AI in Healthcare Today

The healthcare industry is evolving rapidly with large volumes of data and increasing challenges in cost and patient outcomes. Early adopters of Artificial Intelligence (AI) in the healthcare space are reaping the benefits in terms of patient care and adding to their bottom line results, and everyone is taking notice. These companies are using AI for a number of scenarios including managing claims, detecting fraud, improving clinical workflows, and predicting hospital acquired infections. H2O.ai, the open source and automation leader in AI, is empowering leading healthcare companies to deliver AI solutions that are changing the industry.

AI Transformation in Healthcare

The healthcare industry faces significant challenges to continue to provide high quality medical care while dealing with dramatically increasing costs. With over 3.2 Trillion dollars being spent on healthcare in the United States alone, fraudsters are constantly looking for ways to take advantage of the system by filling false claims or with “creative” billing practices. Payers and providers have legacy manual processes to find issues and process claims. These processes don’t scale and leave patients and providers frustrated when payments don’t come through or outcomes are not satisfactory. Clinicians find themselves working harder than ever in a system under pressure to do more with fewer resources. This pressure and lack of adequate resources leads to mistakes and physician burnout that also adversely impact patient outcomes.

The Healthcare industry is ready for change. With the advancement of electronic medical records and other technologies including wearable fitness devices and big data infrastructure, the healthcare industry has a goldmine of data. This data can be used to predict key outcomes in operations, finance and clinical care. The key to unlocking this data and solving key issues for the industry is AI, driven by data science and machine learning. The industry can benefit across a number of areas including:

- Financial – Decrease fraud and increase profitability through increased fraud detection, improved claims management and streamlined clinical workflows.
- Operational – Improve productivity and clinician satisfaction through augmentation of existing practices with intelligent assistants and automation of tedious processes, which allows clinicians more time to spend with patients.
- Clinical – Improve patient outcomes and decrease critical issues such as hospital acquired infections, sepsis, and readmissions.
Sepsis diagnosis and treatment only happen after severe and damaging symptoms. HAIs diagnosed only after the fact with a 40% mortality rate. Clinicians making decisions without the full picture or advanced insights.

Sepsis is the leading cause of preventable death in U.S. hospitals with mortality from sepsis increasing 8% for every hour that treatment is delayed. As many as 80% of sepsis deaths could be prevented with rapid diagnosis and treatment. Diagnosing sepsis can be difficult because its signs and symptoms can be caused by other disorders and there are no reliable biomarkers before onset. Doctors often must order a battery of tests to try to pinpoint the underlying infection which further delays treatment. AI driven diagnosis can help clinicians identify patients at risk for Sepsis using routine vital signs and patient history. This diagnostic assistance helps clinicians order more relevant tests and begin treatment earlier which drives better patient outcomes but also reduces costs for providers and payers.

Hospital or Healthcare acquired infections (HAIs), such as central-line associated bloodstream infections (CLABSIs) are a huge problem for patients and providers. Up to 25% of CLABSI patients die from what is principally a preventable problem. Using AI driven models, providers can predict which patients are most likely to develop central-line infections by looking at a variety of data including patient information and treatment history. With this prediction, clinicians can monitor high-risk patients and intervene to reduce risk.

Clinicians are often overworked and understaffed. Various studies estimate a diagnosis error rate of 10 – 15% which has a huge impact on those patients and the providers. AI based decision support and diagnosis can help clinicians make better decisions by incorporating more data into the decision-making process and by learning patterns that are outside the clinicians’ purview. With mobile devices integrated into the clinical workflow, AI-based decision support helps doctors and nurses by providing a second opinion or by pointing out information they may have missed. These additional insights help the clinician make a more informed decision and can actually save time, expense and patient discomfort by preventing unnecessary tests.

Before:
- Sepsis diagnosis and treatment only happen after severe and damaging symptoms
- HAIs diagnosed only after the fact with a 40% mortality rate
- Clinicians making decisions without the full picture or advanced insights

With AI:
- AI models predict Sepsis diagnosis hours before onset using routine data
- AI models help to identify high-risk patients so that clinicians can monitor and treat them
- AI models integrated into applications provide diagnosis and decision support for clinicians

A sampling of how AI is being used today is summarized below:
**Predicting Readmissions**

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<tr>
<th>Before:</th>
<th>With AI:</th>
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<tbody>
<tr>
<td>Up to 25% of patients are readmitted to the hospital within 30 days after treatment</td>
<td>AI models predict which patients are at highest risk, so care can be managed</td>
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Patients with serious and chronic illnesses are treated in the hospital and then discharged. Unfortunately, up to 25% of these patients will be readmitted within 30 days to be treated again. With a focus on value-based care, providers are trying to prevent unnecessary re-admissions. This process works by finding high-risk patients for readmission while they are hospitalized and then targeting them with different treatments in the hospital, defining different actions during discharge, and taking steps post discharge to ensure compliance with home care regimens. The benefit of this improved process is a more successful outcome for the patient and lower costs for patients, providers and payers.

**Claim Denials Management**

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<th>Before:</th>
<th>With AI:</th>
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<tbody>
<tr>
<td>Manual claims processing is time consuming and leaves valid claims uncollected</td>
<td>AI based processing improves accuracy and catches claims for reprocessing</td>
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On average, 24% of claims are denied during the evaluation and payment process. Denied claims are large expense for providers and painful for patients who have to pay out-of-pocket or providers who have to write off as losses. Existing claims management processes are highly manual with analysts and rules making choices about which claims to work for resubmission with their limited time. An AI approach uses machine learning models to streamline the denials management process by finding claims that have a high likelihood of being paid and the highest potential value. By working these claims first, the providers and payers spend the time on those claims that are most likely to be valid and will yield the most value to patients and providers.

**Fraud Detection**

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<th>Before:</th>
<th>With AI:</th>
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<tbody>
<tr>
<td>Rules catch some fraudulent claims. Others are paid and then investigated later</td>
<td>AI models identify claims that are likely fraudulent and flags them for review</td>
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Tens of billions of dollars in fraudulent healthcare claims are likely filed each year which contribute to the increased cost of care and higher healthcare premiums for patents. Rules based fraud detection is easily fooled with new techniques emerging daily and manual review cannot scale across billions of claims. An AI approach to fraud detection scans each claim to look for patterns that indicate fraud. A real-time machine learning approach can keep track of existing patterns and look for those while also learning from new patterns as they emerge. AI based fraud detection helps find fraudulent claims in the system in real-time before they are paid, which reduces costs for payers, helps keep costs lower for patients and helps catch fraudsters in the act.

**Customer Case Study**

Change Healthcare occupies a uniquely interconnected position at the center of healthcare, serving providers, payers, and consumers. As an independent healthcare IT company, they help process over 12 billion transactions annually covering 5,500 hospitals, 800,000 physicians, 130,000 dentists and 600 laboratories.

Change Healthcare helps provider organizations to process claims with payers. When a valid claim is denied by a payer for incorrect coding or other reasons it is a painful process for both the provider and patient. For those claims that should be paid, Change Healthcare helps the providers to reprocess the claims and collect the payment. Enhancing this process to find the claims that are most likely to be accepted and will yield the most value to the provider creates extensive value for Change Healthcare’s clients.

Using H2O, the Change Healthcare team creates models to predict which claims are likely to be viable. This streamlines the claims management by making sure the analysts that are re-processing claims are working on those with the highest potential.
Challenges of Implementing an AI Strategy

The adoption of AI is not without its challenges. First, there is a critical shortage of AI talent. An expert data scientist is by far the most difficult and expensive position to fill. There are growing number of novice data scientists, but they lack the skills to create accurate models for mission critical applications in the healthcare industry. The second challenge is the time that takes to develop and deploy AI models. Streamlining the model development and deployment process is critical to ongoing success with AI applications. The final challenge is trust in AI. For a healthcare business to run on AI, key stakeholders must be able to understand how and why AI models make their decisions. This is critically important in healthcare where regulations require transparency into decision making processes.

Why H2O.ai for Healthcare

The mission at H2O.ai is to democratize AI for all so that more people across industries can use the power of AI to solve business and social challenges. The healthcare industry is a key focus for the company with an initiative to help develop AI healthcare solutions including dedicated, experienced resources for customers, driving healthcare AI events and meetups, and membership in Health IT Now.

H2O.ai is the trusted, open source leader in AI with its visionary machine learning platform, H2O, which is used by hundreds of thousands of data scientists in more than 14,000 companies, and with its leadership in the 2018 Gartner Magic Quadrant for Data Science and Machine Learning Platforms. H2O is already used to create and deploy production AI models at top healthcare companies including Change Healthcare, HCA, Aetna, Kaiser Permanente and more.

Continuing to democratize AI and solve new challenges, H2O.ai launched H2O Driverless AI, a new approach to automatic machine learning that solves the issues of data science talent, time to develop and deploy models, and developing trust in AI. Driverless AI extends the ability to develop trusted, production-ready AI models to many more users including data engineers, domain scientists and statisticians. With Driverless AI, these users can create and deploy models in hours, not weeks or months. H2O Driverless AI also includes key capabilities that are required for healthcare industry to create trusted AI models including best practice driven machine learning interpretability reports and reason codes to ensure regulatory compliance and trust.
Get Started Today

AI is critical to success in the healthcare industry. H2O.ai, the open source leader in AI, empowers healthcare companies to improve patient outcomes, drive more accurate diagnosis and decisions, and improve claims processes. Contact H2O.ai for more details and to schedule a meeting and/or demo at: sales@h2o.ai

Bibliography


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