Predictive analytics can spot patients not taking their medicine

Using big data to find incidents of medication nonadherence, and using it to tailor patient interventions, is a key component to population health.

Mike Miliard, Editor, Healthcare IT News

Any health system trying to tackle population health management in any meaningful way has to grapple with the challenge of patients who don't adhere to their care plans – especially those who, for whatever reason, don't take their medicines in the way they were prescribed.

"Medication nonadherence is a massive public health problem," said Niteesh K. Choudhry, MD, executive director of the Center for Healthcare Delivery Sciences at Boston's Brigham and Women's Hospital.
"We estimate that almost $300 billion a year is spent in caring for health conditions that are attributable to nonadherence – that amount of money could be saved if patients were fully adherent to their medications," said Choudhry, who will keynote the second day of the HIMSS Big Data and Healthcare Analytics Forum in Boston on Oct. 24.

Worse, from a quality and safety perspective, all sorts of things – "11 percent of all hospitalizations and other staggeringly high numbers" – can be directly attributed to patients failing to take their meds on time, in the right dosage or at all.

"Nonadherence is a really common and prevalent and costly issue," said Choudhry. "And it threatens a lot of the investments we've made in developing new therapies, and testing and rigorously proving their value and then disseminated to practitioners and patients that they're available."

While the U.S. spends billions of dollars developing new therapeutics, those investments won't do much good if the drugs aren't taken as physicians say they should be.

So, what's the answer to better health? Innovating on more and more medicines, or getting better at ensure they're put to work on the people who need them most?

"There's a tremendous efficiency loss in the money we're already spending," said Choudhry. "And so if you had to spend another dollar, the next marginal dollar, on how to improve healthcare quality, getting people to do what we already know how to do, or what we've already proven works, is almost certainly a more efficient strategy."

Population-level studies have shown that medication adherence is only about 50 to 60 percent. Some patient populations are higher-risk, and some are lower, but that's about the average.

"The question becomes, if we know this – for example, if we take one condition such as heart disease, which is what a lot of my work is about, and we know that this is a super common condition and that a million people per year still have a heart attack, despite our availability of very evidence-based therapies – the question becomes how can we prevent those health events from happening?" said Choudhry.
There are two options, he said: "Either we can develop new therapies to reduce the risk of heart disease even further, or let's get people to use the therapies we already have but they aren't using."

Sounds simple enough, right? Not quite.

"The reason why patients don't adhere to their medication are complex," said Choudhry. "Most people have more than one reason to be nonadherent and one person's reasons may be profoundly different than another person's reasons."

That said, "from a pure efficiency perspective, getting people to adhere to their medications, while extremely difficult to do, is almost certainly more efficient than developing new therapeutics which people won't take."

Too often, said Choudhry, "when we think about interventions, what we've done in general is a one-size-fits-all approach: We'll say, 'We know that cost is a barrier to adherence and so let's eliminate cost for all patients with a given condition. We'll just make medications free and see what happens.'"

On one hand, that may seem like an effective strategy. After all, it's easy to do and there isn't any targeting necessary of specific patient populations. But it's not as effective as it might be.

"There are many patients for whom cost is not the barrier, so there is a misapplication of what we're doing and what they really need," he said.

If we know each nonadherent patient had a different reason for that – maybe it's cost, or maybe it's competing priorities, or confusion and uncertainty, or fear of potential side effects – the question becomes: how to ascertain that?

"That's where predictive analytics is really coming into play," said Choudhry.

First, analytics can help health systems figure out who does and doesn't need an intervention. ("Half of people do adhere to their medications, and so it doesn't make a ton of sense to intervene with people who don't need help.")

Second, it can help us predict who is and who isn't adherent now, and who will and will not be adherent in the future – as well as when patients will become
non-adherent," he said. "We've made good headway on that problem, predicting who to target."

Predictive strategies can also "help identify who's most likely to benefit from certain types of intervention – that's really where the future of predictive analytics lies," he said. "We can identify timing. And we might be able to begin to identify barriers people have and what might be reasons they're not adherent using big data.

"But the Holy Grail of health behavior change in general, and certainly when it comes to nonadherence, is to be able to use data to figure out responsiveness," said Choudhry – how well a given patient will respond to a given type of clinical outreach.

"The future is in figuring out what patients' true barriers are, and then figuring out whether or not they'll respond to a specific intervention or not," he said.

Tips for other hospitals and health systems looking to embrace these techniques?

"Don't fall into a one-size-fits-all approach," said Choudhry. "We now have decades of research of saying, 'Here's a simple intervention, let's apply it to everybody,' and often finding that the interventions don't work as a whole.

"The idea of personalizing interventions – just as we believe in personalized medicine and cancer therapeutics – this is the same idea, but just on the other end of the translational research spectrum," he added. "Improving healthcare quality and getting people to engage with healthcare really will require a large degree of personalization."

Another piece of advice is to use "existing and available techniques from big data – methods to predict who will be nonadherent in the future – which you can readily get from insurer claims data by applying published approaches," he said. "That's the second stage and it's already something people can begin to do and large health insurance companies are doing this every single day. They're certainly approachable."

Finally, it's key to keep an eye on the future, said Choudhry.
"Even though the technology to ultimately apply these techniques is still being developed, it's not that far off," he said. "We've come a long way in the past five or seven years in this space, and I expect five years from now will be quite distinct. People should stay tuned."