Getting from Big Data to Good Data:
Creating a Foundation for Actionable Analytics

Ask most health care leaders what drives good patient outcomes and strong financial performance, and you'll likely get the same answer: data, and not just any data. To get a full picture of their patients' health status, organizations need high-quality data from a multitude of sources, including claims, clinical, administrative and socio-demographic data banks. Such data can help payers, providers and the myriad of support services that work with them understand how care is given, to what populations it is extended and how individual practitioners are performing.

It may sound impressive to say that your organization has access to terabytes of patient information, but without robust technology and smart people to manipulate it, that data is simply words and numbers without context. In a day and age when understanding patient risk is critically important, health care organizations must be able to cull robust data to build risk-bearing care systems and the financial models that will sustain positive patient outcomes.

And it all starts with quality data. In the following analysis, we'll explore the roots of good data models at some leading health care organizations and discuss what capabilities are needed to provide the best patient care while managing risk.

What Is "Good Data"?

With respect to data quality, many factors come into play. Raw data from claims or from an EMR database are not suitable for analysis. Turning raw data into usable information requires preparation, including normalization and validation. Only then can an organization gain trustworthy insights from the information and put it to use in maximizing patient care, reducing risk and strengthening a business's bottom line.

While the concept of data quality is widely accepted, most health care organizations define "good data" in different ways. One common thread, however, is the overwhelming need to gather and analyze information from one end of the spectrum to the other — from all data sources and from all sites of care.

"Good data is as much clinical data as you can possibly assemble regarding the care of a patient wherever they are," said Carl Couch, MD, president of Baylor Quality Alliance, a clinically integrated organization of employed physicians, independent physicians, hospitals and other providers. "So, having both inpatient and outpatient clinical data is huge. Good financial data is particularly important — being able to know the entire cost of care — because a claim paid by the payer represents the total cost of care for that patient."

Human error is always a risk in data gathering and entry. It's not uncommon for patient data sitting within health system data marts to show men having babies, people born in 1776 and Daffy Duck coming to an emergency room.

To get a full picture of their patients' health status, organizations need high-quality data from a multitude of sources, including:

1. claims
2. clinical
3. administrative
4. socio-demographic

raw data

normalization validation

usable information

And organizations must pay close attention to the sources of their data. "For example, while my company was cleansing data for a provider organization, we reviewed a lab feed that contained whole sections of lab values that could not possibly be human. As it happened, that lab was also serving veterinarians, and there was no designation for human versus non-human patients in the data," said A.G. Breitenstein. "That's an outlier example, certainly, but it's indicative of the fact that data can't be trusted on its face — it must be analyzed and cleansed to ensure its quality."

More important, quality data must be actionable. "If data gathering is done simply for data's sake, it is not worth doing," said Adrian J. Rawlinson, MD, of Brown and Toland Physicians in San Francisco.

"Actionable data is useful clinical data that provides, for example, a pursuit list of high-risk patients or those likely to be admitted in the next six months," he said. "Anybody can create data or build dashboards and employ these tools. It is really a question of what you are going to do with it and how you are going to put it to best use once you have it."

One important use of actionable data is the development of accurate registries for care management. Registries, which are collections of health and demographic data for patients with specific health conditions, are traditionally built from claims data. Combining actionable clinical data with claims data provides organizations with a truer cohort of patients with the same disease. Without clinical data, registries will be incomplete. An analysis of Optum's clinical database of more than 65 million patients reveals that nearly 20 percent of patients with clinical evidence of diabetes lack a coded diagnosis of diabetes.[1] That means one out of every five patients will not appear on reports from electronic health record systems by diagnosis code, on problem lists or in registries.

A True Snapshot of Risk

Generating and utilizing good data is merely a first step. The next step requires investment in advanced analytical systems that can provide accurate, timely and precise risk perspectives.

Baylor Quality Alliance uses a blend of Optum analytics and home-grown systems for population segmentation, predictive modeling and performance measurements around quality and cost, according to Dr. Couch. By focusing data analyses on specific functions, Baylor is able to quickly and effectively manage risk and make corrections to patient protocols where needed.

Optum One, utilized by Baylor, applies four distinct components to maximizing all-source data analysis:

1. Integration of clinical and claims data across the continuum of care to give providers a complete view of population health

2. Better prediction of at-risk patients to reduce preventable costs via clinical analytics

3. Improved performance via deep comparative clinical benchmarks

4. Easy-to-use interfaces so non-technical people can interact without extensive training and support

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"The fundamental assumption of analytics is you can't manage what you don't measure, and in health care we are particularly looking for performance measurement," Dr. Couch said. "When we look at Dr. A and Dr. B and Dr. C, we need to know why one of them has far better clinical performance or one of them has far worse financial performance than the others. That leads to discussions on what we need to modify."

Getting to the best protocols through robust analytics can mean combining different data sets within the analytic systems. For example, an organization can marry care management information and other analytics to see how it is improving over time.

"If an organization uses analytics to find a group of high-risk patients and assign some of them to intervention A and others to intervention B, in a year's time they can go back and bring those intervention variables back into the analytical platform," said Jeremy Orr, Optum Analytics' former chief medical officer. "They can see which one worked better, and now have a tool that powers a continuous improvement process."

Powerful Data = Better Patient Care

Physicians want to provide the best possible care to their patients. Although there is often wide variability in patient care patterns, the problem may be that physicians don't know how the care they provide varies in relation to that of their peers within the same organization and in the industry as a whole. That's where quality data analytics can mean success within the realms of pay-for-performance and even fee-for-service.

Most health care organizations use some type of scorecard or dashboard to track physician performance and quality measurements. And many are finding trusted data to be a powerful ally in changing their clinical culture and physician behavior.

"I always tell the story of a scorecard for a group of doctors and how well they control blood pressure," said Dr. Rawlinson. "A physician is at the bottom, and near the top is a nurse practitioner. That is a real wake-up call for a doctor. They don't like to be outrun by a nurse practitioner. Doctors don't like being at the bottom of the tree, and it is a big behavior changer."

Brown and Toland provides a variety of information to its physicians through scorecards, including simple patient satisfaction ratings. The organization has worked hard to make such information transparent to the physicians, and not just clinical information. "It's all about data from the patients' side, the physicians' side, the enterprise side," said Dr. Rawlinson.

When it comes to patients, robust data needs to be applied to two related disciplines: identifying patient populations in need of intervention and identifying specific patient needs. When compared against evidence-based guidelines, these two disciplines represent true gaps-in-care management.

Analytic tools help organizations at a strategic level by identifying broad cohorts and segmenting those cohorts into targeted risk populations. For optimum usability, gaps in care should be stratified as age-, gender- and disease-specific. At a more tactical level, gaps-in-care management identifies specific gaps in the care of specific patients, which can be presented to physicians as a work list or within an electronic medical record (EMR) environment.

Measure reporting, such as that done under Physician Quality Reporting System (PQRS) and Healthcare Effectivness Data and Information Set (HEDIS), is more challenging. There are dozens of analytic tools that perform accountable care organization (ACO) reporting, and others that specialize in PQRS reports. Efficiency comes with consolidating data analyses and reporting from one platform.

☑ Excellent
☐ Good
☐ Average
☐ Poor

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"Organizations want one solution to do ACO and PQRS reporting, plus other patient registry functions and pay-for-performance," said Dr. Orr. "They've been adding complexity to their IT environments for decades, and now it's time to simplify." Dr. Orr believes CMIOs are hungry for a single data analysis tool they can use to parse all of the information from divergent sources quickly and efficiently.

Data Capabilities for Patient-Centered Medical Home Models

Consolidation is one of the hallmarks of the patient-centered medical home (PCMH). This care model organizes primary care in a way that emphasizes care coordination and communication that can lead to higher-quality care and lower costs. It's a model that relies heavily on data to encourage patients to make smart choices when seeking medical assistance. And it requires solid clinical analytics to get the most out of it for all sides involved.

Accessing and analyzing clinical data can be challenging in an environment where patients may move around and see different physicians for separate conditions. "Structured, numerical data — lab values, blood pressures, etc. — are easy to capture," said Dr. Rawlinson of Brown and Toland. But capturing unstructured, textual records is another matter.

"Reports for things like Pap smears, mammograms and colonoscopies consist of unstructured data," he said. "Unless you have a way to capture them in a structured way, you have problems."

Brown and Toland's PCMH is using a robust population analytics platform to better collect and analyze that data and assist with patient relationship management. The platform applies population cohort analysis, risk stratification, predictive analytics and longitudinal outcomes tracking to help care teams identify individual patients at high risk. Brown and Toland's PCMH care teams use the data to create a working registry used for outreach, and they have used this content to improve follow-up care for high-risk patients. They have also reduced the number of follow-up appointments for stable patients.

As Brown and Toland's Dr. Rawlinson explained, having the right information in hand to drive strong patient relationships and help with care transitions is a key ingredient to PCMH success. Without good data to share with physicians, other providers and patients, making good decisions relative to patient care would be much more difficult.

"We have case managers, care management programs and nurses embedded in hospitals for planned discharges — all of whom have access to patient information," he said. "We notify primary care doctors upon patient discharge, and this communication allows us to have low readmission rates."

Having staff embedded within various care settings can help smooth care transitions. Having aggregated, normalized information on patients available across the continuum of care is the next step toward optimal transitional care management.

But data silos across settings — even within specific settings — are an ever-present challenge. Patients may have information residing within databases in their physician's office, an emergency department, a hospital — even outpatient, long-term or urgent care facilities. To get a longitudinal view of patient care and health status, organizations need to have all such information aggregated at the patient level and properly normalized.

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Insights provided by analytics also need to be accessible from all the sites of care. This is made possible with a web-based care management platform, where care providers can log in to see and extract the care plan, including the gaps in care.

Another way analytics can inform transition management is in discharge planning. Organizations can utilize predictive analytics to assess a patient's true risk for readmission before discharge, which can inform the type of outpatient care they're provided.

All of the above technologies require clinical integration, a common theme for the medical home model. High-performing medical homes work hard to integrate medical records and patient registries using web-based applications and health information exchanges. Baylor Quality Alliance has also embraced this model, and works to enroll its sickest patients into medical homes, said Dr. Couch. Using Baylor's care coordination infrastructure, affiliated physicians have the tools they need for better disease management. "All of this is data driven," he said.

"We feed our system with health information exchange data to link our independent doctors who may not have their own electronic medical records system," Dr. Couch said. "And through Optum, I can benchmark against the patients that we treat in Baylor who are not our contracted patients. I can benchmark in Optum against the more than 65 million patients that are in the data warehouse.[2] That way we can see how we compare against a much larger universe."

## Data and Risk/Value-Based Contracts

Knowing where your organization stands amidst the larger universe is key, but it is sometimes just as important to have a good grasp on risk at the individual patient level. That's especially true when managing risk/value-based contracts within ACOs and similar organizations.

Brown and Toland learned the hard way how ignoring risk adjustment in coding impacts business. "We left millions of dollars on the table through under-coding," said Dr. Rawlinson. "That's why HCC [hierarchical condition category] is such a big initiative for us."

HCCs came about in 2004 when Medicare implemented the model to adjust capitation payments to private health care plans for the health expenditure risk of its enrollees. The Centers for Medicare and Medicaid (CMS) measures the 70 HCC categories that are correlated to diagnosis codes. To make it more complex, a patient can have more than one HCC category assigned to them. Some categories override others, and, as the name states, the categories fall on a hierarchy.

HCCs are just one of the areas where risk-prediction and -management strategies must be applied. Risk-bearing providers are acquiring more advanced care management strategies and an ability to build better predictive risk models for high-risk populations. Baylor Quality Alliance uses a predictive modeling system to better predict readmissions and segment populations to improve overall care management.

"In the United States, $1.35 trillion is the cost of care for 5 percent of the population, and they need special attention and resources applied to them," said Dr. Couch. "You don't know how to do that until you know who they are. That's where good predictive models come in."
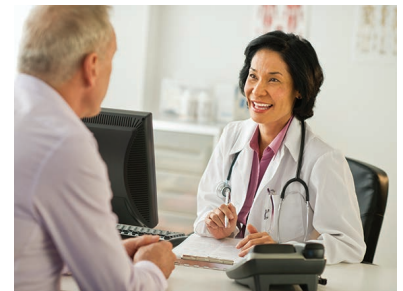
For example, Dr. Couch stated, an organization may be aggressively treating a cohort of diabetics. Without predictive modeling data, physicians may not know that half of them are depressed, which may lead to worse outcomes. Knowing this, he added, allows doctors and case managers to get those patients the mental health services they need. By doing so, those patients may be less likely to be readmitted.

"That is generally not dealt with in any way other than the analytic systems that can help identify those patients and their specific medical conditions," Dr. Couch said.

Using analytics, care coordinators can reach out to patients to ensure they're seeing their physicians, taking medications, communicating with all of their care providers and understanding the different instructions they may get from multiple providers. Predictive modeling analytics allows organizations such as Baylor and Brown and Toland to reconcile discrepancies and enhance care.

While clinical analytics can help organizations identify clinical populations and patient risk, organizations also need to know the details around their financial risk. This need calls for sophisticated predictive models that account for the health of an organization's patient population. Episode grouper technology — the same technology payers use to aggregate and assess data — is useful in this area. Using claims data to analyze past expenses combined with a disease knowledge base, groupers can apply advanced risk analytics to show organizations the cost of caring for a group of patients in the coming year. Such information is invaluable for budget and staff planning.

Future Uses for Data and Analytics

The many benefits of clinical and financial analytics have yet to be fully realized in health care. Integrating analytics within the EMR is the logical next step for using analytics to improve care and better manage patients.

Providers are experimenting with providing high-risk patients with in-home monitoring devices that can relay hard data on risk factors back to analytic systems in real time. Having in-home data on crucial metrics such as blood pressure for patients with hypertension or heart failure, or hemoglobin A1C levels for diabetic patients, may be a truer indicator of health status than when those levels are checked at a doctor's office.

Making such information available in analytic systems is a necessary first step. However, since a doctor's day is spent within an EMR system, requiring doctors to check analytic platforms for patient information adds complexity to physician workflow. But connecting clinical and predictive analytics to the EMR can show physicians context-specific alerts about specific patients at the point of care. Such alerts can help physicians act on gaps in care or immediately address patients' risk factors for hospitalization.

Imagine the possibilities if such context-specific alerts could reach doctors not just when they are working within an EMR; they could alert them directly on their smartphone or tablet. If done in a manner that doesn't contribute to information overload, context-specific mobile messaging has great potential to improve physician decision making.
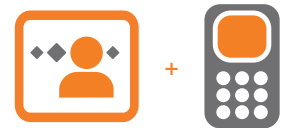
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Analytics can also inform patient decision making. Up until this point, analytics have benefited patients indirectly. Analytics help providers budget, plan, find at-risk patients and communicate management opportunities to care managers; all these things benefit patient care. But the Achilles' heel of value-based care is patient accountability. Successful health care organizations of the future will do a much better job of monitoring at-risk patients and engaging all patients to steer them toward healthier lifestyles and activities.

Health care organizations can take advantage of the ways in which smartphone app developers are encouraging individuals to make lifestyle improvements. And organizations can learn how to use the media-rich, interactive smartphone environment to inform, educate and persuade patients. As with physicians, context is key. Mobile patient education must be not only relevant, but also timely.

Build Better Care Systems on Better Data

It all starts with data — real-world data that can be applied to improve patient outcomes and remove unnecessary costs. For health care, real-world data requires, at minimum, the integration of clinical and claims data to reflect what actually happens in health care environments. And by applying advanced analytics to such broad, inclusive data sets, providers will have a sharper lens with which they can analyze the inner workings of their systems. They can see what's working, what's not working, what it costs and whether it could be more efficient. Data allows them to better understand their populations and then tailor the care they provide to suit patient needs.

Applying advanced analytics to comprehensive data will reveal to providers things they don't know and help them more fully understand the risks and uncertainty associated with providing care. Analytics will help providers better calculate difficult decisions and prompt them to ask questions that they never thought to ask. Successful organizations will embrace the unknowns their data uncovers and ask what they can learn.

Providers want to know what they don't know, and they are using analytics to gain that knowledge — knowledge they need to improve, manage and succeed in today's dynamic, value-based health care market, as well as prepare for tomorrow's challenges.

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Sources
[1,2] Data from Optum One statistically deidentified common data repository (dCDR)

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