

Modern Healthcare | survey

ACCOUNTABLE CARE

July 14, 2014



Advocate Christ Medical Center; Oak Lawn, Ill., where officials deployed a predictive model using clinical and claims data.

Data collection could stump next phase of predictive analytics

Aggregating claims and clinical data pose an initial hurdle for systems seeking to use big data to target patients for preventive interventions

By Melanie Evans

Advocate Health Care's first foray into predicting patients' future medical needs focused on those at greatest risk for repeat hospitalizations.

It made sense. Medicare two years ago began penalizing hospitals with excessive patient readmissions within 30 days of discharge. The policy set hospitals scrambling to identify and head off potential repeat visitors. Penalties to date have cost hospitals more than \$500 million, according to the Advisory Board, including as much as \$5 million for some Advocate hospitals.

Advocate's initial investment in predictive analytics paid off. The big-data initiative, which combined information gleaned from patients' medical history, claims, demographics, laboratory results, pharmacy use and patients' self-

description of their health status, was 20% more accurate than alternative algorithms in the marketplace in predicting who might be readmitted after discharge, system officials said.

But now, with the new system in place at eight of its 11 hospitals, Advocate is looking to take the strategy to the next level. The Downers Grove, Ill.-based health system and its medical records partner later this year will launch a predictive-analytics initiative that reviews all patients receiving care from affiliated physicians. The goal is to identify patients who are likely candidates for interventions to prevent disease, better manage their health conditions outside the hospital and prevent future hospitalizations, all of which could save insurers and the system money.

The model sorts patients by the complexity of their conditions, and then identifies those factors that signal those who are ripe targets for intervention such as unfilled prescriptions

Ranking of respondent ACOs by covered lives

ACCOUNTABLE CARE ORGANIZATION/LOCATION	NUMBER OF COVERED LIVES	NUMBER OF PHYSICIANS PARTICIPATING	YEAR ACO FORMED
Advocate Health Care, Downers Grove, Ill.	609,000	4,500	May 1995
Partners HealthCare, Boston	550,000	6,400	December 2011
Allina Health, Minneapolis	331,388	1,250	January 2012
Banner Health Network, Phoenix	285,000	2,900	July 2011
UnityPoint Health Partners, West Des Moines, Iowa	266,000	2,500	January 2012
Bellin-ThedaCare Healthcare Partners, Green Bay, Wis.	240,000	740	November 2008
MichCare, Rochester, Mich.	180,000	800	2011
OSF HealthCare System, Peoria, Ill.	175,000	1,000	December 2011
Atlantic Accountable Care Organization, Morristown, N.J.	135,000	1,700	October 2010
Physician Organization of Michigan ACO, Ann Arbor	127,000	4,800	January 2013
Texas Health Resources, Texas Health Physicians Group, Arlington	100,000	247	August 2008
SERPA-ACO, Crete, Neb.	90,000	55	September 2012
KentuckyOne Health Partners, Louisville	84,000	1,138	June 2012
Triad HealthCare Network, Greensboro, N.C.	74,000	844	September 2011
Baylor Scott & White Quality Alliance, Dallas	44,000	2,500	January 2011
Alexian Brothers Accountable Care Organization, Arlington Heights, Ill.	41,000	1,350	June 2012
Hackensack Alliance ACO, Hackensack, N.J.	40,000	450	October 2011
Lahey Clinical Performance ACO, Beverly, Mass.	36,000	946	January 2013
Accountable Care Network of Texas, Temple ¹	33,000	1,350	June 2012
Barnabas Health, West Orange, N.J.	30,000	700	July 2012
Heartland Regional Medical Center Accountable Care Organization, St. Joseph, Mo.	30,000	167	July 2012
Sharp HealthCare ACO, San Diego	29,108	565	December 2011
Catholic Medical Partners-Accountable Care, Buffalo, N.Y.	28,000	800	April 2012
Accountable Care Organization of Pennsylvania, Radnor	27,000	855	December 2010
Qualuable Medical Professionals, Kingsport, Tenn.	25,000	444	January 2013
Arizona Connected Care, Tucson	22,000	340	April 2012
AtlantiCare Health Solutions, Egg Harbor Township, N.J.	21,500	335	January 2012
Meritage ACO, Novato, Calif.	20,000	280	September 2012
Methodist Patient-Centered ACO, Dallas	14,000	228	February 2012

¹ACO has a partnership with Deerfield, Ill.-based Walgreen Co.

Source: Modern Healthcare's 2014 Accountable Care Organizations Survey

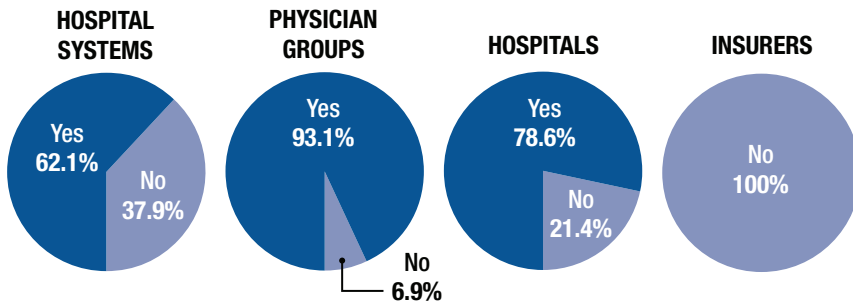
Defining Value was Simple

$$V = \frac{Q}{C}$$



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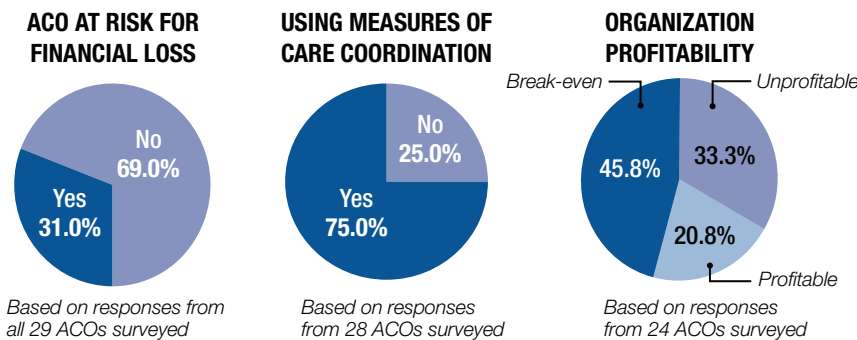
What's included in the ACO?



Based on responses from all 29 ACOs surveyed

Source: Modern Healthcare's 2014 Accountable Care Organizations Survey

Market measurements



Based on responses from all 29 ACOs surveyed

Based on responses from 28 ACOs surveyed

Based on responses from 24 ACOs surveyed

Note: Percentages might not add up to 100 because of rounding

Source: Modern Healthcare's 2014 Accountable Care Organizations Survey

or poor communication between patients' multiple providers.

For providers, the preventive interventions enabled by predictive analytics could deliver profits under new payment models, which are moving toward various forms of capitation. And for policymakers, the savings could ease the fiscal stress that U.S. health spending puts on taxpayers and employers.

"It's enabling strategic resource allocation among the total population," said Dr. Rishi Sikka, Advocate's vice president of clinical transformation. "If you really want to move the entire population ... you need to work on the entire population, not just the most expensive."

Advocate's push to employ predictive modeling across its broad population

base is an early test of the latest front in healthcare's march to using big data to improve healthcare outcomes and reduce costs. It is occurring against a backdrop where much of the industry is still struggling to boost the weak to modest accuracy of existing models, which focus on preventing hospital readmissions and have so far yielded only modest results (some no better than flipping a coin), according to a 2011 review of more than two decades of studies and more recent published research.

"Most models were not very good at discriminating between patients who were and were not going to be readmitted to the hospital," said Dr. Devan Kansagara, director of the Evidence-based Synthesis Program at the Port-

land Veterans Affairs Medical Center, assistant professor of medicine at Oregon Health & Science University, and lead author of the 2011 study.

Using big data and applying predictive analytics have been hot topics among hospital officials and consultants for several years now. But many systems that are moving to implement big-data analytics face huge technological hurdles, including incomplete data residing in multiple electronic health records that often cannot communicate with one another.

Experts also note that some systems' efforts are falling short because they rely exclusively on claims data, which don't include the details and nuance provided by medical records. Those records are difficult to obtain and even more difficult to sift. One problem: Massive clinical data files contain loads of redundant information. "Practically, it's just hard to extract the data," said Ian Duncan, a consultant for the Society of Actuaries and an adjunct professor of actuarial statistics at the University of California Santa Barbara.

Advocate grappled with all those challenges. Its deeper dive into predictive analytics required roughly 18 months of work to merge, clean and organize patient data from multiple sources, including external insurance claims, internal financial and demographic records and multiple electronic medical-record systems. The work was necessary, executives said, to deliver the community-wide health improvement—and savings—that come from treating fewer chronically ill patients who show up on a hospital's doorstep with complex and hard-to-treat medical emergencies.

Advocate developed its new model with Cerner Corp. After scoring all patients on measures of wellness and illness complexity using laboratory values, prescription data, vital signs and smoking status, the model allowed Advocate's providers to identify those patients whom doctors could either keep healthy or help avoid hospitalization by placing them in care-coordina-

Now, it's more complex $V = \sum_{p=1}^n \left(\frac{O_p \cdot S_p \cdot Q_p}{G_p \cdot A_p} \right)$


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tion programs, long-term care or home-care services. Patients may also be identified who could benefit from less resource-intensive interventions, such as telephone outreach.

The ACO imperative

The booming interest in predictive modeling comes as hospital revenue and margins are increasingly dependent on providers' skills at managing care costs because of the demands of accountable care. Profits under accountable-care contracts depend in part on providers' success at keeping medical spending below set targets.

Accountable-care contracts have more than tripled under Medicare since 2012. To date, few have seen financial payouts under the model; three-quarters failed to earn bonuses during the first year. The private sector's interest has also blossomed. There are now 626 accountable care organizations nationwide, covering more than 20 million individuals, the consulting group Leavitt Partners estimated in June.

As accountable-care contracts cover more lives, providers will find themselves at greater risk for steep losses if they fail to get costs under control, since many are moving toward capitated payments.

The growth of ACOs has spurred a booming consulting industry for data analytics in healthcare, with a rush of vendors jostling for business alongside some of the biggest names in computers, software and consulting. Some major healthcare delivery systems in the country are either considering or in the early stages of implementing predictive-analytics programs.

This escalating push into predictive analytics is ultimately being driven by the growing recognition by some hospitals and medical groups that those who can identify and prevent avoidable trips to the emergency room, hospital or clinic will be financially rewarded under accountable care-like payment models. "If you're more efficient when you bear economic risk,



"If you really want to move the entire population ... you need to work on the entire population, not just the most expensive."

DR. RISHI SIKKA,
VICE PRESIDENT OF CLINICAL TRANSFORMATION,
ADVOCATE HEALTH CARE

that's your profit margin," said Dr. David Nash, dean of the Thomas Jefferson University School of Population Health and a professor of health policy.

Predictive analytics has been made possible by the flood of data released by healthcare's recent investments in information technology. To analyze the data trove, clinicians increasingly work alongside statisticians, programmers and actuaries as they look for new opportunities to better manage chronically ill patients.

"Understanding as much as you can about all aspects of your patient, not just their disease, but their social setting, their history of utilization, their risk for hospitalization, that's big data in healthcare," Nash said. "The more you understand, the more efficiently you can deploy resources."

Proponents of predictive analytics say the new systems will move beyond the immediate goal of reducing hospital visits to focus on prevention. They want to head off chronic disease

before it starts or reduce complications among those who are already ill.

"All of the attention up until now has been on the hospitals," Portland VA's Kansagara said. "The next frontier is looking from the vantage point of the primary-care medical home. I think that some would argue that we're missing the boat if we're only looking at the hospital."

Population health 2.0

As hospitals and medical groups seek to capitalize on big data, they face significant information technology challenges, ranging from the basic need for an electronic health record to the intensive process of combining data from multiple systems. Advocate's push into predictive analytics underscores those challenges.

Advocate's work with Cerner to bolster its analytics capabilities began more than three years ago. Early efforts focused on merging and standardizing clinical, claims and financial data across multiple electronic-health records. Aggregated data provided the longitudinal database of patient records for analysis, a project that required 18 months to complete. "This work, in and of itself, is groundbreaking," Sikka said.

The effort required data extraction across multiple databases with different codes that needed to be standardized, from patient gender to laboratory values. For example, one database might report gender with the word "female," another with the letter "f," another with binary code. Databases even used different codes to identify the same patient, making even the most fundamental work of aggregating data a major hurdle. Comprehensive data "is the linchpin," said Tina Esposito, vice president for the Center for Health Information at Advocate.

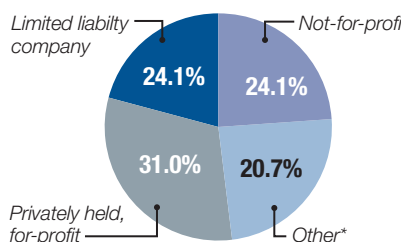
Many providers lack the technology or resources to overcome those barriers, said Ariel Bayewitz, vice president of provider analytics and reporting for major insurer Well-

Have you arrived at a solution... V = ?


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Type of ownership?



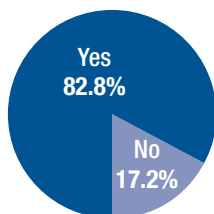
Based on responses from all 29 ACOs surveyed

*Includes nonreporting entities and not-for-profit/for-profit partnerships

Note: Percentages do not add up to 100 because of rounding

Source: Modern Healthcare's 2014 Accountable Care Organizations Survey

Is plan a separate legal entity?



Based on responses from all 29 ACOs surveyed

Source: Modern Healthcare's 2014 Accountable Care Organizations Survey

Point. Not all providers have EHRs and software varies among those that do. WellPoint's predictive analytics tools rely on claims data to identify high-risk patients by studying 40 conditions or risk factors, such as unfilled prescriptions.

WellPoint is testing the integration of health-system clinical data into predictive models through pilots with HealthCore, its research subsidiary. The company declined to say how many systems are involved in the effort, but a spokeswoman said the work "so far has been focused on the complex task of integrating clinical and claims data, and testing that data to ensure we are accurately capturing the information to provide the most accurate longitudinal patient record." The data has been used to uncover undiagnosed conditions and track drug compliance, she said.

At Optum Labs, the Cambridge, Mass.-based collaboration between healthcare companies and Optum, the consulting and analytics arm of UnitedHealth Group, researchers are testing use of predictive models for patient

risk alongside more retail-friendly analytics commonly used by Amazon or Netflix to anticipate consumer needs, said laboratory CEO Paul Bleicher. "One of the richest opportunities, in terms of improving patient care and reducing the cost of healthcare, which is the dual focus of ACOs... is through predictive modeling," he said.

That's a break from strategies to target the costliest patients—the 5% that account for 25% of spending—that fail to make that differentiation, Advocate's Esposito said. "That top of the pyramid is anything and everything."

For that reason, targeting the most expensive patients is "the first generation of population health," said Advocate's Sikka. Using more sophisticated algorithms to isolate medical needs and risk across a full range of patients is "population health 2.0," he said.

Yet targeting the most expensive patients still has its proponents, particularly among ACOs in the early stages of using predictive analytics. The strategy was made popular by the Camden Coalition of Healthcare Providers, which targeted intervention to the most costly patients in Camden, N.J.

Intermountain Healthcare, the Salt Lake City system with 22 hospitals and its own health plan, launched its analytics program to determine how to reduce spending among the 1% of its patients who accounted for 24% of care expenditures between 2008 and 2012. "We did not know a lot about them," said Scott Pingree, Intermountain's director of strategic planning and chair of high-cost patients and hot-spotting.

What they discovered was extensive fragmentation among the caregivers for these complex patients who had on average a dozen attending physicians. Less than half had a primary-care doctor, even though a fourth of patients had at least three chronic diseases.

The system used that knowledge to open a referral-only clinic in Salt Lake City for high-use, high-cost patients. Pingree and his staff also began to wade through the data to identify clusters of patients with similar needs. "There's always more to learn from data," he said.

Accountable care organizations involved with the Brookings Institution's ACO Learning Network are increasingly interested in patients with a "rising risk" of complications who would benefit from early interventions. Until now, most ACOs targeted the top 5% of most expensive patients, said Dr. James Colbert, a consultant for the

network and a faculty member at Harvard Medical School.

Going beyond the high-cost strategy, a few systems are experimenting with collecting data on social determinants of health that are not contained in either claims or electronic medical records, such as housing or access to food. Three moderately successful predictors of repeat hospital visits among heart failure patients include economic status, frequent address changes and cocaine use, researchers reported in the journal *Medical Care* in 2010.

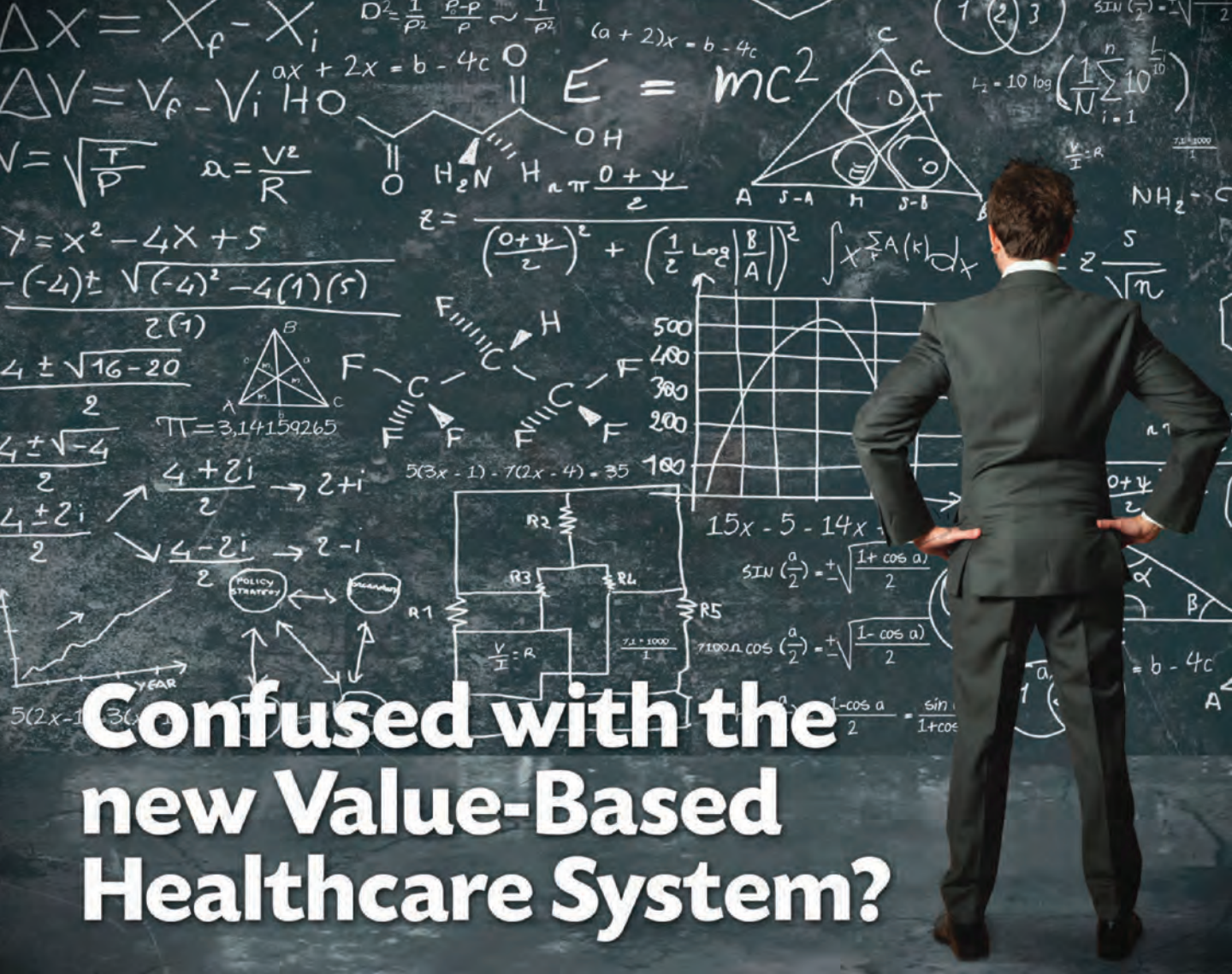
The idea is to get a full picture of individuals most at risk, Colbert said. Unfortunately, most predictive models overlook social determinants of health, Kansagara and colleagues reported in 2011.

Even the biggest proponents of using big data to conduct predictive analytics do not think it will reduce reliance on the individual physician's relationship with patients. Many ACO initiatives include the direct experience of clinicians with patients—and their clinical intuition—to round out patient portraits of who may be at risk, said Dr. Farzad Mostashari, the former national coordinator for health information technology, who is now chief executive of ACO consultancy Aledade.

Some large systems are still holding off, thinking predictive analytics enabled by big data may not be worth the investment—at least not yet. Officials at Banner Health in Phoenix are moving to a team approach to develop population-health management across all their services, including preventive care and chronic-disease management, said Dr. Robert Groves, Banner's vice president for health management.

Banner, whose ACO formed in July 2011, covering 285,000 Medicare and commercial-contract beneficiaries, is looking for ways to move beyond targeting the most expensive 5% of patients to targeting the 15% of patients most likely to end up in that most-expensive group. But so far, it hasn't found a predictive-analytics model that works any better than smart doctors. "I'm unimpressed with their ability," Groves said. "It's chess before Big Blue." ●

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