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Regions consolidate patient data to improve management of hospital resources

Predictive analytics and population data are helping hospitals plan days and weeks in advance.

BY DIANNE DANIEL

When you're managing capacity in a hospital setting, yesterday's news isn't going to solve today's problems. What's needed is a real-time picture based on trusted data – a daunting task for healthcare organizations. An even bigger challenge is turning that data into an accurate prediction of what's to come.

"In healthcare, we've been pretty good at analyzing historical trends. What we haven't been necessarily good at is proactive planning," says Sarah Padfield, chief operating officer at Chatham-Kent Health Alliance (CKHA), a 200+ bed community hospital operating two campuses in southwestern Ontario.

"We know what happened in the last six months and, yes, that is important. But when you're trying to manage beds on a day-to-day basis, what you want to figure out is what's coming at you today and in the next couple of days, as opposed to what happened yesterday."

To provide that real-time snapshot into hospital utilization, CKHA engaged the services of Waterloo, Ont.-based Oculys Health Informatics, a company focused on developing practical, operational visibility solutions for healthcare professionals.

The company's core product, Oculys

Performance, is a mobile tool that displays operational data from disparate information systems in a simple format, providing information such as bed availability and patient flow. After a one-time implementation fee to establish key data points, the service is offered at an affordable monthly subscription fee.

Padfield calls the visualization tool a "real-time utilization dashboard" configured specifically for CKHA. Hospital staff access it through either a BlackBerry 10 smartphone or desktop, there are screens

at every nursing station and it is also widely deployed through a web-based link so users can access it from anywhere. At a glance they can see how long each patient has waited and what's happening with bed availability – for example, making adjustments to optimize capacity and reduce wait-times on the fly.

CKHA's initial goal was to positively influence the time from when an ER patient is admitted to hospital to when they are actually moved into a bed. "When
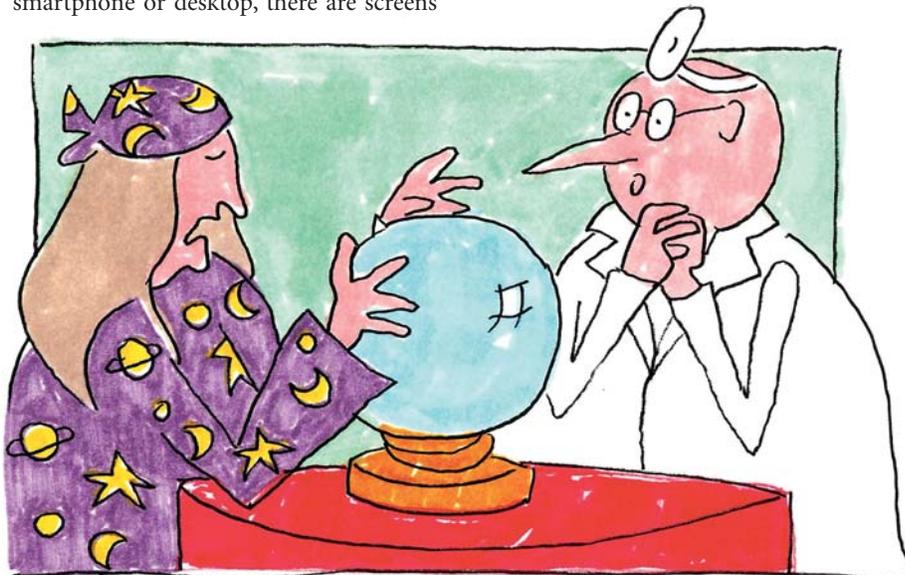

ILLUSTRATION: LINDA WEISS

we started we were averaging well over 14 to 15 hours. Now we're consistently under eight hours," says Padfield. It has since expanded the tool to include housekeeping, enabling housekeepers and porters to prioritize cleaning and maintain up-to-date bed availability status.

Though the end result is a simple-to-understand view, the engineering behind the Oculys solution is complex. Formed in 2011 and known for developing a real-time emergency department wait clock in conjunction with St. Mary's General Hospital in Kitchener, Ont., the company also works closely with academics at the University of Waterloo.

The algorithm that drives its real-time utilization tool is now garnering attention from California's Stanford University, says Oculys president and CEO Franck Hivert, and the company is adept at leveraging the expertise of data scientists.

But its real focus is on the end-users, the hospital clinicians and managers.

"The reason we've been successful is because we have worked with users in understanding what information they need to make better decisions (and extracting it), instead of getting the data first and seeing what analysis we can run on it," says Hivert. "We're not the tool they're going to use to analyze the last six months of data. Our philosophy is: Let us give you the information right now, today, so you can do something about it."

CKHA is one of five hospitals that make up the Erie St. Clair local health integration network (LHIN), all of which will be using Oculys Performance once Leamington District Memorial Hospital goes live with its implementation this fall.

The deployments, created with the help of Oculys, mean there will soon be a LHIN-wide real-time utilization view – a real achievement. Phase One is currently being rolled out and will provide as many as 20 LHIN employees with a snapshot of activity across the whole region, an "unprecedented" development, according to Hivert.

"We are presenting to the LHIN a consolidated view of exactly what's happening so they can make better decisions," he says. "That's something only four years ago was deemed to be impossible without an investment of millions of dollars."

The tool will be key to helping the LHIN manage surge capacity across the region, particularly in the event of an emergency. It will also provide information about operating room schedules and patient wait times, information that can be shared between hospitals to assist in managing daily capacity.

"When we started working with hospitals and told them we would be extracting information from their feeds to come into a regional view, the biggest concern was that we didn't want to miss things," says Erie St. Clair LHIN health system manager Rashoo Brar. "Technology is an enabler, but sometimes it can be a hurdle, too."

To ensure data integrity, the LHIN performed rigorous validation and testing of components, sending the data back to each hospital for further testing. The result is a high level of trust in the data presented by the tool. And if there's any discrepancy, it's checked right away, she says.

Padfield anticipates the regional tool – referred to as Oculys Performance LHIN-View – will help to reduce bottlenecks in

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healthcare delivery and result in better system planning. In a proposed phase two implementation, the LHIN is considering adding a Community Care Access Centre link, as well, so that decision makers will know how many patients are waiting for rehabilitation or long-term care beds, as well as what services and beds are available.

"We have other systems we can use to go back and look at our admissions and census to do historical analysis. This is giving us a real-time snapshot," says Padfield. "We didn't build it to look at using it as a big, data analytics tool. We looked at it as a way to manage behaviour and performance in real-time."

According to a list of top healthcare analytics trends for 2016, compiled by Perficient Inc. of St. Louis, Mo., achieving actionable data-driven insights is in the top five.

The other four include: aligning clinical, quality and financial analytics to enable value-based care; integrating clinical and claims data to enable population health management insight; leveraging cross-continuum data analysis for improved patient care and outcomes; and, growing enterprise intelligence to measure and improve patient and organizational health.

Ontario's Hamilton Health Sciences (HHS), with its Integrated Decision Support (IDS) data store, is working towards all five. Hosted in HHS's partner environment, the central repository currently contains information related to roughly 37 million encounters for 6.5 million unique patients. It is managed by a team of 15 IT professionals, including support analysts, business intelligence analysts, content experts, quality assurance experts and a user experience analyst.

The SQL-based repository collects data from six LHINs in southwestern Ontario: Erie St. Clair, South West, Waterloo Wellington, Hamilton Niagara Haldimand Brant, Toronto Central and Mississauga Halton.

Every day, the team applies reporting and analytics tools from Microsoft, as well as data visualization tools like Tableau, to deliver visibility into the full patient journey. It starts with patients identified through Ontario's Health Links initiative as having multiple, complex conditions – the top 5 percent of patients who account for two-thirds of healthcare costs.

"Because we have all of this data, and it's linked, we can really get the visibility of those patients to see how many ER visits they've had, the admissions they've had, the reasons for the admissions, and how many readmissions they are having," explains Wendy Gerrie, HHS director, Regional Integrated Decision Support Services. "It's very beneficial to see what has happened in the past and then to use predictive modeling to determine what we think might happen in the future."

The view into the longitudinal patient record also supports the transition from volume-based funding to value-based funding, she adds. HHS is currently involved in a pilot project to examine an integrated funding model for congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) patients. "A group of hospitals and CCACs put money into a virtual pot and we are having the dollars follow the patients in this bundled payment pilot to see how that works," says Gerrie. "You really can't do that until you can follow the patient."

Each LHIN pays an annual fee to HHS to belong to IDS, essentially to cover costs.

Information is exchanged through a secure portal and users only have access to the type of information available to them based on credentials and in accordance with privacy legislation.

In addition to a number of fill-in-the-blank report templates related to popular queries, which are returned in minutes, users can also leverage the knowledge of the HHS team to ask more specific questions with reports generally taking two to three days to complete.

One exciting development, says Gerrie, is the ability to apply the information stored in IDS to examine population health. Census data, including postal code and socioeconomic indicators, is included in the patient files, meaning it's possible to group patients according to where they live and look for trends that might help to identify what she calls "rising risks," people who are at risk of developing one of the 54 chronic conditions identified through Health Links.

"Right now we've exhausted the analysis we can do on the top 5 percent of our users," she says. "Can we get to that next large pocket and prevent them from becoming that 5 percent? IDS is allowing us to get to that next step faster."

Earlier this year, HHS announced a collaborative research initiative with IBM that will see a healthcare innovation hub created in downtown Hamilton. Under the partnership, IBM is providing access to its Watson cognitive and analytics software while HHS offers practical industry expertise and serves as a real-world test environment.

As Gerrie explains, the partnership will be instrumental in helping HHS to tap into unstructured data. While the structured, multi-LHIN IDS repository spans outward and provides visibility into data

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beyond a hospital's four walls, HHS also maintains an internal repository that includes hospital-specific information related to diagnosis and procedures, including unstructured pieces of data such as clinical notes or electronic feeds from digital equipment. Watson is intended to mine that data in new ways, she says.

According to a news release announcing the IBM partnership, one project will explore adding a mobile component to "HHS's early warning system, which electronically monitors a patient's vital signs for subtle changes indicative of a worsening condition or pending medical event." Lilian Vasilic, HHS manager, BI Solutions and Products, anticipates that the combination of Watson's analytical capabilities and HHS's rich data set will remove the limitations of IDS's SQL environment.

"What we have is not well suited for totally unknown analytics," says Vasilic. "We can do visualizations and descriptive analytics … but we've realized the relational database world is not really suited for plugging in a million lines of data and letting you data mine."

IDS is already crossing the continuum of care by storing hospital data (acute inpatient, rehabilitation, complex continuing care, ER visits, same day surgery, mental health) as well as CCAC and community health centre data. Primary care data is missing, but pilot projects are under way. In the end, the goal is to provide a longitudinal view of patient outcomes and to try to "standardize the way all organizations are looking at transactions in the healthcare system," says Vasilic.

"This type of information really can be used to influence changes in policy," adds Gerrie. "You can look at the full picture for a patient and ask, 'Why is my readmission rate so high when I look at it across the spectrum of the six LHINs?' We can start to add that quality and value piece to the discussion and factor it into policy."