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HOSPITALS & HEALTH NETWORKS

Dialogue

Executive

Clinical and Business Analytics:

Delivering Real-Time, Predictive Intelligence

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Clinical and business analytics tools are becoming a top priority for hospitals and health systems seeking real-time, actionable surveillance data to reduce costs and optimize care. As hospitals and health systems continue the transformation to value-based care and population health management, enterprise intelligence resources complement electronic health records to provide senior executives and clinicians a comprehensive picture of what's happening within the organization. This will enable hospitals and health systems to react quickly to enhance clinical outcomes and efficiency, as well as the bottom line. Health Forum convened a panel of health care executives and industry experts March 1 in Las Vegas to discuss clinical and business analytics. Health Forum thanks the participants, as well as VigiLanz Corp., for sponsoring this event.

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MODERATOR (Suzanna Hoppszallern, Health Forum): What are your chief clinical priorities, and how are they shaping your approach to clinical and business analytics?

KATHLEEN SANFORD, R.N. (Catholic Health Initiatives): We are a large system — spread from the East Coast to the West Coast. And we have all kinds of electronic health record systems. It's a challenge. We have struggled for some time in getting consensus on definitions across the different platforms. It's important, especially since we are on a multiyear initiative to optimize our data warehouse as we move into clinically integrated networks and population health.

CRIS ROSS (Mayo Clinic): We are in the process right now of moving from multiple electronic health records to one EHR system. That's taking a great deal of energy for us right now as we think that through. We have had classic data warehousing in place for a long time — a lot of work that's supporting our academic mission of research, for example. We've been trying to figure out how to take relatively large leaps forward in this phase. Two years ago, we co-founded OptumLabs™. We input essentially all of our clinical data on a de-identified basis into its data repository for research purposes. We're interested in data aggregation opportunities, as more organizations are trying to figure out how to get diverse datasets together to draw interesting actionable results.

On a more micro level, we're trying to advance some of the things that we've done in natural language processing to get richer insights out of data. We have a cascade of data coming out of our clinical monitoring systems, for example. We get these massive streams of data, but what are we going to do with them? What insights can we get out of the data?

RICK SCHOOLER (Orlando Health): From an information and architecture perspective, we are on what most would consider a best-of-breed platform. However, we've made the decision at this time not to pursue one fully integrated network in terms of clinical platform. We have many competing priorities across the organization that are business-related in terms of our geographic footprint, our efforts to increase market share, our quality initiatives, etc.

The reason we have disparate platforms is the result of acquisitions. We've been able to do a pretty good job of getting things consolidated, however. Most of our hospitals work off

one hospital-based platform. When we acquire a physician practice, we immediately move them to our practice management system. We have an internal health information exchange and we have established our own health platform that has its own set of analytics.

Moving on to predictive analytics, we've started some predictive work at the point of care. But, the disparate systems create an interesting conundrum. We have an enterprisewide warehouse platform and we're trying to move data into that now and begin to use it. But, we still have a lot of people who seek their own solutions. We have a good, solid information technology governance process to help ensure the integrity of our data. We can't have people looking for their own solutions. We need to work together to reach a consensus. We can't make decisions based on one department's perspective or priorities. That decision could have a ripple effect throughout the organization.

It's amazing how we have so many legitimate needs for data that we can't seem to get quickly enough or deeply enough. As we build our clinically integrated network and align with private physicians, the need only becomes greater. Data analytics is hard to manage; it takes a lot of coalescing, a lot of agreement and a lot of consensus as to priorities. And that's our biggest challenge: prioritization. At the same time, all of the activity in the non-acute or the freestanding environments and the way the business is changing for us are beginning to shift the analytics needs.

MODERATOR: Cris, how do you anticipate that your priority list will change over the next couple of years?

ROSS: We are working on some great projects around critical care. It stems from some visionary physicians who picked up on a couple of issues, one of which was how to recognize patients whose conditions are worsening and determining how to intervene at the appropriate point. Another initiative focuses on how to get the correct datasets displayed to clinicians at the right time. They've published several articles and received some grants in that area.

These critical care initiatives were not institutional priorities; rather, they were championed by physicians who identified a need. It's

an area in which we've had some real success. We are an academic medical center with missions in patient care, education and research. We take all three of these areas seriously, so a lot of focus is on how we can get the insights that help us lead in those areas. Our CEO likes to say that knowledge is our most scalable asset. So our focus is on how we can take all of our data, create insights out of it and from that, create products and services that we can distribute to our affiliate network.

We have a tool called 'Ask Mayo Expert,' a point-of-care resource that provides clinicians with access to Mayo physicians via an e-consult or phone consult to guide them on how we would treat a patient based on the patient's circumstances. It also provides clinicians access to treatment guidelines. We put a great deal of thought into how we can take what our doctors know and what they've learned about their patients and turn it into actionable knowledge. We are building a pathway from where we are now, where that information is somewhat static, to something that can be more interactive and patient-centered. How do we apply the specific data about that patient against these decision models, both within our system and potentially outside our system? We're pretty excited about that.

MODERATOR: Kathleen, you have such a diverse group of organizations. Is it possible to even set meaningful clinical priorities in your environment?

SANFORD: We range from critical access hospitals to academic medical centers, so we are definitely diverse. We recently brought together all of our regional chief medical officers and chief nursing officers, chief pharmacy officers and IT folks to figure out what we need to do to bring value. We're focused on doing what's right for the patient from a clinical point of view, but how does that tie to the cost? We've spent a lot of time talking about what things we should do the same centrally and what things we should do divisionally to improve quality and manage cost.

We have an enterprisewide data warehouse and we're working on how we can share service line data across the system. We can look at service line data by specific physician, the cost of care for a particular diagnosis and the

quality outcomes. Each of our platforms has its own chief nursing informatics officer and chief medical informatics officer leadership team, which work up to national, and they work together with groups of informaticists and others in the IT world to figure out for the particular platform what the clinicians' priorities are. We try really hard to let clinicians decide and not IT leaders.
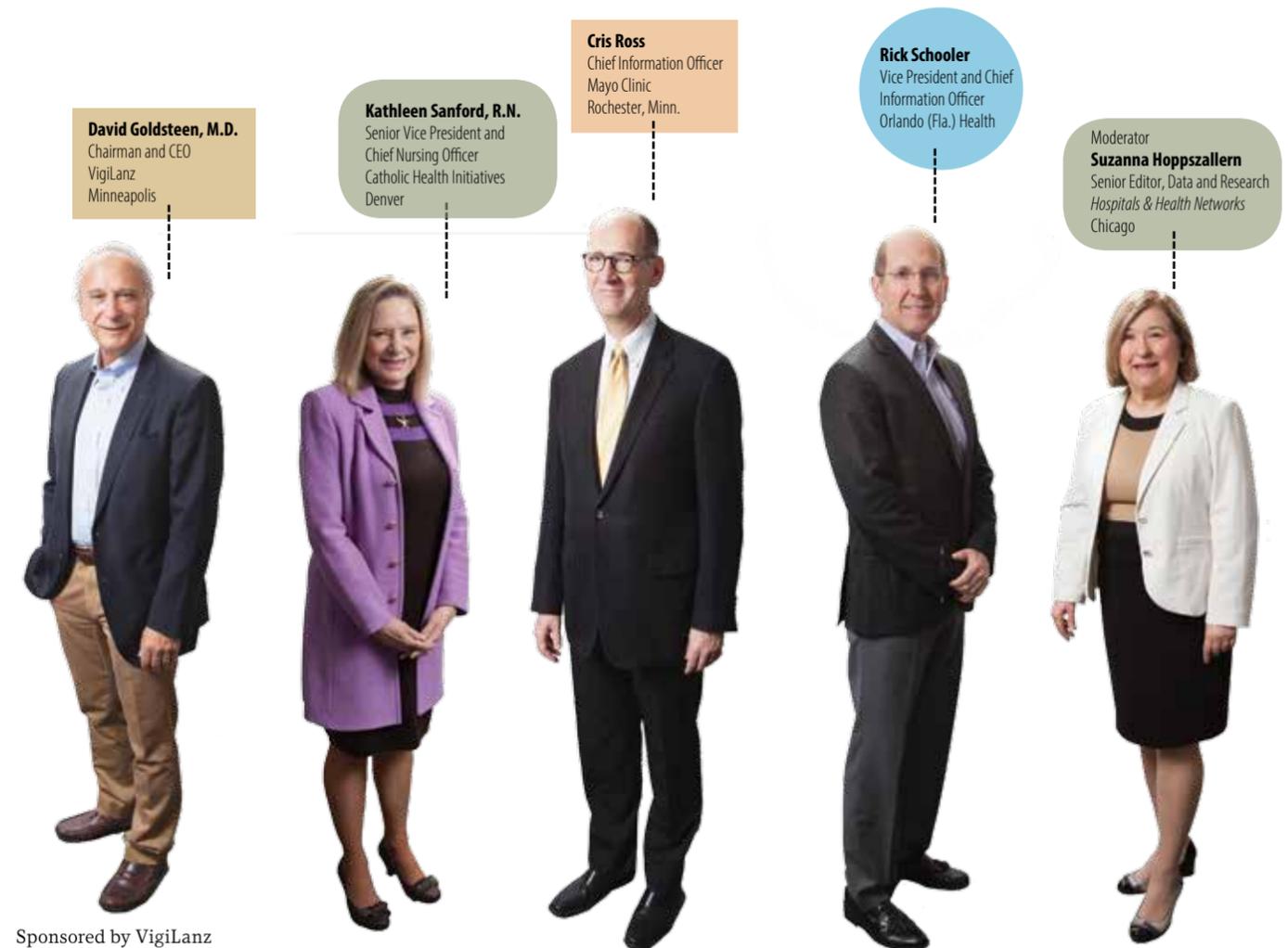
MODERATOR: Rick, can you share how you're setting priorities?

SCHOOLER: Prioritization is tough. In a regional system like ours, where we have limited resources, we are constantly trying to figure but how to prioritize our needs. We typically

drive decisions off our core strategy and core business plans. What is needed to meet our mission, and what will help us to deliver the kind of care and patient experience that we want? We have core mission services like Level I trauma. But, do we need to be more strategic about other services as we strive to remain a viable, key player in the market? So, prioritization, for us, has to do mainly with core strategy and core mission. What are we going to do in our community, and how does it correlate with our strategic priorities with regard to growth, margin performance, market penetration and geographic footprint?

DAVID GOLDSTEEN, M.D. (VigiLanz): It's a diverse market out there. And there's a phenomenal

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amount of data. The challenge is figuring out how to marry the knowledge and insights gleaned from data into actual intelligence to work on the clinical delivery side. That's the bridge that still has yet to be crossed; it's a priority for us and for hospitals and health systems. There are different means and methodologies to achieving true integration.

The market is beginning to recognize that EHRs are not sufficient to cross that gap. We need to have innovative, flexible approaches that cross EHRs, take real-time and historic data in the data warehouse structures and try to marry them. The challenge is to get it into the clinician workflow in a way that makes a difference in outcomes. That's the challenge that everybody we've met is grappling with, whether it is a for-profit or nonprofit organization. Organizations are trying to figure out how to do this with the constraints that we see coming down the pike with risk-based contracting. How do we do it with the ultimate goal of improving outcomes? That's the universality of what we're seeing.

MODERATOR: Are any of you using analytics in real time for decision-making or at the point of care? Is it influencing what you're doing at the point of care right now?

SANFORD: That's what we are aspiring to do; we're just not there yet. It's something our clinicians want. They would love to know if the course of treatment they're providing is the best for the patient. Value is an important part of the equation. If we use a particular medication that's new on the market but costs 80 times more than the other medication, we would like some evidence at the point of care that it's making a difference. But we still are a few years away from having those capabilities.

ROSS: We've done some interesting stuff, but we're just in the early stages. The potential is great, however. Our initiatives have revolved around monitoring patients in inpatient settings, around sepsis and post-surgical monitoring. We're interested in how computers can assist smart physicians to be even smarter around some of the more complicated case management issues. We're working on a project with IBM Watson around clinical trial matching. The results have been promising.

Clinical trial matching is a complicated process; the inclusion and exclusion criteria are complex. They're usually expressed as words rather than something that's computable, and the facts about the patient's case make it hard to comprehensively review the patient's record.

Like other organizations that participate in clinical trials, we have a squad of nurses who pore through the records trying to look for good matches. There's a limit to what we can integrate. Take breast cancer, for example. We found that Watson does a nice job of reading ClinicalTrials.gov, particularly the relevant oncology literature, and then walking through a patient's record, including the structured and unstructured data, and then presenting some potential matches. Our oncologists, and those who support them, are really excited about that. That's just one example of how we can leverage data. Hopefully, we can reduce the administrative load on our clinicians and let them focus on matters of judgment, insight and synthesis that only a human being can do well.

SCHOOLER: Historically, we've used data for surveillance, building clinical alert systems and helping our clinicians provide the right care at the right time. Now, we're talking about predictive analytics, understanding what might happen before it happens. Most of the tools into which we've built a lot of intelligence to this point can't really look around the corner. But we're now beginning to get our feet wet a little bit with the notion that we can take some of the data that historically we've been using for surveillance to get more of a predictive approach. We're also looking at this as we use our population health platforms to manage our accountable care organization populations. We've done very well in that space in terms of managing cost and improving quality. We've been driving a lot of the day-to-day care management with that information. But I'm very excited about the potential to help clinicians, whether in care management or at the point of care, to understand that if they don't do these three things, this patient's going to wind up in this situation. We suffer from many of the different sources and repositories of information and we're trying to figure out what's important and what's not important.

KEY FINDINGS

Strong IT governance will ensure data integrity and help organizations to prioritize their clinical and business analytics goals and objectives.

Other industries and businesses, including Google, the airline industry and financial services, can serve as good models to health care organizations for the effective use of predictive analytics.

Data sourcing remains a challenge to effective clinical and business analytics. Hospitals and health systems need to reduce their number of data repositories to ensure timely access to high-quality data.

ROSS: Other industries are using predictive analytics effectively. The hotel industry can price the hotel room correctly. Airlines can price the ticket right and they can maximize load. Planes are always full nowadays. My credit card company alerts me when there is a suspicious purchase on my account. How can the health care industry catch up with these consumer-oriented industries? It's exciting to think about how we can apply this kind of power to patient care.

SANFORD: About nine years ago, we worked with a local university to develop a staffing tool that would help us to identify what staffing levels we needed to prevent infections, etc. We weren't quite sophisticated enough then, but it's time for us to get back to that. It's about patients, what resources we're using and how we tie that together.

SCHOOLER: We've got many challenges within our own delivery systems, struggling with disparate platforms where we're capturing core clinical data. It's exhausting. I'm not saying we have to have one platform but, from an information management standpoint, it has to look as though it's coming from one platform. It has to be consistent. But we still have a long way to go.

When we put that predictive model out there, it can't be wrong. We only have one chance; we don't have the ability to make mistakes and get a do-over. Once we put something out, when we invest money, people, time and energy and change the clinical process, it has to be right. If we have a problem with our data, we will lose trust, focus and momentum.

SANFORD: That's absolutely correct. We conduct a lot of clinical trials at some of our facilities. We have to be thinking about the impact on patients if we don't have our data right for predictive analytics.

GOLDSTEEN: One thing that we're seeing across the country is that organizations are actively choosing not to standardize at the EHR level, but rather to standardize their data across the system at what Gartner calls the enterprise intelligence resource layer, the level above the EHR. It's more cost-effective and organizations can build in the flexibility they need with whatever you want to do with the data. It's easier to standardize the data at that level.

ROSS: Even though we're committing to getting to a single EHR, we have an equally important investment in what we're calling a unified data platform, which is to try and put all this stuff

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Cris Ross

together. A traditional enterprise data warehouse isn't enough, and transactional systems aren't enough. We're working pretty hard to combine some of the classic structured (SQL) data with emerging, unstructured (No SQL) data. Our clinicians are so hungry for such a range of data, the frontier keeps moving. We'll continue to have disagreements over data, but we're also hard-pressed to say, 'It's fine, let's get some new insights. Let's measure in some new dimension.' Data governance has become absolutely critical in this regard.

SCHOOLER: At least you're doing it. You're well-ahead of most organizations.

ROSS: We are doing it. We still have much to perfect.

SCHOOLER: But, you're paving the way for other organizations. Think about all of the health systems and the smaller providers that are watching and waiting for the Mayos and CHIs to get something done that works, and that the rest of us can get behind. At Orlando Health, we're sort of a hybrid. We do a fair amount of leading the front, but we'll also look to organizations that have paved the way. We can't afford to burn a great deal of time, energy and money doing something that's not going to produce value. There are organizations that are in a better position to do that, while the rest of the field watches and waits. Will this new system have all impact on how we do our business? We'll wait and see.

SANFORD: How do you handle requests for data from different groups across your organization? We have nurses, different medical groups and administrators asking for data so that they can try to get to the analytics. We produce hundreds of reports, and everyone thinks they need data in a certain way. I wonder, at times, whether it's even used. Do you have similar challenges at your organizations? I feel that we need to educate our clinical users to ask the right questions before they start looking for reports and analytics.

ROSS: Yes, we've got that in spades. We replaced a bunch of legacy systems, both clinical and administrative. They're good systems, but clinicians often tell us they cannot find

certain pieces of information, and we sit down and show them how to create a report with the information they need. So, you are correct in that we need to instruct them on how to ask the right questions.

Another piece that we're spending some time on is thinking about our analytics services, and managing them as if we were an internal vendor. It's not enough to release a cool, new analytics tool. We have to go out and meet our customers, clinicians, etc., and make sure our product is meeting their needs. I feel that we have some stuff sitting on the shelf that could create value, but isn't, because of this problem. So, we need to do a better job of educating the end user.

MODERATOR: Are there other challenges you're finding with the analytics and clinicians' ability to use them?

SCHOOLER: We need to separate the real work of analytics into different categories. At the point of care, clinicians basically are interested in outcomes data. They aren't interested in digging deeply through the data. We have pushed back when necessary to see if the reports being requested by our clinicians are indeed what they want.

Our challenge, as has been stated, is data sourcing. We have so many disparate technologies. We need to enhance our IT governance so we can define what's important and ensure what we bring into the organization is useful. Right now, there are too many things coming at our folks at the same time and no definition of what's important.

SANFORD: We all want to do the right thing, and I agree that we all need to work together on this. We want to support our physicians, so when they ask for things, we want to supply them. We need to get involved and ask what problems they are trying to solve. What exactly are they trying to do? That's how we've gotten to the point of having all of these reports sitting on a shelf somewhere and not being used.

SCHOOLER: It's a discipline that we need to develop further. We have so many different priorities and limited resources. We've got to do what's important to the organization.

ROSS: It feels as though we're getting to the point where we're at a cognitive overload for clinicians. As a nonclinician, I'm not sure how they can keep up with the new treatment options, literature, etc. Part of what we need to do is support clinicians so they don't have to sort through the morass of new stuff. I don't know how clinicians keep up.

SANFORD: That's why we focus on the service-line approach. Let's use medications as an example. There's new stuff coming out every day and some of it is expensive. We always try to bring the right people to the table. And, more importantly, we need to recognize and listen to the expertise at the table.

For example, the person who knows the most about killing bugs in the room is the housekeeper, not the physician or the nurse. For medications, we bring together the pharmacist, the physician and other clinicians to review the literature to determine whether a new drug that costs 80 times as much as what you have right now is actually going to make a difference in people's lives. We can only come to the right decision as a group.

SCHOOLER: That reminds me of a special I saw on Netflix about the making of the Ford Mustang. It's amazing to see how it gets orchestrated. There are more than 1,400 parts in that car and there's a hierarchy and structure. Everybody is there for a reason, and everybody is regarded for his or her expertise. There is someone in charge — there has to be. And in the end, there's a Quality No. 1 check. If the car doesn't pass that inspection, it goes back until the issue is resolved.

GOLDSTEEN: Back to Cris' comment, the challenge for clinicians is only going to become more complex with the rise of genomics and personalized medicine. Now's the time to think through how we're going to address that with clinicians. I sincerely believe that having the ability to access real-time information and intelligence within my existing workflow is essential to improve patient outcomes and the health of populations. We're still seeing nurses and clinicians' doing busywork that takes away from their ability to perform the higher-level work they need to do. There are so many things in health care under protocol

with safety checks that can be automated and we have yet to go there. That's what Rick is talking about with Ford. Look at how much is automated in their process, and we've yet to even dip our toes in the water.

SCHOOLER: One of the keys is how they make decisions to automate a process. There's a limited number of people who look at a problem. They're the experts, and when they make a decision, everybody else accepts it. They implement the solution and they move forward. There's no debate.

GOLDSTEEN: Health care is complex and, unlike an assembly line, as people progress in their care, we can do the same thing to 10 people and get six different outcomes. That's where the real-time feedback and information needs to be available for the clinician. As we get better with precision medicine, we'll see less of that.

ROSS: Another piece that we haven't discussed is how we talk about and provide analytics to patients. We're all trying to explain complicated situations to patients so they can make informed choices. We've been developing easy-to-read graphs to help them understand. The charts, for example, show the likely outcome for a hundred cases similar to that of a patient. Three people likely will die of this condition, but if a particular therapy is applied, the outcome likely will be this. I think it's a huge deal. It's a simple tool, but it goes a long way to explain the situation to a patient, to a relative or a friend. I'm not sure we can drive everything down to protocol. I'm not a clinician but, at the end of the day, there are different elements — financial, quality of life issues — that come to play in a patient's decision-making process. This empowers patients and helps them to understand all of their options.

MODERATOR: Is anybody else using analytics to help patients make decisions?

SANFORD: It's not widespread. If that's occurring, it's on individual clinician's level.

ROSS: I think we're early on in using analytics in this way.

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> **Rick Schooler**

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> **David Goldsteen, M.D.**

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> Kathleen Sanford, R.N.

SCHOOLER: For us, it's more often the clinicians who are providing the information to the patient. They're looking at information we're feeding them and using it to help the patient make a decision.

MODERATOR: We've talked about some best practices, including data governance. What are some other best practices that you've actually employed in your organization around IT and clinical analytics that you feel would benefit others?

ROSS: Well, something we're working on now will help many organizations in their IT and clinical analytics. We're working on a way to store more complicated data. We collect a large amount of data on our patients, but we don't have good places to store it. We're finding that we can store more unstructured data, or we don't try hard to standardize and normalize every component of it, and then use techniques to try and extract knowledge out of that information. That's really key. Health care is way behind other industries in that regard, in our ability to capture relevant data and then use techniques to pull meaning out of it. I'm excited about that. We have reached the limit of what we could do with a traditional, classic data warehouse.

MODERATOR: Do you have a strategy for taking advantage of all that data?

ROSS: We are in the early days, but we do have a strategy. We're building a unified data platform that we depict in a pyramid kind of form. We bring raw data in the bottom, and it is enriched in a variety of ways for higher-value use. It's not a unique process; it's broadly used in other industries. The big question is: How do we ask the right questions? How do we ensure that the data have validity all along the way? That's why I'm a fan of the data governance geeks, and I count myself among them. We don't want to have the wrong kind of data lead clinicians down the wrong path. We want to make sure the data are valid. IBM calls it cognitive computing. I don't care what we call it, but any of the areas where we're deriving meaning out of rich data sources have tremendous value in health care.

SCHOOLER: If we're ever going to get command of our information, we have to have formalized data governance in our organizations. We will not be able to get there if we continue to have this competing platform of 'My information's right. This is my definition of information.' It's foundational stuff.

Hospitals and health systems are going to have to realize that we'll never get to one central point where all of the information we need to run our business is in one repository. But we should get it down to just a few central sources of information. There needs to be a limited number of reservoirs of information that we use. Some may be cloud-based, and some will be internally based. But strong data governance and having the ability to shave down the number of sources of truth that we use today is the best, practical advice for any organization that is trying to get control of its information. Without it, we won't get to a point where we can use analytics in a way that addresses looking at the past, what's going to happen next, or prescribing what would be the best thing to do in a given situation. I don't see ourselves ever getting there unless we do those two things. We have to have some level of governance over the information and how it's used and defined. And we need a manageable number of repositories of data from which we draw information. It's what all of the leaders in analytics are doing today.

SANFORD: I agree with Rick's comments. If we are ever going to get to a higher level, we will need to get out of our silos and work together. It's something we have not done well in the past. It's not just finance and clinical care that need to work together, we need to bring in HR and other parts of the organization. At CHI, we are working to eliminate silos. We ask ourselves who isn't at the table and should be there. Are we calling some people by a title and other people by their first names so that we're not able to work together as equals? It's bigger than just IT. Best practice is eliminating silos and changing organizational culture to ensure all voices and expertise are heard.

MODERATOR: David, what are you seeing in terms of best practices in the organizations you've worked with across the country?

GOLDSTEEN: Hospitals and health systems need to keep sight of the end game. It takes balance, perspective and visionary work. The end game is about making a meaningful difference in the delivery of health care to the individual and to the population. Some of it involves IT, and some of it involves advances in knowledge and restructuring the delivery of care. We're currently in an exciting era in health care in which the financing and delivery system are changing radically. The delivery is changing radically. I'm very excited for the alignment that we're seeing today. If we're going to have the responsibility of the delivery of care, health care organizations should have cost incentives so they can control both. We're all trying to figure out how to take this phenomenal amount of information and apply it to the end game of providing exceptional care at a reasonable cost. Meaningful information is good, but it doesn't help clinicians unless it provides actionable information to care for the individual patient.

MODERATOR: Are any of you at this point yet?

ROSS: We're looking at things like sepsis prediction, for example. We're doing a fair amount of work in our surgical cases, trying to determine whether a case is going to worsen based on some early data. We're doing a lot of work in critical care to try to determine when a patient's condition is going to worsen. We actually don't give ourselves enough credit; there is a fair amount of that happening. What intervention can we make in the patient's care to avoid complications? One of the challenges is to scale that stuff up and to begin to look for more cases to which we can apply it. It's becoming more mainstream.

SCHOOLER: Over the past couple of years, we've published content in our enterprise data warehouse to support various performance metric tracking, as well as more specific quality improvement activities, including readmission rates. We've made use of related reports and dashboards that track condition-specific populations monitored by the Centers for Medicare & Medicaid Services, such as congestive heart failure and stroke, as well as our overall corporate, individual facility and service line readmission rates. We use the information about those readmitted patients to better understand why and to help prevent future readmissions.

SANFORD: We can use data to predict patients at risk for falls and skin breakdowns, and to help predict length of stay. We have one product, an acuity system, that predicts how long a patient should be in critical care or in med-surg and when the patient should go home. It is not based so much on the patient, however, but rather on the diagnosis and what the nurses chart when the patient is admitted. This is just the beginning, but it gives nurses and physicians the ability to question why the patient is still in critical care and enables them take action. We are at the beginning in our use of predictive analytics.

GOLDSTEEN: Once organizations start seeing the value of real-time information and what it does to the delivery of care, it's easier to find ways to get the information. Because we have real-time data on the clinical intelligence side, we're able to build and run our machine-learning models in real time on a predictive basis against a population and integrate that with the clinical intelligence side. It works as a real-time predictive model for any one individual, as well as a population.

What we're seeing in the early stages is a wonderful improvement in sensitivity, specificity and positive predictive value in the area of sepsis. Our goal is to bend the curve in sepsis, which is the first predictive model we're developing.

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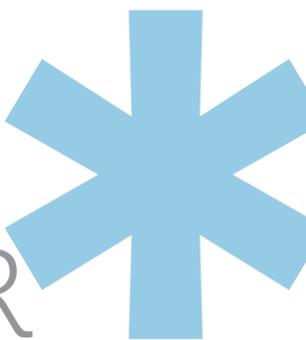
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"Clinical and Business Analytics: Delivering Real-Time, Predictive Intelligence,"
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