

How Machine Learning is Transforming Healthcare Administration

By Elizabeth Galentine



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The healthcare system is being reshaped by transformative applications of artificial intelligence throughout the patient's healthcare journey, from monitoring pharmaceutical compliance to predicting comorbidities to mitigating human error in care delivery, and much more. Over the next decade and beyond, AI will continue to accelerate improved care and reduce costs in ways that healthcare leaders can't ignore — including through machine-learning driven innovations in hospital administration.

AI indicates the ability of computer systems to perform tasks that normally require human intelligence. As an application of AI, machine learning allows organizations to benefit from predictions that arise from the data. Companies such as Workday, a leading provider of cloud-based ERP, are applying machine learning to enhance healthcare administration across a broad spectrum of capabilities, including financial improvement, supply chain efficiency and HR management.

FINANCE

Utilizing machine learning to make the most of hospitals' money spent on administrative services has the potential for widespread savings. In 2017, the U.S. spent about \$3.5 trillion, or 18 percent of GDP, on health expenditures. Just under half of those expenses come from administrative services, according to the Journal of the American Medical Association.

Using data to leverage risk models associated with payers is one way that hospital systems can improve revenue cycle management and make the most out of their administrative dollars. Factors such as which payers pay on time or what the recoupment percentage is for different procedures in various regions across demographics can have a meaningful impact on financial models. "Understanding the risk models drives an opportunity to do some reshaping, if needed," says Joe Wilson, Chief Technology Officer at Workday. For example, a hospital system may decide to close one of its underperforming facilities.



One area where machine learning “has done really, really well” is using data to examine multiple variables throughout the patient care journey to determine if procedures have been coded correctly or missed altogether in the billing process, according to Yomi Ajao, Vice President of Data Analytics and Care Management Innovation with healthcare management consultancy COPE Health Solutions. “That body of work has picked up quite a bit, whereby you see folks using that to generate better revenue for hospital reimbursement,” says, Ajao, who previously worked at HCA Healthcare. “That has been very, very useful in making sure people are coded correctly and the right reimbursement is received for the services provided.”

Internally, machine learning also has the potential to be used to reduce accounting and auditing expenses. For example, Workday is exploring anomaly detection based on a company’s historic functioning to identify transactions that might require additional investigation, according to Anton de Weger, Application Machine Learning Product Manager at Workday. A manager asked to approve a request, whether for expenses, additional hours, or other



factors, could use the data-driven system to know whether such an appeal is normal or reasonable for their particular hospital, based on a number of additional factors, including the type of employee who submitted the request, their location and the type of transaction. “This way, managers would get a guide as to where they should spend their time looking into the requests,” adds de Weger.

SUPPLY CHAIN

Through demand-based forecasting, data models can look at the impact of a wide range of factors to enable hospital administration to place more precise orders.

Rather than placing an order based on current inventory balances, a closer understanding of the data will allow hospitals to move beyond this practice to predict what will be needed and order based upon anticipated needs. “That helps to elevate better spend, by providing unique insights into what the supply chain looks like,” says Wilson.

Ajao agrees. “The most successful storyline has been around supply chain,” he says. Analyzing patterns of use of different supplies and medicines used by hospital staff and which supplies are needed to maintain proper inventory levels is becoming an increasingly common practice. “Rather than ordering more in a bulk fashion, they get more precise in terms of delivering the inventory that they need,” Ajao adds. And there is a lot of room for improvement. A 2017 analysis of more than 2,300 hospitals in the U.S. by Navigant found improvements in supply chain management have the potential to reduce annual supply expenses by approximately \$23 billion — nearly \$10 million a year in savings per hospital.

Off-contract spending is another area where machine-learning driven data can assist with supply chain improvement. Off-contract spending, such as when



a doctor prefers one medical device brand over the one the hospital has contracted for a lower price, can be difficult to track manually. But when hospital administration works with doctors to monitor this kind of spending and renegotiate rates if needed, it represents a significant opportunity to recoup (or redirect in real time) potentially bad spend, Wilson points out. “There’s a huge opportunity to allocate the most appropriate spend for the benefit of the system,” he says.

Other potential applications include monitoring supply usage on a more granular level, even down to which nurses on which shifts are using a greater volume of supplies than expected. For instance, one package of gauze may only cost 40 cents and therefore seem insignificant, but multiplied times 50,000, the savings from more efficient usage become meaningful.



HUMAN RESOURCES

Job turnover in the healthcare industry is on the rise, up 5 percent from 15.6 percent in 2010 to 20.6 percent by 2017, according to a study by Compdata Surveys. A separate survey by NSI Nursing Solutions found in 2016 bedside RN jobs were turning over at a rate of 14.6 percent. It’s an expensive problem to have. Replacing a nurse alone can cost up to \$104,400, according to a study in the *Journal of Nursing Administration*, when factors such as recruitment costs, overtime expenses and unstaffed beds are included.

Using machine learning to mine staff data within a hospital’s system has the potential to address this growing turnover problem. Beyond the basic capability of automating common HR services, such as coordinating work schedules and requests for time off, machine learning can surface top recommended candidates who are most likely to succeed in an open position and present to hiring managers and recruiters.

Further, machine learning can assist with the large variety of staff positions found in a hospital system. From custodial workers to surgeons, intake nurses to administrators, it has been historically difficult to configure an HR management system so that it is relevant to each of these types of employees, says de Weger. Through machine learning, the history of how different users interact can be used to create automatic, user-specific recommended actions. For example, offering training courses to employees based on their potential career paths. “This would create a more personalized experience for the employee while also reducing the impact on HR in providing individual advice,” says de Weger.

HR departments will also be able to use predictive data modeling to leverage data in determining factors such as how likely a staffer is to leave based on their



number of absences from work in a given timeframe or other criteria like lack of recognition. It can also assist with decision making and planning. Rather than attempting to manually analyze data to determine how much the weather will impact a hospital's bed count during winter, for example, HR staffers will be able to generate an accurate prediction of staffing needs based on aggregated historical data, Wilson says.

ENDLESS POSSIBILITY

Although not directly patient focused, the application of machine learning on the administrative side of the healthcare system can support and improve the overall patient care experience. Happier, more efficient employees have more time and energy to spend on care for patients.

As Deloitte Global notes in an example of how machine learning can affect a hospital system in *The Future of Work in Health Care*¹, patient-centered AI has the ability to work in concert with administrative

capabilities to create a cohesive, improved experience: “Digital kiosks, motion detectors, and voice recognition transcriptions brought convenience to patients. Robots assisting with logistic tasks such as delivering linens, meals, and medical supplies provided staff more time for patient care. By integrating technology across all systems, this hospital system improved physician and staff productivity, which resulted in higher quality patient care and enhanced patient and visitor experiences.”

“The healthcare industry is well primed to uptake the machine learning changes that are coming to enterprise systems now and in the near future,” says Workday’s de Weger. By capitalizing on improved financial management, supply chain refinement and efficiencies in HR administration, the possibilities derived from machine learning continue to endlessly expand for those ready to take advantage of it. ●

¹ <https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/healthcare-workforce-technology.html>



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