The opportunities to use data to transform health care are numerous and tantalizing—as long as provider organizations can develop the requisite infrastructure and know-how.

Among the most pressing challenges for leaders of healthcare organizations over the next several years will be learning how to use business intelligence and analytics to enhance their operations and improve the value of care.

If deployed effectively, artificial intelligence (AI) and other data tools can help healthcare organizations improve workflows for clinicians, optimize population health, and get a handle on the cost of care. But figuring out to generate an ROI from analytics strategies and tools has been problematic for organizations throughout the industry.

The challenges and opportunities in the realm of data and analytics were detailed in a cohort, Business Intelligence and Analytics, at HFMA’s 2018 Annual Conference in Las Vegas.

In six sessions over two days, attendees heard from a variety of industry experts on how data can be utilized to make substantial advancements in health care.

TOPICS ADDRESSED IN THIS REPORT INCLUDE:
• The future of analytics
• Unlocking the power of analytics for data-driven care
• Driving financially effective value-based contracts
• Using AI and data to deliver on the promise of value-based care
“When augmented intelligence has the ability, for example, to pull information out of an electronic health record, summarize and aggregate it for you, then come up with treatment recommendations, it changes the whole interaction a physician can have with that patient.”

—Lisa Latts, MD, deputy chief health officer, IBM Watson Health

THE FUTURE OF ANALYTICS
In terms of making optimal use of data, health care is entering a “perfect storm where you see this enormous acceleration coming in the future,” said Mark Lambrecht, PhD, director of SAS HLS Global.

More than ever, Lambrecht said, analytics is a disruptor. That’s because it has ushered in a new type of economy in which computers can replace certain human tasks. “It supports decisions from humans; it doesn’t replace humans,” Lambrecht said.

Machine learning has advanced to a phase called deep learning, which allows for the processing of increasingly vast quantities of data points. The application in health care could be to a panel of thousands of patients whose data trains the deep-learning algorithm, which finds patterns and effects and predicts the best outcome for a patient without human intervention.

That capability could make a profound difference in population health management, Lambrecht said. An example is the Healthy Nevada Project, an initiative of the state of Nevada, the Desert Research Institute, Renown Health, and the genomics company Helix.

The project seeks permission from Nevada residents to collect their health data, including genome sequencing and medical records. The project then goes one step further by accessing real-time information such as pollution levels in a given geographic area.

“They can correlate it to the patients being in those areas and look at if they are more predestined to get asthma because of certain genomic mutations,” Lambrecht said.

A clinic could use that sort of capability to gain a competitive advantage based on its diagnostic services, Lambrecht said. The clinic could analyze thousands of images using machine learning. That data could be combined with information on patients’ lifestyles, family histories, test results, and medical histories.

Findings from the algorithm could then be used to generate evidence-based treatment options for the clinic’s physicians.

“There’s a competitive edge for the clinic because you are able to treat your patients better,” Lambrecht said. “You have an improved experience for the physician because you’re helping the physician to be more effective in treating more patients. You have a better outcome for your patients as well.

“This is one of those rare investment projects where nobody’s losing.”

AI also can upgrade patient care by helping providers slash their error rates. About 250,000 people per year die from medical errors, according to a 2018 Johns Hopkins study, making it the third-leading cause of death behind cancer and heart disease.

AI can address the underlying causes of errors that happen because the wrong medicine or treatment was given, or a condition was
not diagnosed properly. “That’s where a big impact can be made,” Lambrecht said.

If AI soon will be a cornerstone of healthcare analytics, so-called Internet-of-things (IoT) technology will as well. The most obvious example, Lambrecht said, is the way in which wearables are moving beyond lifestyle and personal wellness and into clinical-grade functionality. The Food and Drug Administration already is approving such devices.

But to maximize the benefit of such devices, healthcare organizations must update their data-collection techniques. As soon as 2019, Lambrecht said, 40 percent of the data that is collected from such “connected objects” will be analyzed and processed in that sphere rather than in a central server.

“The old-fashioned analytical life cycle was we collect the data and the information, we bring it in a data storage area, and we analyze it,” Lambrecht said. “We’re moving away from that. We won’t collect it centrally.

“That’s an enormous amount of data that we will never store, but we need to make sure that we have picked up the right signals for the patients. If we have a patient who has a pacemaker, and there’s analytics on top of that pacemaker, we need to make sure that we trigger the alarm in time, before the patient gets a heart problem.

“The new model is capturing the data from the sensors, having streaming analytics come in, and applying the analytics while the data is being transferred from the sensor to somewhere else, maybe to what we call a gateway in between the sensor and the central server.”

The data from such devices are proving useful to health plans, Lambrecht said. Advanced analytics allow insurers to offer services to members that foster a healthy lifestyle and financial incentives to adhere to healthy routines.

In Europe, car insurers give young people incentives to install sensors in their vehicles that can be used to monitor their driving. A similar approach could be used in health care to promote healthy behaviors.

“We should be doing that,” Lambrecht said.

As organizations seek to master the application of analytics technology, the industry needs to establish effective standards for data governance, Lambrecht said. That starts with personal data protection, ensuring that patient privacy and HIPAA rules are not violated.

The “Business Intelligence and Analytics” Cohort

The Future of Analytics
Mark Lambrecht, PhD, director, SAS HLS Global

Unlocking the Power of Analytics for Data-Driven Care
Jennifer Carney, vice president, finance and analytics, Beth Israel Deaconess Care Organization

Creating the Analytics Blueprint to Drive Financially Effective Value-Based Contracts
Daniel J. Marino, managing partner, Lumina Health Partners

Using AI to Deliver Patient-Centered, Personalized, Value-Based Care
Lisa Latts, MD, MSPH, MBA, FACP, deputy chief health officer, IBM Watson Health

The Winning Health IT Engagement Model of an ACO in a Value-Based Setting
David Swieskowski, MD, president, Mercy Accountable Care Organization

Health Care Is Lagging in Data Science. Why It Won’t Stay That Way for Long
Christer Johnson, principal, EY Analytics, EY
“Where you want to start is by looking at the claims data. One, it’s the easiest. Two, there’s a tremendous amount of information and knowledge you can gain out of that. Then it also helps you consider where you want to focus the clinical data.”

—Daniel J. Marino, managing partner, Lumina Health Partners

“We need to find a way to make sure that the effect of technology is such that patients are not exposed unduly to risks at the financial level, or the way they live in society,” Lambrecht said.

People, not machines, will make and enforce those rules. And that’s not the only way in which the biggest factor in the success of advanced analytics will be the human element.

“Humans will keep interacting with artificial intelligence, and it will reinforce what we do,” Lambrecht said. “It’s a way to make our systems more efficient, to do more for the patient.”

THE POWER OF ANALYTICS FOR DATA-DRIVEN CARE

Although future states of the sort Lambrecht described are a central focus in the discussion about analytics, organizations already can use such tools to advance their operations, said Jennifer Carney, vice president of finance and analytics for Beth Israel Deaconess Care Organization (BIDCO).

To make the most of analytics in the short term, organizations should focus on three areas: infrastructure, engagement, and measurement.

Infrastructure. BIDCO, an accountable care organization (ACO), developed a tool to pull in information from the various electronic health records and clinical databases of the participating providers. It aggregates that information with claims data, pharmaceutical data, and data from newer sources such as lab, radiology, and admit, discharge, and transfer (ADT) records.

“Patient-reported information is what I am thinking of as the next frontier,” Carney said.

BIDCO wanted a population health tool that could aggregate the disparate sources of data into one platform, while also incorporating care management tools. But it also needed to make sure the quality of the data coming in from the various sources was optimal.

“We worked closely with our providers in a multi-step process to first map all of the data fields and then to validate it,” Carney said.

Engagement. Once organizations develop the infrastructure with which to effectively aggregate data, they can consider how best to deploy the data.

The first step is identifying which key stakeholders to bring to the table, Carney said. BIDCO initiated monthly meetings with providers to decide on the types of interventions and programs that could be used to drive change based on the data.

BIDCO looks across its data to find conditions that have a high prevalence and high cost. Patients with these conditions then can be addressed through care management. Instead of thinking about dozens of quality measures, BIDCO keeps the focus on three conditions: diabetes, COPD, and heart failure.

“We’ve identified these three conditions, and we wrap our strategy around that when we’re going out to get physician engagement—whether it be talking about reducing admissions or reducing readmissions, transitions of care,” Carney said.

Measurement. The challenge with claims-based data is the inherent lag, Carney noted. Practices may need to wait a year or more to be able to gauge their progress in certain measures.
“The lag is real, but along the way, you can be measuring process measures,” Carney said. For example, as part of its Medicare ACO contracts, BIDCO was not bound by the requirement that patients have a three-day inpatient stay before being admitted to a skilled nursing facility (SNF).

In its endeavor to reduce inpatient stays, BIDCO would need a long time to understand overall outcomes and trends. But it can gauge short-term process measures, specifically how many patients are hitting the SNF waiver. “That’s real-time information that we can gain along the way to see if we’re on the right track,” Carney said.

BIDCO utilizes dashboards to communicate performance levels to participating practices (see the exhibit below). The metrics help establish “where we want to ask the questions and go back to drill down to know why, so that we can plan interventions,” Carney said.

Measurement also is vital to the success of Mercy ACO, part of Iowa-based Mercy Health Network. The ACO lost money in three of its first four years after launching in 2012 but is projecting a $4.4 million profit in 2018, David Swieskowski, MD, president, said in a separate presentation.

At one point, the ACO’s provider performance reports consisted of 60 to 70 measures over various contracts. That was ineffective, Swieskowski said, so now the reports focus on two contracts—one in the Medicare Shared Savings Program and one commercial—and five or six metrics.

Mercy ACO has put various data-related lessons to use over the years, Swieskowski said. Among them:

- Data aggregation and normalization are key skills.
- All possible data should be aggregated in one platform. This includes adjudicated claims, pre-adjudicated claims (837 files), EHR care management data, and ADT files.
- Organizations should avoid being fooled by “analytics wizardry.” They should master a few metrics instead of getting buried in a hundred or more and should avoid
“black boxes" (proprietary vendor solutions that are opaque to the provider).

- Organizations require the ability to monitor data flow at the local level. They should consider how long it would take them to figure out that a data feed is not flowing.
- A care management platform is mandatory.
- Data is never perfect.
- No vendor has a mature population health solution. Organizations should ensure they have flexibility to develop tools as needs become understood, and recognize they are choosing a partner—not a final solution.

**Driving Financially Effective Value-Based Contracts**

Even for providers that are not in an ACO, the transition to value-based care is becoming more pertinent. Business intelligence and analytics can set up providers to flourish in the types of contracts that dictate the terms of newer payment models, said Daniel J. Marino, managing partner, Lumina Health Partners.

“It’s definitely a zero-sum game,” Marino said. “The way the economics of these contracts are shaping up, high performers are getting reimbursed at the expense of the low performers.”

However, “it’s not that the low performers are actually performing badly. The low performers aren’t able to show that they’re doing a good job. They’re getting penalized for their lack of analytics, the lack of proving their value.”

Data drives contract performance, Marino said, especially by providing insights into the patient population as a contract is being negotiated and by giving providers information that can be used to initiate improvements once the contract is in place.

“Where you want to start is by looking at the claims data,” Marino said. “One, it’s the easiest. Two, there’s a tremendous amount of information...
and knowledge you can gain out of that. Then it also helps you consider where you want to focus the clinical data.”

If analysis of claims data indicates that certain high-risk populations are driving an organization’s COPD costs, for example, “then a targeted approach is to build the clinical content around COPD on the acute side and around asthma on the ambulatory side. It’s a starting point. Then you can begin to launch into how you want to manage those patients from a care management perspective.”

Two types of data that come into play are retrospective data and transactional data. Retrospective data allows providers to understand what’s occurring with the patient population but does not necessarily offer guidance on driving results under the contract.

Transactional data can help in that aspect, although providers are not as experienced at using such data. Transactional data is proactive, action-oriented data that results from analysis. It is real-time data that can be used for decision-making.

To harness such data, some provider organizations establish a data management and analytics unit that works side by side with contract negotiators. The benefit is an integrated strategy that allows organizations to build and sustain a data governance infrastructure.

“You need to be able to have reporting and visualization that speaks to the end user,” Marino said.

Once the infrastructure is in place, organizations can work to optimize their data environment as part of a move into advanced analytics. The next step is establishing real-time analytics. “This is the exciting part if you can get there,” Marino said. “There’s only a few organizations that are there.

“They’re taking data, identifying anomalies, pushing information out in real time to providers at the point of care or point of service so they can make a real-time behavior change with the patient.”

Before building the infrastructure, however, organizations should identify what problem they are trying to solve. From there, Marino said, they can consider the data that they will need and the operational changes that will be necessary to solve the problem.

For example, the organization may seek to implement a care management program that can make the biggest impact quickly. Administrators may identify COPD or coronary artery disease as an opportunity for the new program.

“Then you begin to work backwards,” Marino said. “What you’re doing is you’re building your capabilities, creating a balance between clinical outcomes and the clinical data and the cost and the encounter data. To be able to do that is the first step in being able to optimize the contract results through care management.”

USING AI TO DELIVER PATIENT-CENTERED CARE AND LOWER COSTS

Providers can leverage AI to better serve customers and manage conditions, said Lisa Latts, MD, deputy chief health officer, IBM Watson Health. Following a biopsy, for example, an AI system trained in oncology can process reports on gene mutations of a patient’s tumor while extracting data from related clinical trials and known treatment methods.

HUMANS + COGNITIVE=AUGMENTED INTELLIGENCE

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Source: Presentation by Lisa Latts, MD, IBM Watson Health
options. Producing a comprehensive view of the patient’s condition and potential treatments within minutes, the system equips the treating clinician with actionable, personalized data for managing a patient’s condition.

AI “can take all this information and understand it and make personalized recommendations based on those individual patient characteristics,” Latts said in an interview about her presentation. “Physicians can then combine the information with their own expertise and make their best recommendations to the patients to help deliver better care and ultimately improve patient outcomes.”

AI also impacts chronic disease management, Latts noted. People living with diabetes, for example, must consider a number of factors each day when managing their condition—understanding medical advice, knowing what to eat and when, accounting for the impact of food and activity on glucose levels, and trying to avoid critical glycemic events.

An AI-powered app helps people with diabetes manage their condition by providing information on daily glucose patterns and how their activities impact those levels. With these readily available insights, patients can make adjustments throughout the day to increase their time in the healthy glucose range.

AI complements the work of humans with its ability to process large volumes of data, allowing users in the healthcare industry more time to interact with customers and focus on quality of care.

“When augmented intelligence has the ability, for example, to pull information out of an electronic health record, summarize and aggregate it for you, then quickly come up with evidence-based treatment options, it changes the whole interaction a physician can have with that patient,” Latts said. (IBM Watson Health refers to artificial intelligence as augmented intelligence.)

In the oncology care example, with easy access to a comprehensive view of a patient’s tumor and treatment options, clinicians have more time to connect with their patients by explaining the treatment plan, answering questions, and addressing concerns. Reducing time spent combing through patient data may also help prevent physician burnout.

In addition to helping improve care quality and the customer experience, implementation of AI may help health plans and providers reduce waste, Latts said.

Estimates indicate that at least a quarter of healthcare dollars spent each year is wasted. By standardizing information and streamlining processes, Latts said, AI may help reduce variation by preventing duplication of tests, unnecessary treatments, and complications resulting from undertreatment.

When looking to implement AI, users must prepare to build platforms within the context of their objectives, also looping in medical professionals to ensure the technology meets their needs. Latts highlighted the importance of integrating the tools into users’ workflows: “This technology has to be designed to make life easier.”

Predictive analytics, an application of AI, is becoming more prevalent in health care as a means of identifying actionable data, Christer Johnson, a principal at EY, said in a separate presentation.
**USING TIME-SEQUENCED CUSTOMER JOURNEY INSIGHTS FOR OPTIMIZATION OF CUSTOMER OUTREACH TO PROMOTE HEALTH COACHING**

**Time-Sequnced Customer Journey Data**

Journey steps: digital visits, inbound and outbound calls, doctor visits, etc.

- Which sequence of steps usually leads to a positive outcome?
- Which interventions can be designed to drive positive outcomes?
- When should outreach occur to increase likelihood of a positive outcome?

**Machine Learning**

To better predict future customer engagement opportunities, self-learning models automatically tune results as new data becomes available on individual and specific journey steps and outcomes.

**Customer Engagement Results**

*Outreach drives results, but timing of outreach has even greater impact*

20X increase in engagement if outreach takes place after specific key journey steps.

- Outreach before key journey steps: 4%
- Outreach after 1 key journey step: 83%
- Outreach after 2 key journey steps: 78%

Source: Presentation by Christer Johnson, EY
By highlighting factors that cause clinical variation, for example, predictive analytics can equip providers with the information they need to lower costs.

For instance, when one health system looked at average episode spend for joint replacements, the difference between lowest and highest spend at the system’s hospitals came out to nearly $100,000—a 400 percent variance. Drivers of this variance ranged from avoidable to inevitable and included:

- Case mix index
- Age and experience of surgeon
- Type of implant
- Patient demographics
- Day and time of surgery
- Post-acute care physician

Once it has identified this cost variance and some of its potential drivers, the health system can use predictive analytics to further explore drivers that can be adjusted, such as supply cost, timing of surgery, and staff training.

“Predictive analytics can constantly run and look at all the variances, using exploratory data-mining techniques to highlight the factors that are influencing that variance,” Johnson said in an interview about his presentation. Applying this method to the available information, the health system may have an opportunity to close the gap between the highest- and lowest-cost facilities.

Healthcare stakeholders also can use time-sequenced customer journey analytics to reach out to patients more effectively and impact behaviors that can improve outcomes, such as in case management for chronic conditions, Johnson said (see the exhibit on page 9).

Instead of relying only on analysis of claims or EHR data, time-sequenced customer journey analytics includes data on past interactions—such as phone, web, and mobile data—that is sequenced by customer. Analyzing this type of data allows a healthcare company to understand the claims and interaction patterns that suggest the best time to reach out to a customer, driving engagement in a case management or other program.

“You can engage with your patients and customers at a higher rate if you figure out when to intervene or reach out to them at the right moment,” Johnson said.

COMING UP
Much more content on business intelligence and analytics will be available from healthcare thought leaders and stakeholders at HFMA's 2019 Annual Conference, June 23-26 in Orlando.

If you have questions or comments on this report, please contact Nick Hut, HFMA managing editor, at nhut@hfma.org.
ABOUT HFMA
With 38,000 members, the Healthcare Financial Management Association (HFMA) is the nation’s premier membership organization for healthcare finance leaders. HFMA builds and supports coalitions with other healthcare associations and industry groups to achieve consensus on solutions for the challenges the U.S. healthcare system faces today. Working with a broad cross-section of stakeholders, HFMA identifies gaps throughout the healthcare delivery system and bridges them through the establishment and sharing of knowledge and best practices. It helps healthcare stakeholders achieve optimal results by creating and providing education, analysis, and practical tools and solutions. HFMA’s mission is to lead the financial management of health care.