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# Mining Electronic Health Records to Achieve the Triple Aim

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**A**s a predictive analytics leader, I apply my traditional health insurance background and actuarial training to my role leading the risk analytics team at UnityPoint Health, one of the nation's largest nonprofit health systems. Our diverse team includes an engineer, actuaries, former health insurance underwriters, certified public accountants (CPAs), data scientists and a statistician. Together, they use advanced analytics to build more complete patient risk stratification models by mining claims, clinical and social determinant data in new ways.

Hospitals and health systems are increasingly designed to excel at the triple aim of providing patients with quality care and optimal experience at a lower cost. The challenge is achieving financial viability in a changing environment as it shifts from fee-for-service to value-based care. This rapid transformation is offering unprecedented opportunity for those of us working in health care analytics. One step toward achieving financial viability is making use of accurate coding and documentation of electronic health records.

My team and I developed an application to cull unstructured doctors' notes in electronic health records (EHRs) using a natural language processor (NLP). Although the use of EHRs has increased substantially, millions of unstructured, free-form doctors' notes, rich in medical information, continue to go

## CONSIDERING A NONTRADITIONAL CAREER IN PREDICTIVE ANALYTICS?

An actuary's skill set is naturally aligned with current and emerging trends in health care, especially as providers move away from the fee-for-service model and take on more risk. Companies need people who understand the data and how to analyze it, recognize its shortcomings and communicate the findings, and actuaries get that kind of specialized, broad training.

Learn more about predictive analytics opportunities at <https://www.soa.org/predictive>.

untapped. This article explains how the team is mining electronic health records to find previously undiagnosed at-risk patients to improve care management more efficiently.

The work my team does centers around making sure providers realize the value of the services they deliver. At its core, being able to realize the value of these services comes from accurate coding and documentation to provide appropriate care management and get reimbursed for services rendered. At the end of the day, providers can only get paid for what they correctly code.

To help our network of providers realize the value of accurately coding their services, we are taking the massive amount of data in EHRs and running it through annotators we developed in an NLP. It captures clinical data and translates it into useful insights, which we are using to improve patient outcomes.

There's still room for progress. We estimate that up to 20 percent of our diagnosis codes are not recorded in structured fields. We imagine this is not unique among health care systems. Because this kind of undercoding impacts both timely disease identification and billing, we are using the NLP to turn this unstructured data into structured data.

The NLP can scan doctors' notes for valuable information, such as family history and ailments, to help predict patients' medical needs. It can also help identify chronic conditions that have not been recorded in structured fields in electronic medical records.

This enriched information can be used to complete patient risk stratification models, including risk scores, and to analyze missed coding opportunities.

The NLP annotators have "cognitive" abilities similar to human coders. We are using the annotators to analyze unstructured data for diabetes and chronic obstructive pulmonary disease. Our next analysis will be around social determinants of health, such as living arrangements and employment status, to help with care management initiatives.

Some of the other models we developed using EHR data include a clinic appointment no-show model and a staffing model to forecast patient demand and guide staffing levels.

While nothing in health care can be predicted with certainty, actuaries use predictive analytics to identify new models of care that improve health care quality, costs and outcomes for our patients. ■



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