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Challenges of Applying Predictive Analytics to Population Health

Predictive analytics have the potential to revolutionize population health management, but some familiar challenges still stand in the way.



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By Jennifer Bresnick (<mailto:jbresnick@xtelligentmedia.com>)

January 10, 2017 - Healthcare providers are starting to become very familiar with the notion that data analytics can help to drive more informed clinical decision making, but organizations are largely still struggling to implement and leverage the big data tools that will allow them to truly succeed with comprehensive population health management.

Tight budgets, old habits, competing initiatives, and hard-to-shift data siloes have contributed to a fragmented environment where predictive analytics and proactive care planning are still often little more than a pipe dream.

As many organizations have already found out, overcoming these barriers takes some very hard work which must be backed by an overarching strategic plan and a clear understanding of the problems, challenges, and ultimate goals of using predictive analytics to enhance and inform population health management.

“The overall objective for any healthcare provider should be to ensure that the patient’s quality of life is improved and that their outcomes are as good as they can possibly be,” said Sanket Shah, Professor of **Health Informatics (<http://healthinformatics.uic.edu/>)** at the University of Illinois at Chicago to *HealthITAnalytics.com*.

“Predictive analytics can help with that by leveraging the patterns we’ve established, using evidence-based medicine, to project confidence into the next likely event.”

READ MORE: Using Risk Scores, Stratification for Population Health Management (<https://healthitanalytics.com/features/using-risk-scores-stratification-for-population-health-management>)

This competency is especially important for organizations **shouldering financial risk (<https://healthitanalytics.com/news/value-based-care-starts-with-basic-population-health-management>)**, he added, since reducing the number of avoidable, high-cost crisis events can result in higher performance bonuses or more shared savings.

“Population health is one of the primary use cases for predictive analytics right now, especially as we start to move into value-based care,” said Shah. “Over time, as the organization starts to implement more financially-involved models, and those cost-sharing or savings opportunities become more real to the system, predictive abilities are going to become very, very important.”

CHOOSING A USE CASE TO PRODUCE MEASURABLE RESULTS

Predictive analytics have started to find a home in the acute care environment, forecasting the development of **sepsis (<https://healthitanalytics.com/news/sepsis-sniffer-brings-predictive-analytics-to-patient-safety>)**, the chances of an elderly patient taking a **dangerous fall (<https://healthitanalytics.com/news/ehr-predictive-analytics-flag-32-of-nursing-home-patient-falls>)**, and even whether or not an individual patient is **likely to die (<https://healthitanalytics.com/news/montefiore-semantic-data-lake-tackles-predictive-analytics>)** within forty-eight hours of entering the hospital.

These types of serious adverse safety events have a clear and immediate impact on patients – and the organization’s bottom line – and represent an enticing reason for hospitals and health systems to invest in the latest and greatest machine learning and semantic computing offerings.

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But the use cases for primary care providers often seem more nebulous and less likely to quickly satisfy budget hawks. Managing a patient with multiple chronic diseases requires clinicians to look closely at a large number of unique variables, including socioeconomic determinates of health that are rarely available in a digitized, analytics-friendly format.

It may seem overwhelming to try to collect data on all aspects of every patient’s life, develop an algorithm to bring all that information together into a manageable risk profile, and then develop the workflows and outreach required to keep that patient engaged in a regimen of preventive care – and indeed, few experts would advise that an organization should try to take on every challenge at once.

Instead of crushing staff with an impossibly large big-bang implementation, Shah believes that starting with a narrower goal that **fits into the organization’s overall strategic plan** (<https://healthitanalytics.com/news/how-to-build-a-successful-big-data-analytics-program-in-healthcare>) can produce impactful results that will smooth the path towards continuous improvements.

“Trying to predict emergency department use and readmissions among chronic disease patients is a great place to start,” he suggested. “It’s important for organizations to start to dive into the problem of those diabetics, for example, who have made an appearance in the ED for the third or fourth or fifth time in a year.”

Identifying and engaging high-cost “super users” before they experience another serious event can quickly bring down costs and improve performance on quality metrics.

The Agency for Healthcare Quality and Research (AHRQ) **notes** (<https://healthitanalytics.com/news/top-5-of-chronic-disease-patients-spend-29-7-of-care-costs>) that the top five percent of complex chronic disease patients account for nearly a third of spending, while preventable readmissions are a **\$17 billion problem** (<https://revcycleintelligence.com/news/preventable-readmissions-cost-cms-17-billion>) for CMS, not to mention the costs to private insurers.

“You can begin by using data you have on your patients to explore the different methodologies out there to calculate the risk of readmissions,” said Shah. “One popular method is the **LACE Index** (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4670852/>), which looks at length of stay, the acuity of the original index admission, the patient’s comorbidities, and how many times they have visited the ED within the past six months.”

“These scores allow you to get that information to your case management team and alert them that Patient A is probably very close to another trip to the ED, so maybe we can call her and make sure she goes to see her endocrinologist or cardiologist or primary care provider, whatever the case may be.”

DEVELOPING A COMPREHENSIVE PATIENT DATA PORTRAIT

Most providers already possess the data assets required to implement a relatively simple risk score like the LACE Index, although getting access to that information – and augmenting it as much external data as possible – can certainly be a challenge.

The difficulty is compounded when patients move between providers, health systems, or even geographical regions, as they so often do, Shah added.

“A primary care provider isn’t necessarily going to know that their patient living in Minnesota went to the ED while on a trip to Florida four months ago, because it’s unlikely that those systems will be connected,” he said.

“And unless the patient thinks to tell their PCP about that event, where is the information going to come from? The overarching entity responsible for that patient’s life, which is their payer. The payer is going to be the one to **connect those dots** (<https://healthpayerintelligence.com/news/payers-providers-use-population-health-management-to-cut-costs>), so establishing partnerships with those entities is going to be very important for population health management.”

Many providers are already setting up these connections through formalized value-based reimbursement arrangements or accountable care organizations, which are helping to establish best practices for exchanging claims data and more real-time alerts for predictive population management.

“We’re starting to see some headway with being transparent and bringing down data siloes, because it’s just as important for payers to identify those patients that may be in line for a catastrophic event,” Shah said. “Working together will help to achieve those dual goals of improving outcomes while hopefully reducing some costs, so everyone is starting to find those partners that will help them do that.”

But not even payers know everything about their beneficiaries, and sometimes the most important data for understanding a patient’s unique health situation isn’t available in the EHR or the record of claims.

In order to develop truly meaningful predictions about whether or not a patient is at risk for a costly downturn, provider partnerships must also extend into the community.

“You can have two patients who appear very similar on paper: they’re both 45 years old, they both have hypertension and obesity, and they both rarely visit their providers,” Shah explained. “It might seem fair to assume that they have similar risks for readmissions, or that they might be progressing through their diseases at similar rates.”

“But one of those patients lives in a **food desert** (<https://healthitanalytics.com/news/sc-online-population-health-dashboard-reveals-community-disparities>) with no public transportation, and the other has their own car, lives in an area with grocery stores right around the corner, and can afford a gym membership. Adding these datasets makes it clear that they’re not really the same patient at all.”

The new frontier of population health management is understanding how to gather, integrate, and utilize **socioeconomic data** (<https://healthitanalytics.com/news/ehr-socioeconomic-data-a-must-for-population-health-management>) to improve the accessibility of services, coordinate care within the patient’s community, and give patients the best possible chance of maintaining a healthy lifestyle in between visits to the clinic.

“Ultimately, we want to know everything we can about the patient’s life and habits, because that is so important to their overall health.”

“Where does the patient reside, and how does that influence the accessibility of services? And how do we capture that and infuse it into machine learning algorithms to provide a more accurate and more customized prediction of how each individual is going to come in contact with the care system? These are the challenges we are going to have to address quickly in the future.”

PREPARING FOR THE FUTURE OF PREDICTIVE ANALYTICS

Few providers or health IT vendors have the answers to those difficult questions yet, but innovative data sources and new analytics processing techniques are likely to move the industry into a better position to address holistic population health management very soon, Shah predicted.

Internet of Things (<https://healthitanalytics.com/features/can-healthcares-internet-of-things-move-from-froth-to-function>) devices, including remote patient monitoring tools and consumer-focused wearables, will continue to bring real-time patient-generated health data streaming into the clinical environment.

“A lot of these glucose monitors or blood pressure monitors can send information in real-time, which is an amazing development for a lot of organizations,” he said. “Now, you can collect all that data without having to have the patient set foot inside the clinic, which could be a game-changer, because that information is coming in at a relatively low cost-point.”

The healthcare system has not yet found a scalable way to make use of this massive, unfiltered influx of data, but the rapidly growing interest in machine learning, semantic computing, and artificial intelligence **may soon change** (<https://healthitanalytics.com/news/big-data-artificial-intelligence-iot-may-change-healthcare-in-2017>) that state of affairs.

“Machine learning is certainly going to be the next wave of validating these outputs and recommendations, and it’s going to be very important for integrating all the non-clinical aspects of data that have to be considered, like socioeconomics, demographics, and geographical data,” said Shah.

“You can’t make really accurate predictions without those pieces of data, whether they are self-reported by patients or pulled in from IoT devices or more public datasets.”

“There’s still so much information that we have to start to identify. It’s right there, and it’s ready. If we don’t have this data, then we’re just making generalizations. That’s where we are at right now, but there is such enormous opportunity for fine-tuning our predictive analytics in the near future.”

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