



Client Story

Machine Learning Brings New Hope for Better Patient Outcomes

This health system is leveraging machine learning to improve outcomes for a condition affecting 116 million in the U.S. Explore its mission to enhance patient care, empower providers and cut healthcare costs by thousands every year.

The vision: Data-informed care for better outcomes and more empowered clinicians

Hypertension, or High Blood Pressure (HBP), affects nearly half (47%)¹ of the U.S. population and contributes to almost 500,000 deaths per year.² For this pioneering health system, it's a sobering statistic that inspired a new initiative: tap into the power of Machine Learning (ML) and help patients get their HBP under control.

Hypertension is difficult to control for several reasons: Providers must follow population-specific, not patient-specific, guidelines when prescribing medications. Designing a within-guideline regimen is complex. And there are many options for treatment with more than 70 medications available — each with different recommended dosages and combinations from different classes. This makes the number of possible prescriptions for each patient astronomical. For our client, this complexity had resulted in 60% of its patient population not having their hypertension controlled.

To provide more data-informed and targeted treatment, our teams got to work on an ML engine that would provide recommendations based on patients' unique symptoms, comorbidities, current medication(s) and other possible medications.

Industry:
Healthcare

The challenge:
Lessen the cost and complexity of hypertension treatment for better outcomes.

The solution:
A machine learning-based solution to deliver more personalized care with a higher likelihood of success

Insight provided:

- Strategic viability testing
- Development of an ML simulator/decision support system
- Currently designing/architecting for prototype application, UI and data platform
- Opportunities for solution integration within Epic environment for easy access

Insight services:

- Consulting Services

A healthy foundation

First, Insight engaged with the health system's clinicians and surgeons to understand workflow. We also conducted a viability assessment of the current state of hypertension treatment and potential use of ML in the environment. Insight and the clinic's technical team identified technology, general acumen and scalability in the data science as key hurdles.

Our teams then designed and assembled a sizeable Electronic Health Record (EHR) data model compatible with the requirements of ML algorithms. EHR data, including vitals, medications, comorbidities, laboratory results, ejection fraction, encounters and census data, were incorporated into the data model. Vitals, medications and encounters were also processed to incorporate temporal changes of each into the data model. For example, if a patient had prior blood pressure measurements, blood pressure changes and trends were calculated. Similar calculations were done for the most common patient-hospital encounters.

To improve predictive accuracy and inform clinical support, nearly 800 patient data points or patient features were used or engineered for every patient encounter. Our teams ensured that no Personally Identifiable Information (PII) was downloaded to local computers.

Based on impact modeling, this solution has the potential to add, on average, 100 days of life to our client's HBP patient population and to save 20% of that population about \$2,000 per year in healthcare costs.

The outcome: A first-of-its-kind approach for a healthier patient population

With ML at the core of its decision support strategy, the health system is making a significant impact on hypertension care. Helping hypertension patients get their condition under control not only results in better quality of life — but also cost savings due to patients not needing to escalate care. Based on impact modeling, this solution has the potential to add, on average, 100 days of life to our client's HBP patient population and to save 20% of that population about \$2,000 per year in healthcare costs.

On a national scale, the impact is even greater. Today, the collective cost of hypertension care is estimated to be between \$50 billion and \$200 billion per year — making the potential for more widespread adoption of this decision support technology truly transformative.

“Based on our analysis, it can take years to find the right combination of medications to control a patient's hypertension. For many patients, that will happen in one encounter.”

— Chief Data Scientist, Insight

Today, Insight is helping the client plan for application and data stores built on Azure®, ensuring security and compliance with regulations such as the Health Insurance Portability and Accountability Act (HIPAA). Our teams continue to partner with the health system on feature updates, optimizations and expanded use cases.

¹ Centers for Disease Control and Prevention. (2023, Jan. 5). Facts About Hypertension. CDC.gov.

² Centers for Disease Control and Prevention. (2022, Oct. 3). Health Topics — High Blood Pressure. CDC.gov.

Benefits & outcomes:

Estimated
**additional
100 days of life**
per patient due to more
personalized care

Average of
\$2,000 per year
in healthcare cost savings for
20% of the hypertension
patient population



Never-before-seen
predictive accuracy with
**~800 patient data points
informing ML model**



**Increased
efficiency**
in providing care

**Strict adherence
to HIPAA
regulations**

