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As the push toward value-based care continues, hospitals and health systems must leverage data to make better business and care decisions. Business intelligence can help hospital executives gain insights into organizational performance and clinical care to identify trends and change behaviors, ultimately improving outcomes and the patient experience. Health Forum convened a group of hospital executives in Washington, D.C., to explore how hospitals are using business intelligence to improve care and enhance organizational performance. The panel highlights the important role business intelligence plays in population health management and wellness, and the crucial role of business intelligence as hospitals transition to care systems of the future.
**MODERATOR** (Suzanna Hoppszallern, Health Forum): Tell us your business intelligence strategy and how it fits into your organizational strategy?

**STEVE DIAZ, M.D.** (MaineGeneral Health): Our business intelligence strategy has changed over the past decade. Ten years ago, we were talking about how to acquire, store and share data. Suffice it to say, we have moved forward. We now have a mission statement that aligns with our strategic plan. We’ve changed our thought process. We’re working to figure out how we take all of our data, organize it as it comes to us and use it to support review of our mission, which then feeds the development of our strategic plan. For example, we have a daily dashboard that highlights our financial data. It shows us the number of emergency department visits from the day before, what happened in the operating rooms and our inpatient stays. And, of course, it all rolls into the monthly statement.

We are more challenged with getting the appropriate data for population health management. When it comes to population health, everybody has a different metric depending on the health plan or the patient population. It’s much tougher. We’ve made some progress, and we’ve had some wins, but we still have plenty of opportunity ahead of us.

**ALLEN WEISS, M.D.** (NCH Healthcare System): Our overall goal is to help everyone live longer, happier and healthier lives. We want to be out of the repair shop business and get into the prevention business. Data can help us get there. Steve mentioned financial data. We have three boards in our administrative suite that show our ED volume and activity at four-minute intervals. It’s always updating. We’re constantly aware of the incoming tide, if you will, of patients at a micro level versus the macro level. Everything in between, however, has been a journey.

On the clinical side, we now have some capability with predictive analytics. We’re able to predict what may happen and can intervene on behalf of the patient. For instance, we’ve had success with sepsis. We can predict that a patient will become septic about 12 hours before. We look at whether the patient has developed a blood stream infection, has had a drop in blood pressure and urinary output, and whether his or her temperature has increased. We’re now able to treat the patient before the onset of sepsis. As a result, we’ve decreased our sepsis mortality from the low 30 percentile, which was above the national average, to single digits for the past few years. It’s saving lives, and it’s also reducing expenses.

**KARRAS:** Health care is going through a period of unprecedented change. About 70 percent of U.S. hospitals are at Stage 5 or 6 using the eight-stage HIMSS Analytics Electronic Medical Record Adoption Model. This will have a significant impact on data and business strategy. But the health care field still remains woefully behind other industries. It’s very complex. It’s difficult to take the data and slice and dice and do what-if scenarios without a very good business intelligence strategy.

“It’s difficult to take the data and slice and dice and do what-if scenarios without a very good business intelligence strategy.”

—John Karras, CareTech Solutions
MODERATOR: Allen gave the example of sepsis. Are there other areas in which you have been able to enhance outcomes or improve quality of care?

DIAZ: We look at our dashboards through different lenses: quality and performance improvement, and wellness, for example. Maine has a high cancer rate per capita, so we’re using our information to identify patients in need of cancer screenings, including mammography and colonoscopy. We’re identifying people who would benefit from smoking-cessation programs. The hard part about this is that while we can show that we reached more patients through our outreach, the outcomes won’t be known for a generation. These are things that take a long time to measure, so you hope that there’s sustainability. On the quality improvement side, the biggest win for us has been a dashboard that lines up all of the insurance plans’ metrics and thresholds. It’s complex. Those are very different examples — wellness and quality improvement. One is really tangible, connecting patients with our services. The other is aligning with how insurers are going to pay us in the future.

WEISS: On the clinical side, we’ve focused on pressure sore prediction. We have an automated program. If we get a 20-year-old home from college with appendicitis, or an 85-year-old from a skilled nursing facility with a fractured hip, we can respond to them quickly. We assess the data and have nurses trained in pressure sore prevention. Pressure sores can add about $50,000 in cost due to longer length of stay. Prevention improves the quality of care for the patient, reduces morbidity and mortality, and reduces costs. Another focus is on fall prediction. We rate patients and use color-coded footwear. Red socks mean that patients are not allowed to be mobile by themselves. Patients with yellow socks need assistance. And green socks indicate that the patient is independent.

We are also using predictive analytics with our health insurance plan, which has about 6,000 covered lives. We use predictive analytics to see who may develop problems going forward and incentivize them to do things that decrease their chance of getting sick. That’s resulted in no increase in health care and insurance premiums for our folks for the past four years. In fact, we lowered the premiums for single parents because they’re already economically stressed. We’ve also lowered the incidence of diabetes. The overall and the aggregate for body mass index has come down 2 percent over the past five years. Other employers are using our plan as a model. It’s creating a positive trend.

ALICIA SHIELDS, R.N. (Tsehootsooi Medical Center): We’re looking at a lot of quality initiatives. Other than sepsis, one of the big things that we’re doing is focusing on triage within our ED and its impact on throughput. Are patients being seen fast enough? Are we getting them discharged efficiently? Are we getting lower-acuity patients in and out appropriately so that we have more space and time for the higher-acuity patients?

“We use predictive analytics to see who may develop problems going forward and incentivize them to do things that decrease their chance of getting sick.”
- Allen Weiss, M.D., NCH Healthcare System
We’re also looking at wellness and prevention programs. We see what brings patients to the ED and then we translate that to prevention. How can we prevent falls and how can we prevent bike accidents? Those are some of the things that we’re working on.

KARRAS: On a similar note, one health system with which I’ve worked is using analytics to drive ED throughput. They developed a 29-minute initiative for which they actually created an app using intelligence data to guarantee that a patient will be assessed within 29 minutes of arrival. It’s a quality of care initiative to look at quality of care per dollar spent.

MODERATOR: How are your organizations using predictive analytics for population health management?

DIAZ: For us, the opportunity lies with people who are ‘rising risk,’ where we have a chance to intervene and improve their behavior. It’s important to get in front of this population, providing them with the right services to mitigate morbidity and mortality. If you look at your community, and try to figure out how to mitigate the rising risks of cancer, stroke, diabetes and obesity, it stems from the social determinants. That database becomes harder to work; specifically, how do you get those data so that your system can identify the possibilities — mainly the uninsured, underinsured and unemployed population with lots of social stressors?

SHIELDS: We are focusing on population health management, but it’s a challenge. We look at all of the different specialties and try to identify the high-risk patients so we can connect them with case management. Our EHR is very antiquated and it does not pull data as we want. We have to do a great deal of manual extraction, which is time-consuming, even though we have a whole division dedicated to data extraction. We’re looking at new systems, but that’s a barrier for us right now.

KARRAS: The linchpin of health care has been data extraction in a stagnant way, rather than in a moving, dynamic way. This leads to the question:
Can you trust the data? Does the data represent your organization’s case, versus that of the total health care system? I’ve seen many organizations make big investments in a clinical data warehouse, which they use to develop the BI [business intelligence] strategy, which dictates the strategy. So, when you say an antiquated EHR, don’t feel badly. There are organizations with more current EHRs that do the same data extracts that you do, but don’t necessarily feed into a data warehouse. They have the same issues that you discussed.

**Diaz:** I feel meaningful use fell short. While aspirational, it failed by not mandating that vendors develop a solution for the back-end tenets. Ian Morrison likes to say that meaningful use brought us to the 20th century. We’ve invested a great deal in EHRs across our system. It was such a missed opportunity that the back end could’ve functioned seamlessly. We have the same issues of having to manually extract things on something that is certified as a contemporary, meaningful use platform.

**Karras:** That is something that is dynamically needed. There is no standard today for EHR interoperability. Certainly, we can do interfaces for our common admission, discharge and transfer orders, but we can’t bind. I’m using the word bind because there’s specific terminology in BI about data binding [associating a set of data with a report element]. There’s no common standard for binding the data from one EHR to another succinctly and dynamically. Many health care systems that have disparate EHRs and haven’t made the decision, or can’t make the decision, to get down to one. So, instead, they spend a great deal of money doing workarounds. The government needs to do something with that. We’re all paying the price for it right now.

**Moderator:** Are you experiencing any other challenges?

**Shields:** Even though we’re in a rural setting, we have the resources and the volume of a bigger facility. I’ve worked in small, rural organizations before and it’s a huge challenge. They don’t have the resources to pay somebody to extract the data manually. And the more requirements issued from the Centers for Medicare & Medicaid Services, the harder it is for these organizations. One of our biggest challenges is buy-in. Our providers ask, ‘Why do we have to collect this?’ We have to make sure that people really understand the what and the why.

**Weiss:** In 2005, I spoke before a congressional committee on interoperability. It’s 2017, and I could give the same talk. Nothing has changed. Other industries have made it happen, but not health care. Although we often balk at governmental regulation, this is one area where it’s needed. Why doesn’t the health care field have a louder voice in BI or public health?

**Diaz:** We have major challenges. Our margins have decreased over the past 15 years. In Maine,
we haven’t had a Medicaid increase since 2002. I think. It seems that every five or six years, we’re presented with another requirement that takes up time and resources. We are underresourced on the tangible side and then on the expertise side. At the end of the day, when we are trying to make budget, we need to set our aspirational goals aside and focus on what gets us paid. Doing what we get paid for will always win. I know we are not unique in that. That’s the impetus for how we invest correctly. It’s really hard. In fact, it’s probably untenable given the current changing health care climate.

Consider public health. One dollar of prevention will save $100. That ratio’s been around for a long time. Even if we invest on both the public health and prevention side, we have to have the ability to stay in it. Because of the way our political structure works, people think in short timespans for re-election. If we want to fully fund prevention and public health, and have people focus on that even from the business intelligence and the analytical side, then that’s where the money has to be spent. But that’s not how our health care system is set up. It’s not set up for prevention; it’s set up for high-cost, end-of-life care.

WEISS: I couldn’t agree with you more. We have to focus on admissions and acute care rather than prevention and public health. We’ve got to change the paradigm. We’re getting there; I think in the next five to 10 years, health care is in for a major disruption. We’re seeing major layoffs now. The current system is unsustainable.

We can get ahead of this. Just recently, Medicare paid slightly less than $10,000 per person per year. What if they gave us $10,000 per person and asked us to care for the 65-and-older population. We would get into the prevention business so fast. There’s tremendous opportunity to bring together older people dealing with loneliness, for example. Loneliness in an older person is as bad as smoking in terms of morbidity and mortality. We’d get people out walking and interacting with others, developing a purpose. It doesn’t sound like health care, but it significantly impacts health.

We could decrease the demand for health care. We have all of these public health opportunities. If we could change the reimbursement system, we could really move the ball. The challenge is that we have perverse behavioral economics pushing this. It’s self-perpetuating. If people no longer smoke, the tobacco industry would go out of business. How do we change that?

SHIELDS: We would love to focus more on prevention, but the priorities are not quite aligned. We spend too much time dealing with regulatory requirements with little return. It’s ridiculous. If we were able to redirect our resources, we could have a big impact.

MODERATOR: What are you seeing in terms of helping patients to self-manage conditions and some of the public health issues that you’re talking about? Are you using business intelligence tools for that?

DIAZ: MaineGeneral has a prevention center staffed with educators to help patients to stop smoking, manage their diabetes, and become more active. We’ve received some grants from insurers to support programs to encourage people to self-manage. They rely on evidenced-based practices to help people manage their chronic conditions. But so much of this has a simpler solution. If we could just get people to become more active — to walk more — we could manage hypertension and diabetes and prevent stroke. If we could dou-
ble the prices at McDonald’s, put farmers markets in every community, we would see a change tomorrow. It would happen that fast. It would be great if we could feed information back to the patient’s primary care physician to show, for example, that 80 percent of his or her patients have tried acupuncture and it’s worked really well. If we could get that information in front of people, it would be convincing, and we’d have a happier, healthier population.

WEISS: It does work. We are doing it in our community. We have people walking. We’ve used behavioral economics. For our insurance plan, we have a $1,500 deductible, but individuals can buy it down to $500 by doing healthful things like going to classes, improving their diets and exercising. We’ve also changed our cafeteria food. We don’t have regular soda in the hospital at all. In the community, we have restaurants that offer more healthful items on their menus. Our supermarkets offer healthful grab-and-go options. Water sales have gone up, while meat sales have gone down. In our cafeteria, our fruit and vegetable sales have increased. We can change people’s habits, and once they start feeling better, they will continue to make change.

We’ve been able to track the difference within our insured population. Our health insurance costs have gone from $16 million to $6 million over five years, a reduction of 7.8 percent per year. These are audited numbers. We can change communities and we can change populations.

KARRAS: Some wellness programs and patient portals are just now starting to accommodate patient information from Fitbits and other personal monitoring devices. If communities were able to capture some of that data, the information could be harvested into BI. The community and then providers and others would have the data they need to make decisions on how well their programs are working for preventive care. Some of the data is getting in, but not at the volume needed to be useful in a meaningful way. There are also lobbying interests in other industries that are counterproductive to some of these preventive care measures that would benefit our communities.
DIAZ: We are using data to encourage better personal decisions. I have a Fitbit. We have a challenge within the organization to see who can attain certain markers, and it’s working. Our premiums have gone down. We can use this data to make a case. As health systems, we get it. But what if we were able to show the data to lawmakers and employers and get them to enact change? As business intelligence and analytics mature, we should be able to use that data to demonstrate the effectiveness of alternative therapies and then present the data to our boards and our collective management teams.

SHIELDS: For our service population, the annual average income is $7,000. We are in a food desert. The community’s options are going to McDonald’s and buying something off the dollar menu, or going to a grocery store and getting semi-fresh produce for much more than a dollar. We have a huge issue with diabetes, obesity and alcoholism. Where do we begin to combat these things? For starters, we are building a multimillion-dollar wellness center that will be free for the community. Our wellness team and our rehabilitation service are going to move over there. We’ll have a demonstration kitchen, so when people are diagnosed with diabetes, we can show more healthful options.

We have been able to look at our patient data and use it in meaningful ways. One area is with opioid use. Our primary care providers can look at the data and send patients to rehab services (physical and occupational therapy), rather than going straight to prescribing opioids. We’ll be able to offer these patients more support. We’re fortunate that all of these services will be provided under one roof. Our case managers will be able to keep tabs on what services our patients are receiving.

MODERATOR: We talked earlier about getting buy-in for using analytics and figuring out what data we need. How do we get the data to the right people at the right time?

DIAZ: It depends on the audience. We have all these dashboards that are great for those who see them, but it’s hard to push those down. That’s one of the challenges we all face. How do you take a dashboard on length of stay and translate that for front-line staff who can then take action. We’re trying to do that. One things that’s helped in this area is that we are a lean shop. We have a strong lean team that works closely with our inpatient and outpatient teams, as well as with other areas. They help care teams pick their own goals and make them actionable. Prior to this process, we had a hard time getting people to understand the data and how they can be useful in their work. It requires daily management.

WEISS: We post metrics in the various nurses’ stations and in public areas. We highlight quality data, such as days without falls, days without a central line-associated blood stream infection. It’s been about six years now without a central line infection in our ICUs. We’re trying to post clinically appropriate data, but people can get saturated with data.
KARRAS: It’s a change in the payment model that we’re talking about. It’s a dramatic change. One of the biggest issues that I see is when organizations try to do too much, too fast. With the availability of data, they take on too many endeavors, instead of concentrating on just three or four. They don’t optimize processes. I call it the risk-reward model. What risks do you want to take for what reward?

DIAZ: Data governance is key. If we have too many things on our dashboards, people can’t digest it. We have simplified our dashboards to make them more meaningful.

SHIELDS: Getting buy-in is key. We need communication and transparency. The way I communicate with the finance team is different from how I speak with physicians and nurses because they are looking at different things. One of the things I’ve done to increase communication, is to stagger my schedule. One day a week, I come in late and stay late so I can speak to different shifts. It took a while for some people to get used to seeing me, but now they are more comfortable asking me tough questions.

MODERATOR: You have access to a great deal of data. What are some of the insights that you’ve gained over the past year from data about your organization?

WEISS: We didn’t realize where we were going with population health until we took a close look at all of the data available to us. According to Gallup, we are one of the healthiest and happiest communities in the U.S. The Robert Wood Johnson Foundation provides county health rankings for Florida, and we are consistently at the top. But until we saw the data, we had no idea our efforts were working as well as they are. We know our financial data. We know our patient quality data, but we didn’t know about the health of our community. For example, we know how many people we see in the ED. We know how many surgeries we do every day, and we can track that year over year. But until we did a five year look back, we didn’t realize that our hospitalizations per 100,000 people were actually going down. We need the insurance carriers to help us get much of that data. They often know more about us than we do, but they’re not great at sharing.
**KARRAS:** The external data, if fed into your BI, can tell you whether your organization’s business strategy is aligned with the community’s needs.

**WEISS:** Yes, it’s validated what we are doing. But, say the results were not as favorable, the data would have given us what we need to change and deliver more appropriate care and services. It’s all very worthwhile.

**DIAZ:** I hit on this earlier, but we’ve had the most success with the executive dashboard. With the executive dashboard, we have greater understanding, transparency. We have all the financial metrics the hospital needs to know on a daily and monthly basis. I’d like to add one thing in terms of where I’d like to go with business intelligence. One thing that would be helpful in BI analytics would be the quality-adjusted life year [a measure of disease burden]. Many European countries have that. In the United Kingdom, treatment is only added if it shows that the cost has a return on life and what you want it to achieve. That’s an important thing to think about. People often refer to these as death panels, but the real question is whether we, as providers, are actually giving people something of value, and not just doing something for the sake of doing it. This is hugely beneficial if we could show that a treatment does not make a difference in quality or length of life. The data are available today, but we can’t get them. In the future, when we’re talking about transparency and interoperability, that’s an important component that we will need to provide.

**SHIELDS:** We’ve spent a good deal of time on data governance and making sure that we are collecting useful data. In working with our chief quality officer, we realized that we were collecting a good deal of useless data. We were doing nothing with it, so we were able to reduce how much we were collecting. It was being collected because it had always been collected, and that’s not a good enough reason in my book to collect data.

**KARRAS:** One of the challenges we face in health care is ownership of data. We don’t have an owner of the data. The skill set it takes to truly understand the variances in data, and to be able to represent it quickly and accurately for the organization, is usually spread over many people. The information technology department may be in charge of collecting the data, but what do you do with it? We need true ownership and expertise in getting data to the end-user in a meaningful way.

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**KEY FINDINGS**

1. When applied to wellness and prevention, business intelligence can have a tremendous impact in changing behaviors and improving the health of communities.

2. Interoperability remains one of the biggest roadblocks to data collection and use. To truly improve the health of communities, health care organizations need to be able to freely exchange patient data among caregivers and other stakeholders.

3. Business intelligence can drive predictive analytics, allowing clinicians to enhance the quality of care, improve outcomes and reduce the overall cost of care.

4. Take a pragmatic approach. Try to concentrate on three to four key metrics, show value and then expand.
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