALTHCARE IT

The role of healthcare IT is evolving beyond simply keeping the lights on. IT leaders are now expected to be strategic partners in driving innovation and improving patient care.

"I think as we implement more and more automation, we can retool our staff," Kos reasoned, saying he prefers this approach to saving on head count. "And we need to get back to [retooling] in healthcare and really double down on providing great service to our patients."

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- Talent Management: Attracting, retaining, and upskilling talent to meet the demands of the digital health era.
- Innovation: Fostering a culture of innovation and embracing new technologies.
- Collaboration: Building strong partnerships with clinicians and operational leaders.

MEASURING AND MONITORING SUCCESS

- To gauge progress, healthcare organizations should establish clear metrics, such as:
- Data quality and timeliness.
- Adoption rates of self-service analytics tools.
- Outcomes related to patient care improvements and operational efficiency.

Continuous monitoring ensures that data initiatives remain aligned with organizational priorities and adapt to evolving challenges.

CONCLUSION: EMBRACING DATA MASTERY FOR THE FUTURE

Data mastery is no longer optional — it is the foundation of success in healthcare's digital age. By leveraging advanced technologies, fostering a culture of data literacy, and prioritizing robust governance, healthcare leaders can unlock data's full potential.

As emerging trends like quantum computing and blockchain come into focus, the next wave of innovation is on the horizon. Now is the time for healthcare organizations to take the first — or next — steps toward true data mastery.

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