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PHOTO: COURTESY REACTS

Montreal physician creates new telemedicine platform

Reacts, a new company led by cardiologist/intensivist Dr. Yanick Beaulieu, has produced an innovative platform for telehealth and other applications. The system is capable of supporting multiple video streams, enabling healthcare professionals to see each other while performing various tasks. Hospitals throughout Quebec, as well as in New York, Europe and Asia have been testing the solution. **SEE STORY ON PAGE 4.**

Interoperability headaches eased by VNAs?

BY JERRY ZEIDENBERG

CHICAGO – Solutions for interoperability are hot commodities these days, and the market for Vendor Neutral Archives, which can house and interchange all manner of healthcare information, is growing by leaps and bounds. It's estimated that sales of VNAs are growing by double digits each year, compared with single digit growth for traditional Picture Archiving and Communication Systems.

Hospitals and health regions have found their PACS often have a hard time exchanging images with systems provided by other vendors; moreover, most PACS do not easily accommodate data from electronic health record systems and other sources.

> **Vendor Neutral Archives are seen by some as a solution to interoperability woes.**

The latest Radiological Society of North America conference, held in Chicago last December, was a showcase for a variety of leading-edge VNAs. The booths of these vendors were buzzing with healthcare managers seeking solutions to their interoperability headaches.

Let's face it, getting different databases and archives to easily communicate is no easy task – despite the pronouncements of vendors, who often assert that interoperability is a mere technical problem. Unfortunately, it's a problem they either haven't been able to solve or one they don't want to.

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Vendor neutral archives promise to solve interoperability problems

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The conundrum is so irritating that Quebec health minister Gaetan Barrette recently told the press that he'd like to rip out all of the electronic health records in the province and start over again. The only thing stopping him is that it would cost $1 billion or more, and the province doesn't have the money.

Moreover, Alberta just struck up a task force to look at ways of getting the myriad of EMRs in the province to talk to each other. During recent discussions on the issue, Alberta College of Physicians and Surgeons registrar Dr. Trevor Theman called the current electronic system "a failure".

Things aren't all that bleak, however, and it appears that provinces, health regions and hospitals need not rip and replace their systems. New approaches to interoperability of computerized healthcare systems have appeared, using VNAs, and progress is being made.

Indeed, the whole state of Colorado and its 200 hospitals have produced a solution to share information. The system was created in conjunction with Perceptive Software, which has pioneered methods of consolidating incompatible data into a single archive, making it usable to all kinds of clinicians and administrators and their various computer systems.

"We've also got the whole country of Wales using the solution, and the Sussex region of the U.K. has started to roll it out," commented Larry Sitka, principal solution architect at Perceptive Software, a company now owned by Lexmark.

Sitka, who was the founder of Acuo, an image management company that was acquired by Perceptive Software, explained the solution makes use of a 'vendor neutral archive', meaning it migrates all data from the various repositories used by clinicians and wraps it in codes, such as DICOM, that can be read and manipulated by viewers on any computer.

Vendor neutral archives originally referred to picture imaging archives, and emerged out of the radiology world – which produces massive stores of X-rays, CTs, MRIs, ultrasounds and other types of pictures. These diagnostic images resided in the original generation PACS, but too often, the images stored in the PACS of one vendor couldn't be shared with the PACS of another vendor.

Add to that the challenge of accessing cardiology images from separate archives, along with non-DICOM images from endoscopy, pathology, dermatology, ophthalmology and numerous other disciplines, and the incompatibility problem is truly daunting.

To date, the strategy has been to build silos of separate images and data. However, that too is problematic.

"Maintaining these separate archives, which all do the same thing, is expensive," commented Heidi Brown, an account executive with Perceptive Software Canada. Far better, and more cost-effective, she observed, is a strategy of keeping the images in a single archive.

VNA developers do this by migrating the images to a central archive. Before archiving, metadata is attached to each picture or 'object', so all of them can be indexed, searched and quickly retrieved.

For its part, Perceptive Software has added access to electronic health records to the mix, enabling clinicians to access various types of text and numerical data along with images. That means doctors and health professionals can access lab reports, medication histories, vital signs and other data, along with medical images.

"The electronic medical record, and radiology information systems (RIS), are now driving workflow," said Sitka, noting that healthcare professionals want quick access to a wide variety of images and documents.

Demand for interoperability has spawned new and successful companies – Mach7, based in Burlington, Vermont, was launched in 2007 and now has over 45 customers using its VNA, including Massachusetts General Hospital, as well as hospitals in Saudi Arabia and other parts of the Middle East, Asia and Europe.

The company has succeeded, as it helps users standardize the components of archives – the images and data, worklists and viewers. "No custom coding is required, it's all in the building blocks that we supply," said Eric Rice, chief technology officer. "We neutralize everything."

Theoretically, the traditional producers of PACS and EMRs should be able to easily interconnect their systems, as most have agreed to standard ways of exchanging data – such as HL7, XDS and the various IHE profiles.

In reality, there are many different ways of conforming to 'standards', and often enough, one vendor's use of a standard doesn't mesh with the way another vendor makes use of it.

"If everyone followed the standards [in the same way], no one would need VNAs," commented Jim Prekop, president and CEO of Milwaukee-based TeraMedica, one of the largest and most successful providers of Vendor Neutral Archives.

Prekop mentioned that his company recently completed a project in the Australian state of New South Wales, in which the diagnostic images of 200 facilities were merged into a VNA. "Now each of them can access any study taken at any of the sites," said Prekop. "And the studies all appear in the same format. If you call up a study from another hospital, it looks like it was taken at your own facility."

For its part, TeraMedica emerged from the need at the Mayo Clinic, in Minnesota, to more readily access the medical images from different archives. TeraMedica was created to find a solution.

Photos, often taken on phones, are now becoming part of the EHR.

"At Mayo, we're now managing 2 billion objects, from 15 to 20 clinical systems," said Prekop. "And we're contributing to better care."

He noted the TeraMedica system serves a variety of users, including radiologists, cardiologists, surgeons and oncologists. All of them can obtain images generated by other departments, but they will appear in their viewer of choice, in the way they prefer. "If you are used to using a Terarecon viewer, your images will pop up in Terarecon. If you like using Vital Images or the GE viewer, the images will appear in Vital Images or GE," said Prekop.

Prekop said TeraMedica's technology is widely used in oncology around the world, and is currently deployed at the Princess Margaret Hospital, in Toronto, the largest cancer treatment centre in Canada. "They have a lot of outside data sets, from six or seven different systems, that need to be ingested," he said.

TeraMedica is currently in talks to help integrate data at other imaging repositories across Canada, said Prekop.

At a press luncheon at the RSNA meeting, Agfa HealthCare highlighted the work it is doing with its own VNA solution at the Cleveland Clinic. Agfa announced that it has converged its successful Impax PACS with its enterprise information system, and is now offering only the one, enterprise solution. However, customers can acquire the components they need, as they need them.

Dr. Cheryl Petersilge, vice chair of regional radiology at the Cleveland Clinic, and medical director of the famous hospital's integration project, described how "we've been driving toward a single archive for medical imaging."

She added that the imaging archive is being integrated with the Epic hospital information system, so that "all information is accessible through the EMR."

Cleveland Clinic has been adding images from various departments to the central archive, including radiology, surgery, ophthalmology and women's health.

She noted there has also been an explosion in the use of jpg images, taken by doctors across the enterprise. In most hospitals, these photos are left unarchived, and can easily be lost.

"The iPhone is becoming a very important medical tool, whether we like it or not," said Dr. Petersilge. "Doctors are taking and transferring a lot of pictures … we never guessed they produced so many."

For example, in family practice and pediatrics, physicians are taking photos of rashes, to send to dermatologists. Surgeons are also taking jpgs to document various conditions in their patients, as are geriatricians and social workers.

To ensure these photos are captured and archived, so they can be viewed by other clinicians, Cleveland Clinic is about to start encoding them. "There's great value in indexing photos," said Dr. Petersilge, explaining that when they're simply attached to a file in a department, they're only of use to a few clinicians and can be very difficult to find when needed. On the other hand, when they're archived, and associated with a patient, they can be easily accessed.

To start, the Cleveland Clinic will have a person in participating departments start indexing photos. "Photos will be DICOMized, and we'll wrap every object in DICOM," said Lou Lannum, director of enterprise imaging.

In time, said Dr. Petersilge, there will likely be a central indexing department. "Later, the process may even be automated," she said.

(For its part, Perceptive Software just released an app that works on smartphones and automates the tagging of photos with the appropriate patient information. Devised by PACSgear, a company recently acquired by Perceptive, the

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Montreal innovators create new form of medical videoconferencing

BY JERRY ZEIDENBERG

MONTREAL – A Canadian cardiologist/intensivist with entrepreneurial flair has launched Reacts, a company that offers high-powered videoconferencing at low prices, making it easier for medical professionals to collaborate.

The Reacts platform is said to bring the performance of expensive videoconferencing systems, which often require special equipment and dedicated rooms, to standard, off-the-shelf desktop computers, tablets and smartphones.

It's a solution that could very well shake up the telehealth sector – turning what was once a specialized art into an everyday tool that can be used by doctors, nurses, and patients alike.

Significantly, the system can handle multiple video streams with little loss of speed. Healthcare professionals can watch each other in conversation in one window on a computer screen, while viewing a patient's face in another, and zooming in on a problem, like a wound, in a third window.

"With Reacts, health professionals can teach, supervise and provide remote care as if they are right next to their patients, colleagues and other professionals," said Dr. Yanick Beaulieu, a cardiologist and intensive care specialist who works at Hôpital du Sacré-Coeur de Montréal and led the creation of Reacts. "My team and I call this hyperpresence."

The company has produced unique features that could be of great use to professionals in healthcare, like augmented reality and real-time image overlay. For example, a feature called 'chromakey' allows users to superimpose their own hand-gestures over the images or streams being viewed – much like the 'green-screen' effect used in television weather reports – showing exactly where to make an incision or how to treat a bed ulcer.

A surgeon, for example, could provide guidance to other physicians operating at a remote location; or an experienced nurse could offer help to a neophyte nurse providing wound care to a house-bound patient.

"Tertiary hospitals are often called for help by community hospitals, but these smaller hospitals don't have telemedicine rooms," said Dr. Beaulieu. "They end up texting and sending pictures on their smartphones, which isn't very effective and also isn't traceable."

Smaller hospitals that do have traditional telemedicine equipment are often hamstrung by the need to schedule the equipment beforehand. That's not much help in the case of fast-breaking medical emergencies or problems that require a quick answer.

What was really needed, said Dr. Beaulieu, were telehealth systems that were inexpensive and readily available – using everyday computer and telephone equipment. And of course, the systems had to be secure, given the sensitive nature of medical information.

"We created a very secure solution that costs only $84 a year for each user, runs on Windows devices in its full version and on Android and iOS devices in its "lite" version," said Dr. Beaulieu. He noted that Reacts makes use of the highest security standards, which are required for healthcare applications in Quebec and other provinces.

A relatively new language for web video called Web RTC is used in Reacts, which also helps boost operating speeds. To date, Reacts has been used in pilot projects by four major health systems in the province of Quebec – at McGill University Health Centre, the CHUM, CHUS and CHUQ.

It has also been trialed in New York, as well as hospitals in Europe. It is now being launched for general use across Canada, the United States and around the world.

Dr. Beaulieu started working on Reacts in 2012, and he now employs a team of 12 computer and communications experts. For his part, Dr. Beaulieu previously created two companies that produced systems used for teaching ultrasound skills. Both were sold to CAE Electronics, which specializes in aviation and medical simulation and training systems and now markets the solutions worldwide.

Reacts currently works in two versions – full and lite – on Windows computers and phones. The lite version is available on Android, and the Macintosh and iOS versions will come out in 2015.

Dr. Beaulieu leads a team of 12 computer and telecom experts.

Dr. Beaulieu notes Reacts includes integrated checklists and reports so that sessions can be documented and stored for later review and for teaching purposes. Users can also overlay three-dimensional objects on still or video images – another nice feature for instructors.

The system can display any type of image or live feed, including PACS and pathology images, echocardiograms, along with live video images.

In 2015, Reacts will add a drawing package, so that users can draw on top of images – an additional asset to instructors and students.

In the summer of 2014, Reacts was used at the Montreal Grand Prix. It wasn't a frivolous exercise – the tool helped medics provide care. In one instance, an accident occurred and patients were flown by helicopter to a nearby hospital. Reacts was used to provide video images and instruction right in the helicopter, with doctors at the hospital instructing the crew.

"The hospital could follow the patient in the helicopter through Reacts using a cellular connection," said Dr. Beaulieu. "It worked well."

He noted the system could be used by ambulances, as well, in the case of trauma or other situations. Doctors could remotely instruct paramedics, enabling advanced care to occur even before the patient reaches the hospital.

Currently, Reacts is a point-to-point solution. It can support numerous video feeds, along with file transfers, but only from one site to another. In 2015 the plan is to launch the multi-point version, where several sites can all communicate with each other. One might wonder about the performance of the system across Canada, since the servers are housed in data centres in Montreal. But Dr. Beaulieu observed that Reacts recently conducted tests with users in Hong Kong, with startling results. "There was virtually no latency," he commented.

Now, he said, healthcare groups in Morocco are set to begin using it, as well.

Despite who uses the system, no personal health data resides on the system – all information stays at the hospital, clinic or location in which it originated. Reacts is strictly the bridge that connects various users.

$50 million project combines medicine, supercomputing and analytics

ST. JOHN'S – Memorial University has announced the launch of a Translational and Personalized Medicine Initiative, a program that will benefit from $50 million in contributions from private and public sector partners.

IBM Canada is providing $30 million in computer hardware, software and staffing over the next five years, while the government of Canada will contribute nearly $13 million through the Canadian Institutes of Health Research ($10 million) and the Atlantic Canada Opportunities Agency ($3 million). The government of Newfoundland and Labrador is investing $7.2 million.

The effort will marry the university's strengths in high performance computing with its medical school, and in the process generate new medical knowledge that can be transferred to healthcare practitioners in Newfoundland and Labrador and abroad.

Dr. Randy Giffen, a medical doctor who transitioned to the study of analytics and predictive methodologies and joined IBM Canada to become a software architect, said the goal is to apply analytics to healthcare in three areas – genomics, operations management, and predictive technologies.

"In traditional medicine, we'll find new associations between genetics and illness. In the area of operations management, we're looking at how to improve scheduling and workload management.

"For example, in healthcare, there is a lot of interest in Lean. People want to know where the bottlenecks are and where the waste is.

"As well, we will bring more analytics into the day-to-day practice of medicine." Dr. Giffen explained that IBM Canada has done a great deal of work in predictive analytics in other industries, and has developed computer systems and dashboards that can detect and display problems in remote machines before they become serious.

While emphasizing that people are very different than machines, Dr. Giffen said that some of the expertise could certainly be transferred to create models of predictive behaviour and illness for humans.

As a very simple example, he noted that a WiFi weight scale can be used to track the onset of congestive heart failure in cardiac patients. "A simple scale can be quite predictive of a patient getting into trouble," he said. "Why not automate it and use it for alerting physicians?"

Researchers will have access to what is essentially a supercomputer, installed by IBM Canada.

In January, Dr. Giffen will start a new role as solution architect at the new Centre for Health Informatics and Analytics (CHIA) at Memorial University.

Researchers will have access to one of Atlantic Canada's fastest computing environments – essentially a supercomputer that has been installed by IBM Canada.

CHIA researchers, to start, will focus on issues such as colorectal cancer, long-term care and laboratory utilization, according to a news release.

The genomics effort will begin by looking at issues such as hearing loss, neurocognitive diseases, back pain, vision loss, colorectal cancer and breast cancer.

At a launch event for the Translational and Personalized Medicine Initiative last November, Ralph Chapman, IBM vice president, public sector, said the supercomputer that has been installed on the Memorial University campus will be an important tool for researchers.

Problem-solving that previously required months, using traditional computer systems and methodologies, can be achieved in a matter of minutes with the new equipment, Chapman said.

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Accelerating EHR adoption, Obama-style: how incentives can be used

BY ANDY SHAW

American President Barack Obama, author of the contentious restructuring of the U.S. healthcare system, has also fast-tracked American hospitals' electronic health record (EHR) adoption rate to breathtaking speed. He has been assisted in this task by Farzad Mostashari, MD.

Speaking in Toronto recently, Dr. Mostashari, an epidemiologist and public health expert, served five years in the Obama administration, ending up as the country's National Co-ordinator for Health IT before leaving in 2013.

During that tenure, he quarterbacked much of a 2009 federal stimulus package and its related Health Information Technology for Economic and Clinical Health (HITECH) Act that gave hospitals incentive payments to adopt "meaningful use" EHRs. The upshot: EHR adoption has rocketed up from less than one in 10 to now nearly half of all American hospitals.

Like Obama, Dr. Mostashari brought to his Washington post proven street smarts, in his case straight from the Big Apple.

"To give you context for what we did subsequently across the country with the EMR, I should begin with what we first did in New York City," the affably bow-tied Dr. Mostashari told his Toronto audience at the first Telus Health Talk in November.

"Our goal was to improve population health," explained Dr. Mostashari, who led a $60 million Primary Care Information Project at NYC's health department. "So we asked ourselves quite simply: How can we save the most lives?'And we reasoned that you can save the most lives if you can stop what kills the most people. We also knew, just as elsewhere, that heart disease is what kills the most people – my Dad had a heart attack, my grandma had a stroke. But do we need a great new cure from some pharma company to stop all those heart disease deaths? No. The fact is we already have treatments that can prevent many deaths – they are just not being used enough."

And those treatments to Dr. Mostashari are as simple as your ABCs, "For the A, we have aspirin. It is not very expensive, and more than half the people who should be on aspirin are not taking it.

For B, we have blood pressure control. One of the best medications for it, statins, costs pennies and yet more than half of people with high blood pressure don't take it. And C, care for you when you need to have help and want to quit smoking, which can triple your chances of not dying from heart disease."

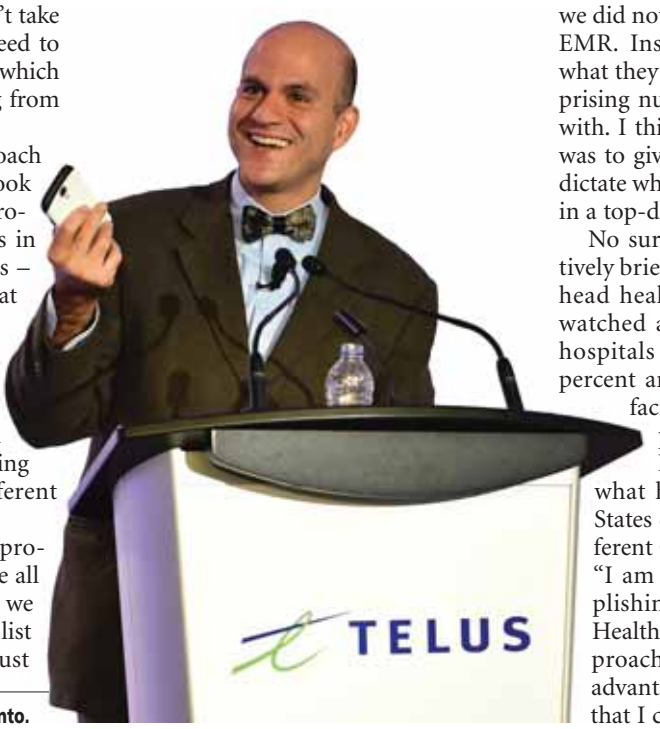
So it was this "public health" approach that Dr. Mostashari and his team took to successfully rolling out an EMR program to 1,500 doctors at 233 clinics in New York City's poorest health areas – to help them track who is taking what when and how they are doing.

"We simply wanted those doctors to be able to see, for example, how their patients are doing with their blood pressure control. The problem was that blood pressure data was being recorded in 185 places in 185 different ways.

"So we brought in a large data processing vendor to help us standardize all that," recalled Dr. Mostashari. "What we wanted to give the doctors was a full list of patients so they could see not just each, one by one, but how all their patients were doing, all at once."

The value of that "common denominator" health record approach was driven home most memorably, says Dr. Mostashari during a visit to a humble, two-room medical clinic in Brooklyn. "With one click, the administrator, at first to her utter disbelief, saw that barely 22 percent of the clinic's diabetes patients were being compliant with their meds."

Not long after, Dr. Mostashari heeded Obama's call to Washington, D.C., to do similar work with a much larger budget on a much larger scale. Among his duties, Dr. Mostashari oversaw a $800 million medical technical assistance program to help 140,000 American physicians in every state get on the EMR bandwagon, the largest such assistance program in US medical history.



Dr. Farzad Mostashari spoke recently in Toronto.

He also co-ordinated President Obama's complementary EHR incentive program that eventually enrolled 85 percent of eligible hospitals. In his spare time, Dr. Mostashari noodled out the answers to other record-keeping puzzles related to health information exchange, health IT workforces, medical researchers, and security mavens.

"We worked nationally through 62 outreach centres spread through every state and what we called their "geek squads", but we did not impose any centrally developed EMR. Instead we helped them develop what they had in place or with what a surprising number of vendors came forward with. I think the biggest thing we learned was to give them a helping hand, but not dictate what system they were going to use, in a top-down way."

No surprise then that during his relatively brief three-year stay as the country's head health IT honcho, Dr. Mostashari watched as EHR adoption by American hospitals shot up from 9 percent to 44 percent and adoption by outpatient care facilities rose from 17 percent to 40 percent.

But does Dr. Mostashari think what he accomplished in the United States can be applied to our oh-so-different Canadian healthcare system?

"I am aware of what you are accomplishing nationally through Canada Health Infoway (and its shared cost approach) but you don't have the same advantage of a $2 billion incentive fund that I could access."

Synapse network for doctors integrates with electronic medical records

BY JERRY ZEIDENBERG

BRAMPTON, ONT. – Synapse, a system that enables healthcare professionals to easily communicate with each other via Facebook-like technology, is currently being used by about 1,000 physicians across Ontario, plus another 3,000 nurses, pharmacists and allied healthcare professionals.

Those numbers have been steadily rising since the system was launched in 2012, and will likely get a boost in the months ahead, as the company developing Synapse is now integrating it with a variety of electronic medical record solutions.

At the moment, it integrates with Oscar, the 'open systems' EMR that was originally created by doctors and university researchers in Hamilton, Ont. Soon, it will also mesh with other popular EMRs in Canada, thanks to funding from Canada Health Infoway. The plan is to make use of ThoughtWire technology to build a seamless integration layer on top of other EMRs.

"It's a $1 million project, with a major contribution from Infoway," said Dr. Sanjeev Goel, the family physician in Brampton, Ont., who has been leading the effort. Dr. Goel employs a team of software engineers and programmers who created Synapse and are now refining it, and adding a suite of related programs.

As its foundation technology, Synapse makes use of Microsoft Yammer, a computerized communications system that has been called 'Facebook for business.' In addition to computers, it runs on iPhones and Android smartphones, enabling anywhere, anytime communication.

While there are other Facebook-like systems available for doctors in Canada and the United States, the comparative advantage held by Synapse is that it integrates with EMRs, while most others don't. That means physicians can not only communicate with each other, but they can also access and update their patient records, wherever they may be.

Doctors can make electronic referrals to specialists, and they can automatically inform patients about the status of the referral by email or text.

They can also send prescriptions directly to pharmacies, eliminating the problem of lost scripts.

An important new component is called iDash, a dashboard that provides doctors with a host of information and metrics about their patients and their own performance.

It can analyze charts, going back three years, to provide information about patients with diabetes, cancer, and other diseases. It can offer reminders to order tests for these patients – such as A1C screening, LDL and eye exams for those with diabetes, and Pap tests and breast exams for women. It then scores the doctor, showing him or her how well he or she is performing when it comes to ordering the suggested tests and exams.

There are other Facebook-like systems for doctors, but very few, if any, that integrate with EMRs.

Results are flagged with points and colours – red, yellow and green. "We're gamifying performance, to make it fun," said Dr. Goel. "But there are also financial incentives and rewards, as physicians receive bonuses [from the government] for reaching targets for various tests."

In the end, this leads to better care for patients, as they're receiving the screening and tests they need to detect problems as early as possible.

The scoring system is effective, said Dr. Goel, as many physicians aren't aware they need to do more screening.

"When you ask doctors, most will say they're providing excellent care," said Dr. Goel. "But if you knew the numbers, you might feel differently."

He noted that, "I thought I was doing fine with diabetic eye exams. It wasn't until I saw the numbers that I realized I needed improvement." The iDash enabled Dr. Goel to track his own performance, and to improve in certain areas.

He said iDash will soon be rolled out to an additional 200 sites in Ontario, as his company, Health Quality Innovation Collaborative (HQIC), recently became an authorized provider of the Oscar EMR. iDash is an add-on to Oscar, and physicians must pay a license fee. But Dr. Goel said most have been happy to do it, once they've tried using the system.

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Ontario's ehealth blueprint revealed: a conversation with Peter Bascom

Launched this past November, Ontario's ehealth blueprint is billed as the key to enabling a fully interoperable electronic health record (EHR) for all 13 million Ontarians – one that provides a lifetime record of a patient's health history and care. The blueprint enables healthcare IT experts to build standards-based, robust ehealth solutions that can securely share data, or integrate existing ones. So, what does it all mean and how will it impact healthcare? We caught up with Peter Bascom, eHealth Ontario's chief architect, to find out more.

CHT: In a nutshell – what is Ontario's ehealth blueprint?

Bascom: The blueprint describes the elements that make up Ontario's EHR. It paints a picture of the EHR's end-state. This is crucial as the job of building an interoperable EHR for the province is shared amongst government, government agencies, the healthcare sector at large and independent vendors. The blueprint clarifies roles and responsibilities and, as such, enables everyone involved in building components to make effective decisions along the way. Using the blueprint, developers will know how their segments will be able to recognize, share and process data with other systems across the province.

CHT: Who is it designed for?

Bascom: All the folks building or buying ehealth solutions for Ontario's EHR. These include ourselves, our delivery partners such as OntarioMD, University Health Network, The Ottawa Hospital, London Health Science, our stakeholders such as Ontario's Ministry of Health and Long-Term Care, the 14 local health integration networks, Ontario Telehealth Network, and Cancer Care Ontario to name a few. It's for information technology and data architects, healthcare providers, developers, vendors and the public – in short, multiple audiences.

CHT: What does the blueprint consist of?

Bascom: Three different views describing the future state of the EHR, which relate to each distinct stakeholder; a framework of the architectural principles and patterns, as seen through architectural modeling and schematic graphics; an introductory brochure; and in-depth document.

CHT: Why was it needed?

Bascom: In Ontario, the EHR is not being delivered by a single entity. When the various delivery partners go off to build their portions, they needed to be able to hook up in a consistent manner so their solutions can talk to each other.

CHT: What do you expect the blueprint's impact to be?

Bascom: The blueprint will help enormously in our continuing quest to develop a fully interoperable EHR. It will make developers' and IT experts' jobs easier. For example, one of the areas the blueprint describes is the standards needed to consume and provide data. Now there's a consistent way to access data using standards, which for the most part, follow international standards that are aligned with what is being done in other jurisdictions.

And because the blueprint provides a vision of the EHR's end-state, developers can see how to integrate their systems to take full advantage of Ontario's EHR.

Ultimately, automating healthcare information management translates to significant cost savings. It will also improve the patient experience through better coordinated care. As patients transition to different healthcare settings, their data will follow them, giving clinicians immediate, relevant information to make better and faster diagnoses, and reduce repeat tests.

CHT: Much of the blueprint is dedicated to three distinct views or models – how did you come up with these categories?

Bascom: The blueprint is based on standard architectural frameworks in addition to extensive stakeholder consultations. When we looked at all the folks involved in creating the EHR – we tailored it to their needs and arrived with three distinct views – business, information and systems views.

Peter Bascom of eHealth Ontario.

CHT: Who is the business view primarily for?

Bascom: It's largely for those involved in strategic planning and investment decisions – planners, providers, managers, architects, health custodians and funders. This view highlights the business services we offer to the health sector, so they can conduct more effective planning. It is not about technology.

CHT: What does the information view convey?

Bascom: The information view articulates what data needs to be captured as part of a patient's EHR. It defines each piece of information to support a common language between stakeholders, identifying what information about a patient is collected, included, and expected at different points in the healthcare system.

CHT: What is the key purpose of the systems view?

Bascom: The systems view describes various components that make up Ontario's EHR. It defines the applications, services and core infrastructure required to build and integrate ehealth solutions. And it shows how EHR resources and services are integrated and deployed, and how the blueprint is governed. Its purpose is to enable developers to create service-oriented solutions that can be repurposed and combined to meet larger business needs – solutions that won't be compromised as technologies evolve.

CHT: I've downloaded a copy of the blueprint, reviewed it, but I'm still not sure how my solution fits – what now?

Bascom: Reach out to my team anytime at architecture@ehealthontario.on.ca and we will arrange how best to support you.

CHT: So what's next?

Bascom: We are working on the connectivity strategy – which outlines how we get from the current state of Ontario's EHR to its future state. We are also finalizing our roadmap which describes when the blueprint's various components will be ready, and who is responsible for them. Stay tuned.

Ontario's recently published ehealth blueprint is a robust framework that informs electronic health record planning and delivery for the province. It contains new business and information views, and an elaborated systems view. It can be downloaded from eHealth Ontario's website – www.ehealthblueprint.com.

ALIO Health transforms homecare delivery via a portal solution

OTTAWA – Moving away from a manual process of using phone calls and faxes to assign patients to visiting nurses, ALIO Health Services has transformed home healthcare delivery with an online workflow management tool. The computerized system was developed to assign nurses faster, increase visibility into the status of patient visits, and improve post-care report quality.

For its part, Ottawa-based ALIO Health facilitates all aspects of Patient Support Programs and provides home healthcare services that include education and medication/injection/infusion support to patients in their homes.

With experience working for pharmaceutical companies through his contract research organization (CRO), ALIO Health Services' President Jeff Smith was approached by a client at a pharmaceutical company, asking if he'd consider entering the home healthcare field. Although this client had five other providers, they struggled with a number of issues, including the length of time it was taking to assign nurses, visibility into patient visit status and care, and the speed and accuracy of documentation about patient care.

"One pain point noted by this initial client was the need to have patients assigned to a nurse expeditiously, but it was often taking too long to assign a nurse," explains Smith. The pharmaceutical company's patient care support team would fax the requests into the home healthcare provider and then call them to verify if nurses were assigned and visits scheduled.

"The objective is to get the physician-prescribed product into the patient as fast as possible," says Smith. "Our client felt that if we were to apply our experience as a CRO, which is a highly documented and regulated business, to home healthcare, we could avoid some of the pitfalls they were seeing and address their pain points."

Jeff Smith

As Smith recalled, "The pharma client was finding it quite labour intensive going back and forth with their other home healthcare vendors trying to find out what is going on with these patients, and there are a lot of patients," noting for one product alone there are over 12,000 patient visits each year.

"I said to my team, if we are going to get involved in this business we not only need to address these pain points but we need our approach to be efficient and easy to use for everyone, including the nurses," says Smith. He added that with low margins, it is critical to control overhead. "I knew our approach would need to be efficient and controlled, so we didn't need to have a tremendous number of staff managing everything."

Without workflow management or automation, it would require a large number of staff to accomplish the job. "From the beginning," said Smith, "our concept was to develop software to manage the process, give the client visibility through a web-based portal to see what's going on, and reduce the amount of resources needed for us to run a program."

Smith started ALIO using the same manual processes as other home health providers, but his team applied their experience in data capture and forms development through his other CRO company, to streamline the entire home

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Congratulations to **Centre Hospitalier de L'university de Montreal** (CHUM) for treating its **1,000th** prostate patient with Low Dose Radiation (LDR) brachytherapy!

ELEKTA

Toronto-branded condoms win Infoway's social media challenge

BY DAVE WEBB

It's a small wonder of technology itself, able to help prevent unwanted pregnancies and stop the spread of virulent sexually transmitted diseases. But why is a condom winning awards on the digital front as well?

Okay, it's not the condom itself, but the social media campaign used to launch condomTO, a limited edition city-branded prophylactic. Toronto Public Health's project was named the winner of Canada Health Infoway's first Public Health Social Media Challenge.

Cheeky as the campaign may be, positive sexual behavior is a serious issue. TPH used social Facebook and Twitter to reach a younger target demographic, according to Lenore Bromley, manager of media relations and issues management with TPH.

"The condomTO campaign goal was to promote sex positive behaviour and reinvigorate condom use in Toronto," Bromley wrote in an e-mail interview. "Younger audiences were very active in response to condomTO on social media, and communicated many of our messages about sex positive behaviour."

That viral nature was one of the standards by which the judging panel measured the value of the competition entries, said Jennifer Zelmer, executive vice-president of Canada Health Infoway, with a mandate to maximize return on digital health efforts. The viral reach within the target audience, along with the effectiveness of the messaging, was what separated the winning entries from the rest.

There was a wide range of entries, "which is great, because there's such a wide range of public health issues," Zelmer said. "We had everything from campaigns focused on childhood immunization and childhood injury prevention, to campaigns that were focused on safe sex practices and even increasing blood donations."

There was also a broad range of social media channels used. "That was part of the richness of the challenge. It helped us to be able to understand how public health organizations were using social media, but also for teams to get ideas from each other," Zelmer said.

Infoway invited health organizations at all levels to use social media in their campaigns and join with Infoway in seeking expert advice. "We'd been talking with public health, local public health, sometimes folks working at the national level, many of whom were getting started with social media, but were looking to use social media more broadly as part of their public health campaigns. So we wanted to look at what opportunities we had to help them do that," Zelmer said

With social media as a platform for service delivery, how will it engage with the rest of the healthcare digital infrastructure, already somewhat muddied by conflicting standards? Dr. Chris Hobson, chief medical officer with healthcare integrator Orion Health, said that's not necessary – yet.

"This is such a new concept that providers and health systems are not yet able to properly understand what to do with the data," Hobson said. "There is a major obstacle to overcome around privacy, security and accurate identification of the person using the social media account before we can mix that type of content with the clinical record."

The proliferation of healthcare smart phone apps also raises challenges, but the solution lies in standards, Hobson said. "The new platforms also raise interoperability issues as there are so many devices and apps in the marketplace and no clear winner yet in terms of the standards that they will follow. Healthcare vendors need to have deep experience both working with standards and working with vendors that don't follow standards."

But some kind of integration of these new healthcare service delivery platforms will have to happen, Hobson said. "Medicine cannot simply stand on the sidelines and continue to insist on a face-to-face patient/doctor visit as the only way to do business."

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VIEWPOINT

Apps are cool, but apps alone don't make a patient engagement strategy

There is no one-size-fits-all modality for patient engagement.

BY JOSHUA LIU, MD

A few years ago, I had immersed myself in understanding the systemic problems we were facing in healthcare. As I was doing research on hospital readmissions and poor transitions of care, I was fascinated by the complexity of our system but concerned about the future. With rising population needs and limited resources, I began to believe that patient engagement would play a very important role in a value-based care delivery model.

The concept of patient engagement is a powerful one: empowering patients with the drive, knowledge and tools to manage their own health should lead to improved patient satisfaction, better outcomes and lower costs.

The emergence of mobile applications ("apps") is what first got me excited about the potential that technology could have on driving patient engagement. Smartphones and tablets, and the ability to stay connected via the Internet, created an unprecedented opportunity to make scalable patient engagement a reality.

My excitement about mobile technology and healthcare caused me to make the leap from physician to tech entrepreneur. So when we started our venture, we placed a very strong focus on building a mobile app-based platform for patient engagement.

Certainly, the impact on patient care has been phenomenal, and it's been incredible to see patients actively using our mobile platform to receive electronic reminders, access interactive education and self-monitor for post-discharge complications. And I remain convinced that mobile platforms will continue to play an important role in healthcare.

However, as there is often no 'one size fits all' intervention for many diseases, I have come to learn there is similarly no one size fits all modality for patient engagement.

> **Patients want to be engaged with the technology platforms they are familiar with — phones, tablets or desktops.**

Don't get me wrong - patients want to be engaged with technology. But, patients want to be engaged with the technology platforms they are familiar with.

So while I love the enthusiasm of providers itching to give every patient an app, I also caution them to not let their excitement for apps cloud the importance of accessibility.

If you serve a young adult population, perhaps you can safely build a patient engagement strategy centered completely on an app. Then again, this could change if you care for a less affluent population.

Or consider that as you start caring for middle-aged to senior patients, you should expect a greater variety of preferences. Of course, some patients (including seniors) will still want an app. But others will prefer to be engaged via web-based applications, text messages or automated phone calls.

As we came to this stark realization that accessibility drives engagement, we made patient accessibility one of our core design principles. Today, our venture takes delight in helping providers engage patients using a variety of modalities, no matter their access to technology.

Our providers receive as much positive feedback from 70 year-olds who can only receive text-message reminders as 30 year-olds who can access more comprehensive, interactive experiences on their smartphones. I truly believe this is the impact all organizations should aspire to when using technology for patient engagement.

At the end of the day, we all want to build models of care that are cost-effective, scalable and positively impact health outcomes. Technology can certainly help, but only if you focus your patient engagement strategy on patient accessibility. Get that right, and the health outcomes will follow.

Joshua Liu is a physician turned entrepreneur and co-founder of SeamlessMD, which provides a mobile and web platform to engage, monitor and care for patients across surgical episodes of care. Dr. Liu has been named a Forbes 30 Under 30 in Healthcare and received the Eric Fonberg MD Award for Health Systems Leadership. He blogs at http://www.joshualiu.ca.

REBOOTING eHEALTH

Tacit knowledge to explicit information: The secret to success?

BY DOMINIC COVVEY

Nose grease and ear smear lubricate the advancement of science!

There was an interesting story in the October 2014 issue of Nature Magazine. Scientists have been trying to create extremely high quality sapphire crystals. These crystals are crucially important, being used in gravitational wave detectors that require extremely high purity crystal mirrors.

Russian scientists lapped Western scientists by coming up with crystals that were (embarrassingly) many times more pure than the West's. Despite multiple attempts, Western scientists were unable to match the results of their Russian counterparts. The Russian scientists had published articles explaining their methodologies, but, even by carefully following the published procedures, no joy!

It turns out that growing these crystals requires sapphire seeds to be suspended on fine fibers. These fibers had to be greased, according to the articles, with a fatty film. However, the articles didn't explicitly state the source of this grease. Luckily, Western scientists visited the Russian researchers and, in passing, noted that a Russian scientist ran the supporting thread over the bridge of his nose or behind his ear, giving it an extremely fine coating of oil. When the Western scientists used this human flossing technique with the right human (!), they achieved similar results to the Russians.

This strange procedure of how to grease a fiber is an example of tacit knowledge. As you can see, that knowledge made all the difference in the achievement of the desired outcome.

In the field of eHealth, we have complicated procedures with myriad variations that include project management, team management, evaluation, usability assessment, procurement and approaches to technology adoption.

Some groups undertake these with dramatic success, creating exemplars, models of excellent work. But, others, following the books and other publications as well as the personal descriptions shared by these exemplars, run up against problems and cannot achieve the same, top echelon results. Could it be that a great deal of the knowledge needed to be successful in this domain is, in fact, tacit knowledge – knowledge that isn't explicitly stated and shared?

Dominic Covvey

We all know of individuals who have done landmark work. We sometimes read stories about them in this magazine. We also know of many who try to follow the example of these leaders, but can't pull off the magic of success. Perhaps we should wonder if, out there, there is a ghost world of unexpressed but critically important knowledge, methods, approaches and even tricks that, shared, could provide the rest of us with a leg up towards the achievement of excellence in our work.

Having known, and in a number of cases having been able to work with some of these individuals, I assert that they do have and they apply something special. Often, they also have a great deal of difficulty expressing what that special something is.

Sometimes it is their ability to engage, listen and be perceived as listening. Sometimes it is their ability to manage stress and remain calm in political or fiscal storms. Sometimes it is their ability to pause and to sit

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CCAC improves communications and collaboration using Sharepoint

For years, the Toronto Central Community Care Access Centre (CCAC) had been communicating through a conventional intranet, but the system had clearly become dated and did not provide the functionality required for a large and growing employee base.

With 534 employees on the roster in 2012, the CCAC needed a reliable, easy-to-use method of communicating and collaborating across the organization. Due to the remote nature of much of the workforce at the Toronto Central CCAC, there needed to be a unifying option for both information-sharing and engagement.

"Half of our employees were not in the office every day," said Kateryna Kramchenkova, IT application specialist at Toronto Central CCAC. "We needed an option that provided connectivity, ease-of-use and remote access. We also required a tool that facilitated information sharing through an intuitive and simple interface."

"Considering all factors, it was clear that a new form of internal communications was needed," said David Barnes, associate director, business excellence at Navantis. "Working with the CCAC, we were able to quickly determine the challenges the organization was experiencing and offer solutions that would allow them to experience a more seamless and interactive user experience."

After assessing the factors related to the CCAC's organizational and technological needs, Navantis and CCAC chose SharePoint 2013 as the solution. The decision to implement this technology was based on a number of factors, including SharePoint's ability to facilitate an integrated, collaborative platform for staff to work on projects and share information, with a high level of security and privacy.

SharePoint is a web-based platform developed by Microsoft. First launched in 2001, SharePoint integrates intranet, content management, and document management, but recent versions have broader capabilities.

By default, SharePoint has a Microsoft Office-like interface, and it is closely integrated with the Office suite. The web tools are intended for non-technical users. SharePoint can provide intranet portals, document and file management, collaboration, social networks, extranets, websites, enterprise search, and business intelligence. It also has system integration, process integration, and workflow automation capabilities.

The process of full integration of the SharePoint framework took two years from start to finish. This was due to the many phases of testing and review that were required to assure that the system would run smoothly and efficiently.

The CCAC's back-end systems are supported by the University Health Network's Shared Information Management Services (SIMS), so the two-year process included a joint effort between SIMS, Navantis and Naked Design, a design firm that customized the front-end of the intranet. The collaboration between SIMS, CCAC and Navantis involved project management, testing, UI, UX, programming, quality control and bug fixes.

The Toronto Central CCAC's decision to move forward with the SharePoint 2013 implementation was made with the express purpose that no future upgrade would be required, as it would have been had the organization installed the already-available 2010 version. Since the rollout went "live," the CCAC has seen a considerable uptake in use of the tool by employees. As the front-end face of the company intranet, SharePoint allows users to not only view and share information, but to store, access, and actively engage with colleagues on a variety of projects.

With a simple, intuitive and easy-to-use format, it encourages individuals and teams to collaborate to make their respective jobs easier. Examples of this include a more streamlined workflow and e-forms functionality that has cut down on paper forms and improved administrative efficiency.

VIEWPOINT

How to get things right using an EMR: a checklist for healthcare

BY CLAYTON L. REYNOLDS, MD

"Medicine, with its dazzling successes but also frequent failures, therefore poses a significant challenge. What do you do when expertise is not enough? What do you do when even the super-specialists fail? We've begun to see an answer, but it has come from an unexpected source – one that has nothing to do with medicine at all … It is a checklist."

– Dr. Atul Gawande

According to Dr. Gawande, an American physician and author, the aviation industry was the first to systematically use the checklist. But the author notes that checklists of sorts have already been used in the healthcare industry (albeit when healthcare was called the practice of medicine and before it was considered an industry.)

Back in 1905, Dr. Nicolai Korotkoff used the stethoscope and an inflatable sleeve to measure blood pressure. That vital sign, combined with the patient's pulse, temperature and rate of respiration, became the focal point of evaluation of a patient's overall clinical status.

The vital signs became such an integral part of clinical evaluation that most of us physicians didn't think of them as a "checklist" until Gawande systematized our thinking.

In his 2009 book, The Checklist Manifesto, Dr. Gawande defined two types of checklists. With the first type, DO-CONFIRM, the users perform their duties by memory and experience. If they are part of a team, they can perform their duties separately. At some point they pause and run the checklist, to ensure that they had done all that had to be done for the task or process at hand.

With the second type, READ-DO, the users read the checklist item and then perform their tasks. It's as if the checklist were a recipe.

Gawande's penultimate chapter ended with an exhortation to use the checklist tool in healthcare, because "it's time to try something else" other than "working harder and harder to catch the problems and clean up after them."

The theory of the 3 Rs and the electronic health record: The checklist manifesto is similar to two ideas that are already in healthcare and which overlap with Gawande's thesis. One of these is the theory of the 3 Rs of healthcare quality and the other is the use of the concept processor as the semantic engine in an electronic health record – a system used in the Praxis EMR (www.praxisemr.com).

The concept processor can in fact be seen as holding a collection of checklists, although I had not used the term "checklist" in this context prior to reading Gawande's book.

The theory of the 3Rs in healthcare is related to Gawande's checklist thus: The theory states that a Reminder (of what a provider should do in a particular type of case or clinical situation) is the same as what should appear in the medical record (the SOAP note) and both of these are the same as the Review (which can be done by the provider or carried out by the clinic's medical director or performed by an outside agency).

The Reminder can be in the form of a checklist and, by virtue of the nature of the concept processor, the healthcare practitioner is reminded what elements are included in management of specific cases (the assessment), in real time.

Although the theory was conceived in 1999 (toward the end of the era of the paper-based medical record), I had already been working with the concept processor for seven years and I knew that eventually it would be possible to bring the theory to life via the electronic health record, using the concept processor. The Reminder is a checklist whose elements are in the SOAP note (Subjective, Objective, Assessment and Plan).

When we consider that the concept processor is centered around the familiar SOAP system of Progress Note generation, and that each section of the SOAP Note can be "pre-programmed" to contain information specific to the Assessment, Gawande's checklist is seen to be embedded in all of these sections of the SOAP note as Assessment-specific SOAP Note elements, which are equivalent to checklist items.

With the concept processor, there is no need to limit the number of items to be checked. One simply enters the number of items related to the appropriate portion of the SOAP note. The "checklists" can be entered by the practitioner during day-to-day work or they can be imported from another Praxis user's knowledge base via the Knowledge Exchanger.

Let's look at a concrete example of the use of the concept processor in handling what has become a fairly common case: the adrenal incidentaloma. Let's further assume that it is a single, unilateral mass, found by CT scan while investigating another problem. The imaging report (which by definition revealed the presence of the tumor) will have provided the initial data, which becomes the first sentence of the Subjective portion of the SOAP note.

Subjective: this patient underwent a CT scan which revealed a single [2 cm] mass in the [left right] adrenal gland.

Adrenal tumors (whether incidental or symptomatic) can be primary or secondary (metastatic), and if primary they can be benign or malignant and, whether benign or malignant, they can functioning or non-functioning.

In reference to the possibility of metastatic disease, the Subjective note can be expanded thus:

Subjective: this patient underwent a CT scan which revealed a single [2 cm] mass in the [left right] adrenal gland. The patient has no history of cancer of the lung, gastrointestinal tract, kidney or breast and no history of lymphoma.

Because adrenal tumors can overproduce their normal hormones, the Subjective note can be further expanded:

Subjective: this patient underwent a CT scan which revealed a single [2 cm] mass in the [left right] adrenal gland. The patient has no history of cancer of the lung, gastrointestinal tract, kidney or breast and no history of lymphoma. There is no history of hypertension, diabetes or hypokalemia (to indicate Cushing syndrome of hypercortisolism or Conn syndrome of hyperaldosteronism) and no history of sweating episodes, headache and palpitations (to indicate the presence of pheochromocytoma).

If the patient is female, the Subjective note can continue:

Subjective: this patient underwent an imaging procedure [CT scan] which revealed a single [2 cm] mass in the [left right] adrenal gland. The patient has no history of cancer of the lung, gastrointestinal tract, kidney or breast and no history of lymphoma.

There is no history of hypertension, diabetes or hypokalemia (to indicate Cushing syndrome of hypercortisolism or Conn syndrome of hyperaldosteronism) and no history of sweating episodes, headache and palpitations (to indicate the presence of pheochromocytoma).

Checklists enable us to work smarter, instead of harder, to catch problems in healthcare and improve quality.

There is no history of hirsutism or other signs of masculinization (to indicate excessive testosterone production).

The nature of the concept processor is such that, with very little effort, a separate case can be constructed for adult females as distinct from adult males, so that the reference to hirsutism does not appear in the SOAP note for adult males. And of course, separate cases can be constructed for female children and male children.

The Objective section will contain general examination elements and the physical examination findings that are usually present in patients with Cushing syndrome, Conn syndrome and pheochromocytoma. It too acts as a checklist, reminding the practitioner that certain physical examination features are associated with these disorders.

The examination can be extremely detailed, with features included from textbook and other sources. The practitioner reads the Objective text just prior to examining the patient and then performs the physical examination. This follows the dictum of "doing what you wrote rather than writing what you did."

In female patients this will include mention of the presence or absence of hirsutism and other features of masculinization. Creating a separate case for adult females, and selecting that case as appropriate, speeds the process of creating the SOAP Note for Adrenal incidentaloma, initial visit based on the sex of the patient.

The Plan section is where the checklist function of the concept processor has an additional, major impact not only on quality of care but also on efficiency of office operation.

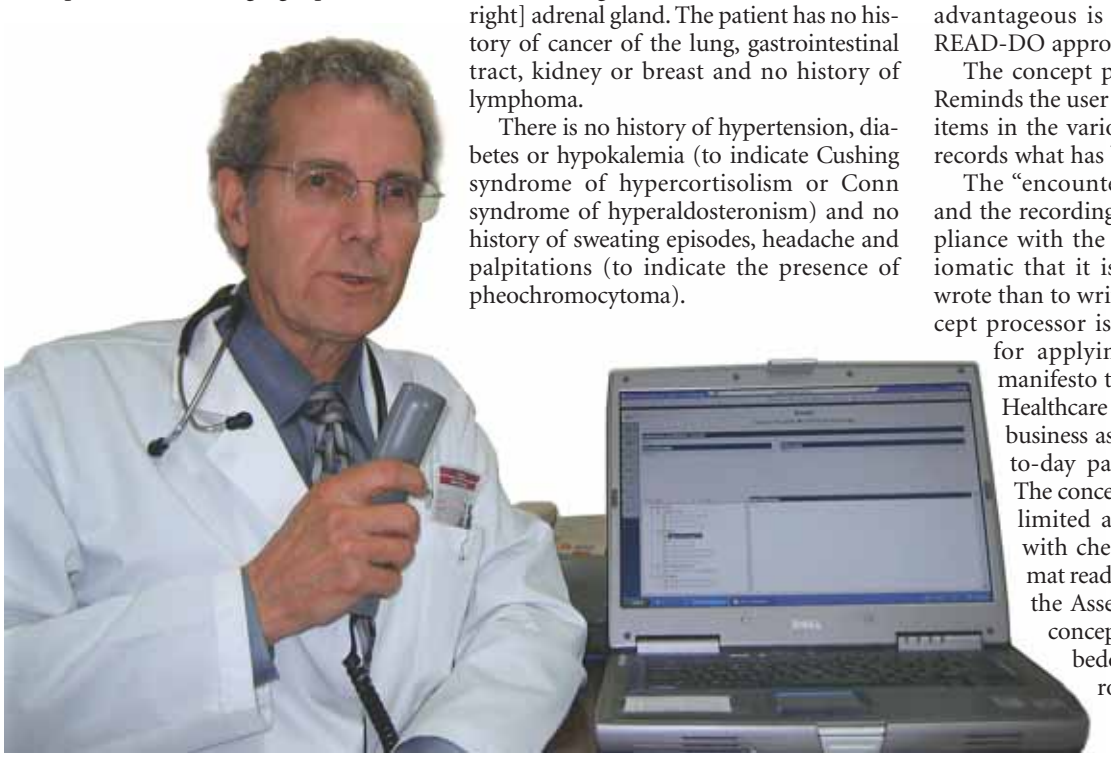
The majority of the time, the healthcare provider using the concept processor will use the READ-DO method. During medical encounters it works better than the DO-CONFIRM method, which is the traditional method of managing the encounter and its recording within the patient chart.

The more complex the case, the more advantageous is the concept processor's READ-DO approach.

The concept processor simultaneously Reminds the user of what to do (follow the items in the various SOAP elements) and records what has been done.

The "encounter" is both the checklist and the recording device that shows compliance with the checklist. Since it is axiomatic that it is easier to do what you wrote than to write what you did, the concept processor is an efficient technology for applying Gawande's Checklist manifesto to clinical practice.

Healthcare is complex not only in its business aspects, but also in its day-to-day patient encounter aspects. The concept processor can hold unlimited amounts of information, with checklists in structured format readily available for use within the Assessment of any case. The concept processor, with its embedded checklists, thus makes routine the reliable management of complexity in health care.



Clayton L Reynolds, MD, is an endocrinologist in Victoria, BC. He is also an EMR content developer, and is a former Chief Physician in the Los Angeles County Health Department. He can be reached at: reynoldsclayton@msn.com

Technology is changing, the human body is not – how do we stay healthy?

BY DEBORAH GOODWIN

Everywhere we look we see advances in technology, including in the healthcare work environment. With this technology comes increased work time spent using keyboards, mice and monitors, along with a wide variety of other interfaces.

• What is the impact of this increasing technology on our health?

• How can we design the technology and work environment to better support worker well-being?

The standard computer (i.e. CPU, monitor, keyboard, mouse and printer) has become a common part of our healthcare workplace. Computers are used to help triage and register patients in emergency departments, document physicians' orders and lab results for inpatients, monitor supplies inventories for our kitchens and warehouses, manage all the business functions including payroll and finance, and so much more.

Approximately 70-80 percent of healthcare workers must now use a computer on a daily basis. Remarkable when you consider computers were only significantly introduced in the 1980s.

Physically a computer typically requires a worker to:

• Sit or stand in a stationary position for an extended period of time

• Use repetitive fine motor movements of the fingers, hands and wrists to use the keyboard and mouse

• Angle and twist the head and neck to direct the eye line to one or more monitors, as well as documents

Common symptoms and injuries that are associated with these static postures, fine repetitive movements, and awkward postures include:

• Back and neck pain, including muscle strain and disc herniation

• Repetitive strain injury, including tendonitis and carpal tunnel syndrome

• Headaches from eyestrain and neck/shoulder muscle strain

In healthcare, approximately two-thirds of work related injuries are sprains and strains. While about half of these are attributed to patient handling activities, the impact of computerization on the healthcare workforce is also being detected in these statistics.

The variable healthcare workplace also means that computers are not just on desks in a traditional office setting. They are on mobile carts, wall-mounted arms in patient rooms, services columns and booms in operating rooms, and in multi-user nursing stations.

Healthcare also consists of a highly diverse workforce spanning 18-70 years of age, with statures (height) typically accounted for in design ranging from a 5th percentile female (152.8cm/60.2") to a 95th percentile male (186.7cm/73.5").

So how can we design technology and the work environment to better support worker well-being? Our best solution is through the application of ergonomics.

Ergonomics is concerned with interactions among humans and other elements of a system (e.g. the tools, equipment, products, tasks, organization, technology, and environment) with the goal of optimizing human well-being and overall system performance (per the Association of Canadian Ergonomists).

With regard to computers we typically see diagrams of the recommended setup for a seated workstation, with the user sitting upright supported by a good chair, hips and knees and elbows all bent at 90-degrees, and the monitor and keyboard and mouse located directly in front for easy reach and viewing.

This is a good reference position for our bodies. However in practice the best posture is the next posture. Our bodies do have preferred neutral positions for each joint, but we are also designed to utilize movement, be dynamic, to encourage blood circulation and vary the muscles being used throughout each day. To truly de-

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Radiology departments pressured to deliver quality results with declining budgets

DI chiefs are deploying new IT tools to run leaner, more efficient departments.

BY DIANNE DANIEL

Simply put, diagnostic imaging (DI) is about obtaining a clear picture of a patient's condition in order to arrive at a diagnosis and treatment plan. And in many ways, the same approach is helping DI departments across the country as they cope with funding cutbacks in the face of higher patient volumes, aging equipment and the constant pressure to improve performance levels.

In this case, the 'diagnostic tools' include IT enablers like decision support systems and lean methodology, while 'treatment plans' include centralized booking, regional collaboration, standardization and managed equipment service contracts.

"Everybody understands that money is limited, that we have to do the best with what we have," says Dr. David Koff, chief of Diagnostic Imaging at Hamilton Health Sciences (HHS), in Hamilton, Ont. "We have to rationalize and look at new models."

In Ontario, base funding for healthcare has remained flat for several years. Diagnostic imaging, like other clinical programs and services offered by HHS, is actually seeing budget cuts of about 2 to 3 percent each year.

"Radiologists understand the changing landscape," says Dr. Koff. "We have to adjust and adapt. There's no choice; we cannot go back and we all understand that."

Smarter use of limited resources is part of Ontario's Health System Funding Reform, announced in January 2012. Funding will be tied to sustainability and accountability, and that means being able to demonstrate that you're using those dollars in effective, efficient and financially responsible ways, explains David Wormald, integrated assistant vice-president of Diagnostic Services and the Medical Diagnostic Unit at HHS.

As funding decreases, HHS is aiming to "re-imagine, re-invent and re-deploy" DI resources in a manner that improves care delivery and ultimately results in positive patient outcomes, all while reducing the per capita cost of healthcare.

In his integrated role – which includes responsibility for seven HHS sites and three St. Joseph Healthcare sites, as well as referrals from the Hamilton-Niagara-Haldimand-Brant and Waterloo-Wellington Local Health Integration Networks (LHINs) – Wormald views imaging as a value chain made up of several components.

And he is applying several tools to identify areas for improvement within each.

Lean methodology, a quality improvement process that has its roots in manufacturing, is used to give HHS valuable insight into performance metrics; that insight is then used to inform decisions.

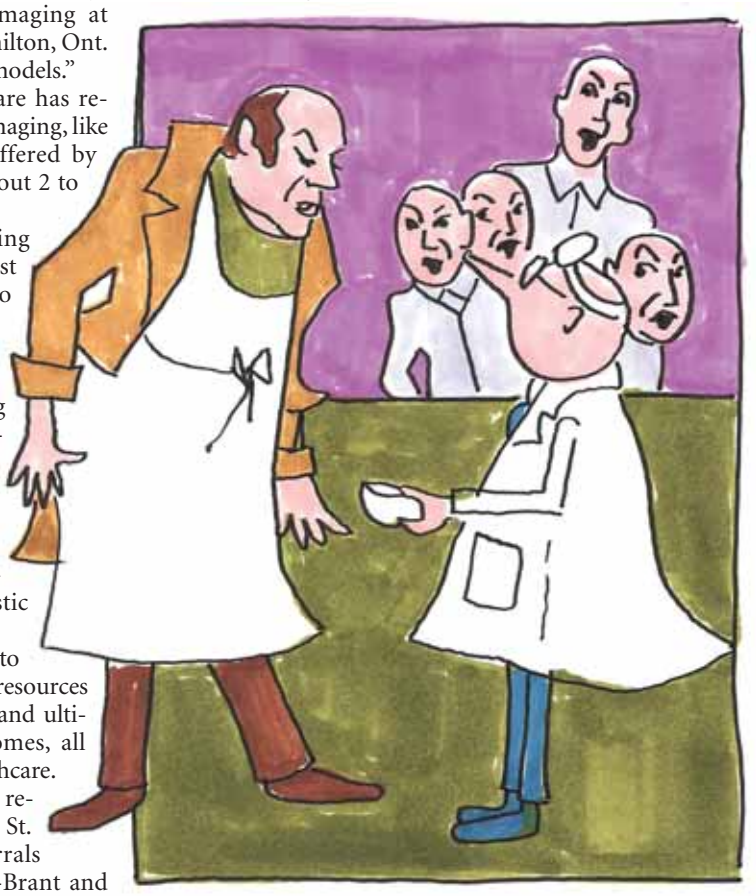
For example, information gleaned from decision support and analytical software is used to present key performance indicators (like MRI wait times) in a way that is clearly linked back to goals and objectives. This enables managers, senior technologists and front line workers to see the information at a glance and use it to predict short-term resource requirements, take corrective action to problems, or propose longer term solutions.

"It's iterative," explains Wormald. "It's a pursuit of perfection that we strive for using the information we get from these dashboards that we share through the team."

Another tactic is to streamline back office functions. Products are now standardized across the city, and everyone has access to the same digital image repository. Central booking offices have been created to ensure the appropriate test is being requested for the right patient at the right time and place, and with the right interpretation (report) going out.

HHS is also taking a bold approach to control equipment costs by introducing a managed equipment service partnership that includes purchase, maintenance and training. Wormald calls it a paradigm shift because it takes what is normally viewed as transactional procurement and makes it transformational.

Under its new multi-vendor service contract, HHS has a single source provider to support all equipment. Not only does the contract enable HHS to ensure it is procuring the most appropriate technology at the best price, but it also allows for better replacement planning and includes educational support for radiologists who use the equipment. As a strategic partner, the provider is also helping to introduce transformative change in the way HHS delivers services.



"We keep talking about transformation as a buzzword, but from a DI perspective, we know it is really needed to ensure the sustainability of our healthcare system," says Wormald. "We know health system funding reform is going to continue on this trajectory for the next four to five years, so we need to be committed to innovation."

A similar situation is occurring in Saskatoon, where DI budgets are not keeping pace with inflation, population growth and other demographic changes, says Dr. Paul Babyn, head of Medical Imaging for the Saskatoon Health Region. The provincial funding model is slightly different from Ontario in that some modalities are funded per case, based on provincially discussed and agreed upon targets. Targets have increased in some areas, but overall funding is flat, he says.

Which is why Saskatchewan is also deploying lean methodologies through a partnership with John Black and Associates LLC. Dr. Babyn has received certification in lean initiatives and is embracing his new role as a "lean leader." It's still early days, but through value-stream mapping and rapid process improvement workshops, the region is identifying "waste" in its system and making improvements.

"You can't keep doing more with the same processes. It just won't work and it's not funded," says Dr. Babyn. "Sometimes it's like a model of balloon animals – one thing squeezes out as another part is addressed – but lean is giving us the tools we need to move forward."

Similar to efforts in place in Hamilton, Saskatoon Health Region has looked at ways to eliminate duplication. The entire province uses the same picture archiving and communication system (PACS) and radiology information system, and is moving towards a completely integrated DI solution, similar to Manitoba or Alberta.

Equipment procurement remains a challenge. Ongoing support from hospital foundations and donors makes it possible to obtain new equipment, but ripple effects often occur due to the overall aging infrastructure. "You often have knock-on effects that occur within your heating and cooling systems and electrical supply, and that can add additional costs," Dr. Babyn explains.

The current priority is to replace aging angiographic interventional equipment that is eight years old and heavily used. When it goes down, there isn't a backup, so the need is highly visible, says Dr. Babyn. In general, a "fair bit" of infrastructure and radiography equipment is well within replacement age.

"We would welcome it if there were government dollars available for that," he notes. "Definitely we're getting close to needed replacement in some of the other modalities like CT, as well."

Dr. David Barnes, chief of DI at Capital District Health Authority in Halifax agrees another round of investment capital from the federal government is needed, similar to 2003 when the budget included diagnostic/medical equipment as one of the health initiatives to be supported by an influx of $5.5 billion over five years.

According to Dr. Barnes, the capital equipment funding deficit will come to a crisis point in the next few years. DI departments will need to be more creative in how they purchase equipment, he says, including options such as leasing and/or managed equipment and service contracts like HHS is doing. "We need to be allowed to be innovative," he says.

For as long as Dr. Barnes has held an administrative position at Capital District Health Authority, DI budgets have been tight. Meanwhile, patient volumes are moderately increasing. The authority's most pressing problem is wait times for elective MRIs. Ac-

ILLUSTRATION: LINDA WEISS

cording to the government wait times website in January, nine out of 10 patients are waiting between nine and 28 months.

Strategies for improvement include: ensuring appropriateness of studies in the first place by screening requests and educating referring physicians; sending city-based patients to outlying districts to have their MRI performed so that resources are used more effectively; hiring additional technologists so that service delivery hours can be increased; adding equipment; and, prioritizing to ensure the "sickest patients" come first. Centralized booking is also having a major impact for ultrasound and CT exams.

In terms of acquiring new equipment, ultrasound is a top priority as many units are well past their expected useful life. Three CT units and a number of radiography units also require replacement.

"There is a process at our hospital and through the provincial department, but the funds available are well below what is required," says Dr. Barnes, noting that there is an emergency pathway to replace critical equipment that fails. "Foundations are essential and certainly we would not be able to advance the department without their contributions."

From his vantage point in Saskatchewan, Dr. Babyn calls it the new reality. "If you have a static budget, the only thing you can try to do to maintain appropriate services is to cut out what you may be wasting – either in people's time or in supplies or having excess inventory," he says. "You have to make that your first priority, to remove that, so you can provide more value for the patient's dollars."

HHS embarked on its own lean journey back in 2004. Beyond finding ways to eliminate waste and improve processes, it also uses lean tools to enhance the patient experience. Analytics were instrumental in helping to design and plan a future-proof DI facility at one of St. Joseph's three sites, for example.

The lean exercise identified ways to use space effectively to ensure a positive experience as patients move through admission to testing. Considerations like positive distraction and lighting features were incorporated, and ensuring staff are engaged and committed to service excellence.

"You're scanning the horizon, looking for best practices and they may not be evident at first," says Wormald, explaining how the DI department has had to shift its thinking to consider what can be learned from other industries and sectors. "You need to be able to think about how those practices might be applicable to our environment; how we might morph them to create something different than what we currently have."

Looking forward, as HHS proceeds with its continuous process improvement methodology, the patient experience is expected to improve in spite of financial constraint. The department is constantly evaluating the way it operates to ensure a high quality of care and an important piece of that is meeting consumer expectations.

Today's consumers are asking more questions, says Wormald, and 'people skills' are needed to address these concerns. And as healthcare delivery shifts from being hospital-based to community-based, there is a greater to connect patient information systems to guarantee quality of care. The patient experience is often very fragmented and siloed as they transfer between facilities and services, and that's no longer good enough, he says. Instead, care needs to be co-ordinated and seamless.

One demonstration project being considered at HHS is the ability to give patients access to a web portal to book their own DI tests, with the option to go to the first available appointment. Patients are demanding the best possible experience; nothing less than that is acceptable, he says.

"We've been using IT enablers, creating accountability and understanding, and making sure we've got up to date, clean data – the right information that we translate into knowledge and then use in our decision making," says Wormald. "It's clear to me, and I think others, that we need to use that information to identify and implement new efficiencies on a continuous, ongoing basis."

"What we're really doing is moving from quality to more quality," says Dr. Koff. "We have no other duty than to be innovative and transformative. That's the game changer that is going to help us to move forward."

Companies introduce impressive technologies for digital imaging at RSNA

CHICAGO – Over 28,000 medical professionals from the United States, Canada and around the world flocked to the Radiological Society of North America's 100th annual meeting at the end of 2014, seeking updates on the latest imaging techniques and technologies. Many innovations were found on the show floor, where vendors showcased their work in CT, MR, PET, dose reduction, vendor neutral archives, zero footprint viewers, and more. Here are just some of the latest developments:

TOSHIBA demonstrated the tight integration of its Infinix C-arm, typically used in Interventional Radiology, with a CT scanner to produce the Infinix 4D CT – a system that enables clinicians to achieve faster, safer and more accurate interventions. With this innovative combination, healthcare providers can plan, treat and verify in a single clinical setting for better patient care – rather than transferring patients between departments, risking infection and dragging out procedure times.

The system improves workflow with its Sure Guidance technology (pending Health Canada clearance) that allows for seamless and automatic transition between modalities – the CT slides back and forth over the table, so the patient doesn't have to be moved. And, it is capable of saving hours by allowing clinicians to perform CT and interventional procedures within the same room and verify treatment success immediately after procedures.

Toshiba says the Infinix 4D CT improves workflow of IR, oncology and cardiac procedures, providing interventionalists with CT images of targeted organs and producing more precise views of areas to be treated and device placements. Clinicians can also adjust the procedure with real-time studies instead of relying on CT images taken at an earlier time.

Currently the solution is FDA cleared with the Infinix Elite and Aquilion ONE ViSION Edition configuration, and is pending Health Canada clearance.

Toshiba displayed a new CT detector technology that will be incorporated into all of its CT machines going forward. Called the PureVision detector, the new technology converts X-ray energy much more effectively, producing sharper images than ever before. The company also showed the industry's largest bore CT, with an opening of 90 cm, designed to accommodate large patients.

PHILIPS had many innovations to showcase at its booth, including its new DoseWise Portal – said to be the industry's first integrated radiation dose management solution for patients and clinicians. According to Philips, DoseWise Portal is a cloud-based, vendor agnostic, turnkey software radiation management solution that allows clinicians and administrators to gain an understanding of radiation use in the form of tailored reports, alerts and advanced analytics.

Computer tomography (CT) scans are of most concern, with a higher average diagnostic radiation dose per scan and nearly 68 million performed annually in the U.S. "Dose management is a critical issue, and the reality is that sometimes the higher radiation dose of a CT is necessary for a particular patient in order to reach a definitive diagnosis, in the shortest time, and at the lowest cost," said Gene Saragnese, executive vice president and CEO of Philips Imaging Systems. Philips is also targeting radiation dose from general X-ray, fluoroscopy, mammography, and nuclear medicine.

Not only does DoseWise Portal track the dose of patients, but it also offers real-time information about the radiation being absorbed by clinicians and staff. It's done through the use of badge-like sensors, which are integrated into the system and report exposure levels after each procedure.

Philips also launched its IntelliSpace Portal 7.0 at RSNA 2014. The system is said to offer radiologists a more integrated view of each patient moving along the health continuum and the ability to create faster pathways to definitive diagnosis for referring physicians.

"Diagnosing a patient can often take multiple scans – from MRI to X-ray to CT – and requires a collaborative review of imaging results and surrounding data including clinical notes, EMR data and more," said Jeroen Tas, CEO, Healthcare Informatics Solutions and Services, Philips. "IntelliSpace Portal 7.0 is a critical solution connected to the Philips HealthSuite Digital Platform, integrating data from multiple imaging systems, enabling radiologists to put their patients on a faster and better path to treatment."

IntelliSpace Portal 7.0 also connects radiologists and referring physicians across clinical domains, integrating with multiple modalities and hospital information systems (HIS), picture archiving and communication system (PACS) and radiology information systems (RIS). Clinicians can review and complete cases from virtually any location.

IntelliSpace Portal Enterprise, the multi-site companion to the IntelliSpace Portal, connects multiple hospitals to ensure every clinician always has access to the same applications – and grows the solution as the hospital network grows.

IntelliSpace Portal 7.0 also offers a broad set of clinical applications covering cardiology, vascular, oncology, neurology and other clinical domains. Highlights include:

- New cardiovascular applications like Advanced Vessel Analysis, which have been shown to reduce time to results by up to 77 percent relative to PACS analysis.
- Integrating with the Philips Allura Interventional Suite, bringing advanced analysis directly to the point of care and enabling physicians to review interventional and diagnostic x-ray datasets.
- New applications to help measure and track COPD (Chronic Obstructive Pulmonary Disease) and workflows designed to speed the detection of pulmonary emboli address recent growing interest in pulmonary disease management.

The CT scanner portion of the Infinix 4D CT slides back and forth over the table, so the patient isn't moved.

At RSNA 2014, Philips also announced the launch of Ingenia 1.5T S, a new MR system designed for "First Time Right" imaging and for faster workflow, while enhancing the patient's experience during magnetic resonance imaging (MRI) examinations.

Inconclusive image quality due to patient motion is a constant issue, making it difficult for clinicians to get accurate results in the first attempt. One repeat exam can throw off an entire day's schedule by two to three hours, affecting throughput and patient satisfaction.

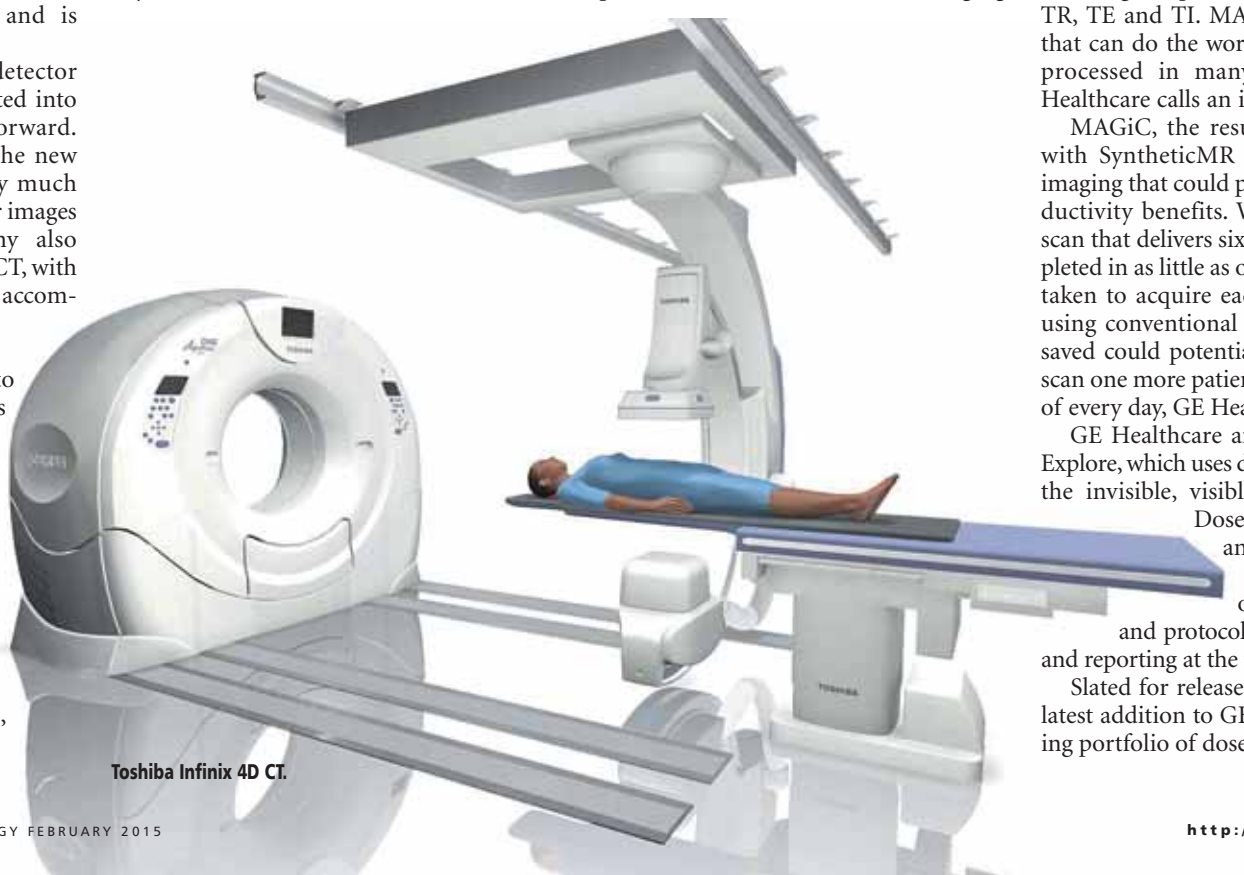
Ingenia 1.5T S is designed for "First Time Right" imaging, addressing the issue in a holistic way. Ingenia 1.5T S combines superb fat-free and motion-free imaging techniques, patient-centric workflow and a unique patient experience during the exam. The system is complemented with the patient in-bore solution, which offers a comforting, engaging visual distraction. It provides patients with the option to personalize their experience by selecting a visual theme to fill the room with colorful video images, which they can view during the examination.

This is combined with soothing audio to create an immersive experience, allowing the patient to relax through the exam.

The system also includes AutoVoice, to provide clear instructions and coach the patients, while scanner noise is reduced through ComforTone scan techniques. Its Premium IQ imaging, powered by dStream, allows for faster and more robust imaging, while the automated and intelligent iPatient platform provides quick patient setup, allowing clinicians to focus time on ensuring patient comfort.

Philips also showed off its new Vereos PET/CT, which it calls the world's first and only true digital PET/CT. According to the company, it offers approximately twice the volumetric resolution, sensitivity gain and quantitative accuracy compared to analog systems.

And it announced the IQon Spectral CT, an industry-first CT that adds spectral resolution to the image quality, delivering anatomical information and the ability to characterize structures based on material content.



Toshiba Infinix 4D CT.

GE HEALTHCARE unveiled its own MRI innovation at RSNA 2014 in the form of the SIGNA Pioneer, a new, 510(k) pending, 3.0T magnetic resonance imaging (MRI) system that enables clinicians to generate multiple image contrasts in a single MRI scan – including T1, T2, STIR, T1 FLAIR, T2 FLAIR and PD weighted images of the brain in a single acquisition.

The contrast of images can be changed even after completing the scan by simply moving the cursor on the MAGiC interface to change acquisition parameters such as TR, TE and TI. MAGiC enables one scan that can do the work of many and can be processed in many ways – which GE Healthcare calls an industry first.

MAGiC, the result of a collaboration with SyntheticMR AB, is one-and-done imaging that could provide significant productivity benefits. With MAGiC, a single scan that delivers six contrasts can be completed in as little as one-third the total time taken to acquire each contrast separately using conventional techniques. This time saved could potentially allow clinicians to scan one more patient per hour, every hour of every day, GE Healthcare said.

GE Healthcare announced DoseWatch Explore, which uses data + analytics to make the invisible, visible, the company said. DoseWatch Explore will be an entry-level, cloud-based web application offering detailed dose and protocol information, analytics and reporting at the touch of a hand.

Slated for release in 2015, it will be the latest addition to GE Healthcare's expanding portfolio of dose management and op-

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Open-source T-Rex advances radiology through structured reporting

Traditionally, radiology reports are presented as narrative text. The content and structure can vary significantly from one radiologist to another.

Within the last several years, radiology report templates have begun to emerge to enforce consistency, but template creation is on an ad hoc basis. Some organizations create templates for the radiologists to use, while others leave the template to the discretion of the radiologists.

The organization or radiologist may create their own brand new templates, or use templates provided by their dictation system or slightly modify them. Further, a template can be in a variety of formats, such as a static document like a PDF, in a format that is proprietary to the dictation system, or in XML.

When the templates come from these various sources and are in various formats, there is no standardization in structure, content, or coding, which makes it difficult to extract the required data for patient care or analytics from each report.

To improve reporting practices throughout radiology, the Radiological Society of North America's (RSNA) structured reporting subcommittee created RadReport (radreport.org), a library of clear and consistent structured report templates.

RadReport provides radiologists with expert report templates they can use to improve the quality of their reports, by using a structured, coded format and standardizing the types and formats of the content to include. As RSNA highlights, "These templates make it possible to integrate all of the evidence collected during the imaging procedure, including clinical data, coded terminology, technical parameters, measurements, annotations and key images." (www.rsna.org/Reporting_Initiative.aspx)

Radiologists also contribute to the library using the RadReport Open Template Library (open.radreport.org) to create report templates and submit them for peer review. Once finalized, these expert report templates become available on RadReport.

The expert report templates prompt the radiologist to provide a complete set of information in a clear and consistent format. This results in the ordering physician, such as the oncologist or surgeon, having all of the information which they require, and, in turn, fewer clarification calls back to the radiologist. The end result is better patient care.

Moreover, once the reports are in a complete, consistent, coded, structured format, researchers can simplify the extraction of relevant information for their studies, and educators can teach students the important elements of reports for each sub-specialty.

DICOM Supplement 155 – Imaging Reports in Clinical Document Architecture (CDA) is the result of standards body DICOM Working Group 08 and HL7 Working Group 20 collaborating to advance reporting. DICOM Supplement 155 is a significant step forward.

It provides the mechanisms to produce consistent reports for referring clinicians and a better means to integrate the reports into EMRs. Structured templates and reports reduce variability in reporting, normalize best practices, and support the automated integration of image measurements.

There are mechanisms to reduce the risk for communication errors and enable follow-up of critical results. This supplement also enables the validation of complete report content, to measure compliance with accreditation bodies and meet increasingly stringent certification requirements.

The IHE Radiology Management of Radiology Report Templates (MRRT) integration profile defines a format for radiology report templates, as well as a method to exchange templates between medical institutions.

It is heavily utilized by the RSNA Reporting initiatives. For example, if a report template supports MRRT and the dictation system supports MRRT, then the dic-

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Much innovation, many new products in the ultrasound marketplace

CHICAGO – Demand for ultrasound machines continues to grow steadily, driven by a number of factors: manufacturers are increasingly able to pack more power into smaller devices, making them more useful at the point-of-care; and through constant innovation, a wider variety of exams can be done using ultrasound, often reducing the need for biopsies.

Moreover, ultrasound is cheaper than many other modalities and offers the advantage of being free of ionizing radiation.

According to a 2014 report by Harvey Klein, the ultrasound market guru, sales of ultrasound machines in the United States hit $1.44 billion in 2013, a 3 percent increase over 2012. Klein expects U.S. sales to reach $1.8 billion by 2018.

While a 3 percent gain appears to be modest, some parts of the ultrasound marketplace are growing much faster – for example, the point-of-care sector, using hand-carried and pocket ultrasound, is expanding by double-digits.

As well, demand for premium systems is strong. Klein noted that the top three products in the ultrasound sector were all premium machines, and each of them accounted for sales of more than $100 million. The top players in the ultrasound market are GE, Philips, Siemens and Toshiba.

That steady, growing market is drawing new competitors into the fold, and Carestream announced its entry with the first of a family of ultrasound systems at the Radiological Society of North America (RSNA) conference in Chicago late last year.

Called the Carestream Touch Ultrasound System, the cart-based device offers a touch-screen control panel, with programmable keys and buttons. "You can put the buttons anywhere on the console," said Helen Titus, marketing director, digital capture solutions. She explained that a good deal of ergonomic research went into the creation of the Touch Ultrasound, and the result is a system that's easy for radiologists and sonographers to use.

The individual user's preferences are automatically loaded by using a 'swipe and go' badge, and etched markings on the console help the user find the controls without looking away from the patient. The cart is smaller than most ultrasound carts, making it easier to move around a hospital or clinic. Titus said the Touch Ultrasound is a premium system, with 13 available probes.

For its part, Mindray, the China-based manufacturer of medical equipment, is making a concerted effort to gain a bigger foothold in the U.S. ultrasound market, and is planning to increase its marketing in Canada, as well. The company has Canadian offices in Richmond Hill, Ont., and Vancouver.

Mindray recently released its M9, a premium compact system that weighs 12.8 lbs, uses single-crystal transducer technology and is said to boot-up in 7 seconds. Mindray says the system is ideal for use in emergency departments, the ICU, and for cardiac and anesthesia applications.

Samsung is flexing its muscles in the ultrasound sector, and at RSNA announced the U.S. availability of the Samsung RS80A, a high-resolution, full-featured, premium ultrasound system designed to serve radiology departments. The company is represented in Canada by Apexium Medical Group, of Montreal.

With the RS80A, Samsung says it offers fast, easy and accurate imaging across a number of applications, such as abdomen, vascular, cardiac, small organs, breast, urology, musculoskeletal, pediatric and fetal/obstetrics and gynecology.

Toshiba introduced the Aplio 300, 400 and 500 Platinum Series, an enhancement to the company's existing Aplio series. The Aplio Platinum series provides clinical imaging tools for advanced visualization, quantification and intervention. This includes BEAM, a new technique that improves needle visualization during ultrasound-guided procedures.

On the Aplio 500 Platinum, shear wave elastography is a new tool to non-invasively measure tissue stiffness of the liver and potentially reduce expensive biopsies, while Superb Micro-Vascular Imaging (SMI) can capture low-velocity blood flow without the need for contrast agents or more invasive modalities.

GE Healthcare`s Vscan.

Ultrasound market leader GE Healthcare demonstrated that it continues to innovate. It showcased the Venue 50 tablet-style ultrasound – which is said to deliver crisp images quickly with the simplicity of a tablet. The touch user interface offers easy gel-and-go scanning – a clinician can just select the probe and pre-set in one step. Designed for speed, it takes just moments to boot up and has no buttons, keyboard or knobs to slow clinicians down when scanning the patient or disinfecting the system.

GE also demoed its pocket-sized ultrasound, the Vscan, with an innovative Dual Probe. The dual headed probe enables clinicians to see both shallow and deep views of the body without changing probes. This latest innovation enables efficient triage and fast workflow, which may lead to time and cost savings in point-of-care settings. It also may add clinical value in a wide variety of resource-constrained environments, all from a pocket-sized device that covers many ultrasound procedures.

Meanwhile, Siemens introduced the Acuson X600 ultrasound system, a mid-range product. Said to be an affordable multi-purpose solution, the Acuson X600 comes equipped with state-of-the-art technologies and workflow efficiencies migrated from premium systems.

Advanced imaging solutions such as real-time spatial compounding and Dynamic TCE tissue contrast enhancement technology reduce image artifacts and enhance border detection, offering improved detail and contrast resolution. Knowledge-based productivity applications simplify exam workflow and reduce keystrokes, enabling consistent measurements in less time while decreasing operator fatigue and risk of repetitive strain injuries. Three new volume transducers provide enhanced 3D/4D image quality for clear visualization, especially in OB/GYN.

As well, the new 2.0 release of the Acuson X700 ultrasound system leverages sophisticated imaging technologies for performance across a broad range of clinical applications. This shared-service core platform features premium technologies on an advanced imaging engine that boost efficiency and workflow, in addition to providing rapid, uniform visualization. The 2.0 release of the Acuson X700 includes eSie Touch elasticity imaging for non-invasive relative tissue stiffness analysis. Enhanced transducer compatibility and customizable upgrades make updating easy as clinical needs evolve.

The de-constructed PACS takes the stage at RSNA 2014

BY THOMAS HOUGH, CMC

At the most recent RSNA meeting, held last December in Chicago, the biggest buzz was about the 'Deconstructed PACS'. Every vendor stated it multiple times in discussions – but what does the phrase really mean?

As you might guess, it is the opposite of constructing a PACS. Since inception, vendors and hospitals have been assembling and building Picture Archiving and Communication Systems with ever increasing breadth and scope.

However, with current changes in IT, the objective is now shifting to deconstructing the PACS into its individual components to lower overall costs, and to increase performance and capabilities in specific areas.

Communications within PACS is a matter of networking. Hospital and country-wide network infrastructure is now fast and reliable enough that network upgrades and enhancements no longer need to be a part of a large capital PACS project, as they were 10 years ago.

Archives have evolved from being storage repositories for diagnostic images exclusively to what is now called a Vendor Neutral Archive (VNA), which contains every type of document, image, and content a hospital and clinic can create.

And finally, the picture: the image-display and advanced image manipulations, such as 3D, MPR, MIP, CT/PET fusion, cardiac imaging, colonoscopies, etc., are no longer limited to a single dedicated workstation with specialized high-resolution monitors and software trapped within the specialized department.

With advancement of web-based technologies, HTML 5, and the development of zero footprint viewing applications, which are client/server applications, can be attached as a layer on top of VNAs.

The impact of these changes is workflow; workflow outside of the DI department and also across the entire healthcare enterprise – internal and external to the hospital itself.

Where is the workflow coming from? The RIS, the EMR, the VNA, the HIS, the zero footprint viewers? Well, this is a good question, and it is yet to be determined, as many vendors are viewing this as part of their future.


Thomas Hough

This is why acquiring replacement PACS during the 'Deconstruction of PACS' is not a simple task and may need the input and insight of qualified consultants for even the most experienced of healthcare facilities and regions. There is more than meets the eye and this is what made RSNA 2014 so interesting. The ability to retrieve any and all patient or business records at a moment's notice is not trivial, and to serve them up in a workflow without having the user do a search, as it is done today with a browser on the Internet, is where the magic lies.

Having this done via or through the EMR is the pixie dust, which is sought today. Tools to achieve this include the XDS standard, with its registries and repositories, IHE integration profiles and workflows. Vendors are employing all of these and then some of their own magic to get to this desired end state.

Who can do this with a workflow best suited to each enterprise's workflow is yet to be seen. Healthcare has learned from PACS 1.0 and 2.0 that workflow is not always as advertised. So to ensure that PACS 3.0 does not repeat history, this is where the effort needs to be invested and insight sought.

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Open-source T-Rex

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tation system is able to consume the report template for the radiologist to subsequently use to author the clinical findings.

The report templates located in RadReport support the RSNA's initiative of developing clinical templates using best practices. However, creating templates which leverage the advantages of DICOM Supplement 155 and the IHE MRRT profile require very technical knowledge of XML and HTML5 to create. Most radiologists do not have, nor desire to have this knowledge. This issue was stifling the inflow of expert medical report templates for RadReport.

The benefits of using structured report templates for diagnostics are clear. The challenge lies in creating these structured report templates while supporting industry standards such as DICOM Supplement 155 and IHE MRRT profile, in a simple manner that requires no technical knowledge. And this is where T-Rex comes in.

Karos Health, a leader in standards-based clinical information exchange, cross-enterprise workflow and diagnosis solutions, took the initiative to support RSNA's reporting initiative and developed T-Rex – The Report Template Editor, as the solution.

Karos Health developed T-Rex as open-source freeware for RSNA and the user community. T-Rex is linked on the RadReport Open Template Library to enable RSNA members to easily submit expert-based templates in a more expedient manner. With T-Rex, radiologists create structured expert templates and import these templates into their dictation systems (supporting MRRT). The report may subsequently be available in their repository for access via third party applications, such as an EMR (supporting HL7 CDA Level 1).

"At Cancer Care Ontario (CCO) we create structured radiology report templates using evidence-based, peer-reviewed methodology. These report templates are used by radiologists province-wide for cancer imaging," says David Kwan, project manager of synoptic radiology reporting project, from CCO.

"Our structured radiology report templates are synoptic templates, presented in paper form. When the templates are loaded onto report-generating systems, the template mimics the paper-based format, and the resulting report is transmitted and stored in narrative text format, with no minable data. The end users of radiology reports include referring physicians, patients and cancer registries. The narrative text format is not conducive to locating the pertinent information that referring physicians and patients require."

Kwan adds that, "Furthermore, for cancer registry use, this format is quite labour intensive for extracting data. Assessing reports for consistency and completeness is inefficient when presented as pages of text. We are excited to hear about T-Rex and are looking forward to assessing this tool to simplify radiology user-report template creation."

Vendor neutral archives and interoperability problems

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solution was demonstrated at the Perceptive booth.)

Interestingly, Cleveland Clinic hasn't yet added its renowned cardiology department to the central VNA. "They already have an established workflow, and their images aren't lost," said Dr. Petersilge. "There are many other departments that are generating images and losing them – they are our priority."

She observed that in addition to jpg photos, there has also been a jump in the number of ultrasound images being generated. "Point-of-care ultrasound is everywhere now," she said. "It has migrated from the radiology department to physician offices." The Cleveland Clinic has a push on to ensure more of these images are captured and archived, too, so they can be easily found and shared.

Carestream

For its part, McKesson has for a long time emphasized its strength as an enterprise-wide supplier, and it also produces a Vendor Neutral Archive. "We do PACS for the entire island of Ireland," commented Bob Baumgartner, director of product marketing. He noted the company also produces workflow solutions, through its QICS engine, which is integrated with its enterprise system.

For example, the workflow engine can re-direct studies from an overloaded radiologist to others who are less burdened, to ensure that readings are done in a timely way. Peer review can also be integrated in the process.

Baumgartner noted that Island Health, in British Columbia, is rolling out the peer review component throughout the health authority.

While McKesson does have a central repository or VNA solution, Baumgartner observed that for many hospitals, it's too expensive to immediately start migrating studies from a network of PACS. Using the McKesson solution, they can keep their various PACS and view studies, from different archives, through the McKesson viewer – as long as the PACS solutions are web enabled.

"This saves you from doing the migration until you're ready," said Baumgartner.

For its part, Chicago-based Merge Healthcare calls itself the top VNA vendor, in terms of revenues. It cites a recent IHS study which reported that Merge's iConnect Enterprise Archive accounted for a 13 percent share of the market in 2013.

Merge is one of the granddaddys of the business, having acquired VNA technologies through its acquisition of Amicas, which itself had bought Emageon, a leader in enterprise imaging solutions.

"We have installs where there hasn't been a second of downtime in eight years," asserted Atul Agarwal, chief technology officer for Merge Technologies.

Agarwal, who is based in at Merge's offices in Mississauga, Ont., observed that Merge VNA technology is used to consolidate some of the largest archives in the world, such as the Dignity Health system in the United States. "We're used in archives with more than a billion objects," said Agarwal. At the same time, the iConnect system is also used in relatively small, specialty clinics.

"It's can be scaled down for use in single facility systems, such as orthopedic clinics," said Agarwal. "These clinics are producing 50,000 studies a year, but they also want access to surgery plans and templates, which are often in the form of pdfs." These and other documents are all housed in the central archive for quick access on the same workstations.

John Memarian, general manager of emerging markets at Merge HealthCare, noted the company in the last few years has launched a number of 'do-it-yourself' modules that give hospitals and regions more control over their own information. Once they're trained by Merge, they can handle tasks such as migrations and setting policies and rules for workflow.

He said that in 2015, the company will be launching an awareness campaign in Canada for its VNA and other products, so that its brand is better known here. He pointed out that Merge technologies are used by many vendors in their own offerings, but Merge is now making a bigger push to become known as a brand name in its own right.

Like Merge, Carestream Health is one of the major global suppliers of Vendor Neutral Archives, and the company announced an innovation at the RSNA meeting in the form of a solution called the Clinical Collaboration Platform.

The system archives DICOM and non-DICOM images, offers a quick method of tagging non-DICOM images with metadata, and is said to offer a single view of patient information. It also serves as a telehealth platform, tying in remote specialists who can easily view a patient's images and clinical information from afar.

Carestream is highlighting secure patient access to their own records, including images, something that's a major issue in the United States, as patient satisfaction with care is being tied to funding and remuneration. In future, patient access to medical records may also become more important in Canada.

Interestingly, Vendor Neutral Archives aren't only being used at the regional or provincial levels. Hospitals are the main customers, at the moment, as they're having difficulties integrating images and data among their own departments.

"Seventy-five percent of our discussions about VNAs have been at the hospital level," commented Lisa Shoniker, national sales director at Agfa HealthCare Canada.

Hospitals are also interested in the workflow improvements that can be gained through the use of enterprise-wide solutions. "You want systems that can give you more information," said James Jay, global VP for imaging IT at Agfa HealthCare. "You want access to images from different departments, but you also want to see more information that's associated with those images – like the diagnosis, the care plan and treatment, the whole clinical context." It's the more powerful VNAs that can deliver these capabilities as they're solving integration problems, said Jay.

Synapse integrates with electronic records

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Not only does iDash provide performance analytics, but it also offers a patient appointment reminder system, using emails and SMS phone messages, which have proven to be highly effective in preventing patients from missing appointments.

Once they see the whole package they're being offered, doctors tend to welcome it and don't mind paying the fee, Dr. Goel said.

Patients can also tap into part of the system, called miDash, to make appointments, and view portions of their electronic records. Test results are displayed in way that patients can understand, using easy-to-read graphs.

Patients can upload their own information for tracking purposes – this includes weight, blood pressure. "We give them devices that allow them to measure and upload the data," said Dr. Goel.

Dr. Goel is testing e-Visit technology supplied by Medeo, a B.C.-based firm. It allows doctors and patients to see each other and to converse using computers and webcams.

Physicians are funded for e-Visits in British Columbia, but remuneration is not yet available in Ontario or other provinces. Dr. Goel predicts that it's just a matter of time before this happens. Meanwhile, he is starting to deploy the 'e-chat' technology, simply to make it easier for his patients to obtain the medical attention they need.

"If we're not accommodating patients, we need to change the way we do medicine," said Dr. Goel. "We've got to be more efficient, and one way of doing this by using more e-Visits."

Ergonomics

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sign a healthy workplace involving technology we must incorporate the ability to move and be dynamic.

Start with the chair at a seated workstation. The backrest should support the natural curves of the spine and have height adjustability to fit the lumbar (low back) of each user as well as angle adjustment to vary the recline. The seat-pan should be height and depth adjustable to fit both the shorter and taller workers. Other features should include a five-point caster base and adjustable armrests (although armrests can be optional).

In an ideal scenario, whether for a seated or standing workstation, the work surface (i.e. desk) should be height adjustable to suit a range of worker heights. Historically, fully adjustable stations tended to be provided for workers who already had hip or back problems, but we are seeing a shift to proactively place these into the workplace to prevent injury.

Examples include electric height adjustable triage workstations in emergency departments (refer to photo) and 24/7 nurses' call centres, as well as the modification of fixed desks by mounting a sit-stand product onto them for a variety of desk-intensive roles – including data analysis and ability management.

The workstation on wheels (WOWs) and wall-mounted arm systems used in many areas for electronic patient charting are also height adjustable to allow for both seated and standing use suitable for the variety of user heights.

In situations when the entire workstation is not height adjustable, provision of height and angle adjustable keyboard trays is a suitable option. The trays should allow the keyboard and mouse to be placed side by side to encourage neutral hand and arm positioning, and allow for the mouse to be placed on either side of the keyboard to accommodate left and right hand use.

In addition to getting the workplace design right, it is essential to have good job design, allowing movement.

Monitors should be height and angle adjustable to suit a variety of worker heights as well as different users' corrective lenses. Workers with bifocal or progressive lens glasses often need the monitor lower and at a more reclined angle to view while maintaining an upright and neutral head and neck posture. Use of monitor arms is an effective way to increase ease of adjustability.

In addition to getting the workplace design right it is essential to have a good job design.

Good job design allows workers to adopt a variety of postures and incorporate movement throughout their shifts. For example, alternating between seated computer work and tasks that are more mobile, such as filing or administering patient care.

Good job design also allows workers to take micro-breaks (1-2 minutes every 30 minutes) to change positions and move, and to take scheduled breaks (i.e. coffee and lunch breaks taken near their allotted time and used to step away from the work area).

Advances in technology will continue to occur, and for the well-being of our healthcare workforce it is essential that we also continue to advance the application of ergonomics to the workplace and job design.

Deborah Goodwin is an Ergonomist with the Workplace Health and Safety Department at Alberta Health Services. She has been a healthcare ergonomist for 15 years, has a Master of Science (M.Sc.) degree in Ergonomics from Loughborough University in England, and is a Canadian Certified Professional Ergonomist (CCPE) and LEED Green Associate.

ALIO transforms homecare delivery via a portal solution

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healthcare process from workflow development through to reporting and billing.

Finding their older PCs were too slow, Smith purchased new laptops powered by the latest processors – in this case, the Intel Core i7 processor family to speed development and more easily integrate with the ALIO platform and software packages.

Automation speeds care delivery: After receiving their first patients and delivering care the traditional way, Smith's team identified workflow improvements which were integrated into their solution to reduce data entry and manual interventions. For example, instead of faxing in new patient enrollment forms, the client enters the information online, which initiates the automated workflows.

As soon as a patient is registered online, the ALIO system issues an alert to the email or smart phone of nurses in the area of the new patient. The nurse can accept a patient from any device and once the acceptance is received, the ALIO platform automatically uploads all the required patient contact details and forms to the nurse's secure online portal profile.

Smith says this approach creates an urgency to accept patients because patients are assigned to the first nurse who responds to the request. This approach has reduced assignment time from 48 to 72 hours to less than three hours.

Program workers can access a customized dashboard view to instantly see which nurse has been assigned, when visits are scheduled, call logs, and the documentation submitted for each visit.

"Through an internal alert system, staff have immediate visibility into patient assignment status, so if a patient is not accepted within six hours, we can intervene and look at extending criteria to get care for that patient," says Smith. "We are regularly and automatically informed of who is and isn't being looked after."

Companies introduce impressive imaging technologies

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timization offerings. This solution will help GE computed tomography (CT) customers gain greater visibility for their practice-level dose performance, requiring no onsite IT integration and minimal resource commitment.

Tracking of exam information, including dose and protocol parameter details, provides visibility to system settings that impact the amount of dose delivered. New levels of visibility around dose can help providers deliver better patient outcomes based on data and analytics, "making the invisible, visible."

SIEMENS: On the CT front, the U.S. Food and Drug Administration (FDA) recently cleared Siemens' syngo.CT Liver Analysis software. The software can reduce time-consuming steps and improve decision-making in oncological surgery by delivering preprocessed segmentation results and intuitive workflow guidance for in-depth analysis of vascular supply areas.

The software provides information regarding tumor size and location and can help physicians assess the amount of the resected liver tissue and better understand the vascularization of the affected liver segments.

Siemens also showed its MRI technology for assessing prostate cancer. It can rule out the presence of life-threatening cancer with more than 89 percent certainty, the company said. SEEit – Siemens' new solution for prostate MRI – is designed to enable users of the MAGNETOM Aera 1.5T and MAGNETOM Skyra 3T systems to perform a noninvasive prostate MRI without an endorectal coil.

Powerful coil technology and unique applications help to streamline processes and maximize system utilization. Siemens' direct RF and high-density coil technology Tim 4G and the unique readout segmented diffusion technology, RESOLVE, deliver the essential signal to noise (SNR) and resolution to perform examinations purely with surface coils.

Powered by Siemens' new software architecture syngo MR E11, SEEit can enable users perform a routine multiparametric prostate exam (T2-weighted and RESOLVE) in just 10 minutes of scan time when used with the new Body 60 channel coil. Reading and reporting of the acquired data can be performed efficiently with the syngo.via Prostate engine, which provides standardized communication according to PI-RADS, a structured reporting system for prostate MRI.

In molecular imaging, the Biograph mCT Flow 5 PET/CT system overcomes the limitations of conventional bed-based, stop-and-go PET/CT imaging with FlowMotion, a new technology that moves the patient smoothly through the system's gantry while continuously acquiring PET data.

The Biograph mCT Flow with FlowMotion enables imaging protocols based on the individual organ of interest, leveraging the finest volumetric resolution, the company said. FlowMotion expands accurate, reproducible quantification in all dimensions for precise disease characterization in therapy monitoring while enabling physicians to offer as low as reasonably achievable (ALARA) dose to every patient.

Siemens introduced an MRI solution for assessing prostate cancer with 89 percent certainty, without an endorectal coil.

Additionally, the combination of a 78 cm bore with five-minute ultrafast scanning and a continuous sense of progress throughout the scan offers a potentially more comfortable exam experience for the patient.

The latest version of Siemens' syngo.via 3D and advanced visualization software supports physicians in treatment decision-making, planning, and assessment based on meaningful information – specifically for the field of oncology.

Supporting the entire cancer care continuum across various modalities and departments, syngo.via is well-positioned to facilitate prompt, sound decisions and cost-effective therapy.

In women's health, Siemens' MAMMOMAT Inspiration Prime Edition digital mammography system lowers patient radiation dose by up to 30 percent, compared to its predecessor model, depending on the patient's breast tissue thickness.

Dominic Covvey

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down with someone who is an opponent or naysayer, while exhibiting tolerance and respect.

Sometimes it is just a sense of confidence that oozes out and convinces others of their trustworthiness. Sometimes it is having wounds, previously acquired, that bloodied them so that today's challenge is expected and familiar. There are probably thousands of other examples that are closely-held secrets that enable them to do marvels in situations where we ordinary mortals bog down or fall to the wayside.

What if we accept this and put out a Call for Tacit Knowledge, much like a call for papers or abstracts? Perhaps you would be willing to share what helped you, gave you the foundation for, or prepared you for addressing key eHealth challenges.

It could be a fact, a specific experience, a Dale Carnegie skill, a positive attitude or a vital value that you embody. Whatever it is, perhaps it can serve as a powerful adjunct to all the explicit knowledge we get through education, discussions, reading, etc. It could be the secret ingredient that helps more of us achieve success.

Would you be willing to perhaps tell us about things that have had crucial value for your successes or, for that matter, your survival of the inevitable failures? We will include and discuss these in future articles, associate it with your name if you will permit that, or present it anonymously if you would prefer that.

Tacit knowledge might position more of us to achieve that gemstone quality to which we all aspire.

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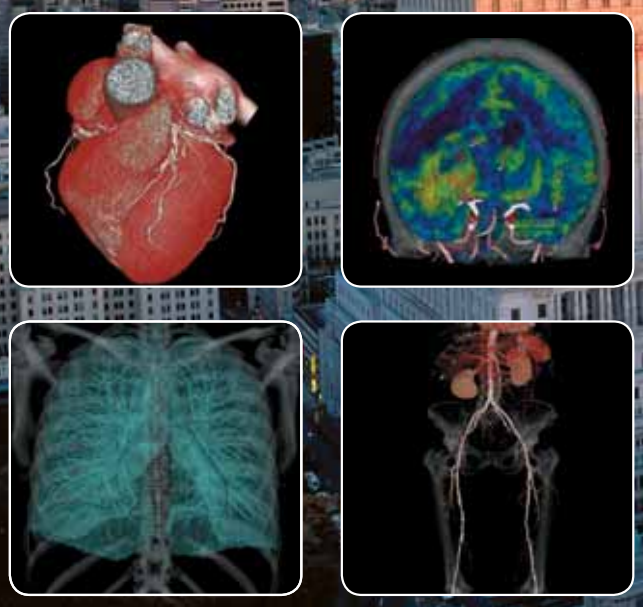

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- Patient treatment and care management post neurological event
- Acute Stroke Imaging
- Live Streaming of Neuro Intervention Treatment of AVM (Arterio-Venous Malformation)

Venue: McGill University
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- Single Energy Metal Artifact Reduction using Helical CT and/or Volume CT
- Volume, Volumetric or Helical CT - from a Technical Perspective
- Contrast versus Spatial Resolution in Neuro Imaging
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