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PROJECT HUGO AT LHSC: LEADING URGENT CHANGE IN HEALTHCARE

On the morning of September 6, 2011, Susan Johnson took a deep breath as she entered the parking lot of the London Health Science Centre (LHSC). She had just launched her children into a new school year. Johnson smiled as she recalled the excitement and anticipation on their faces at their fresh start back to school. Her smile lessened as her thoughts turned to the monumental change leadership task that lay ahead. Today would bring a public announcement by the senior management team that "her" Project HUGO would be live in all LHSC hospitals by April 2013.

Johnson was the director of Pharmacy Services at LHSC. Over the past year, she had been planning for the launch and implementation of Project HUGO, an acronym for Healthcare Undergoing Optimization. HUGO would be one of the most complex, expensive and challenging projects ever undertaken by the hospitals in London and region. HUGO would transform the way care was delivered, from patent registration to patient discharge. When fully implemented, the physicians, nurses and other healthcare providers would be using a fully electronic patient record (EPR) in place of the current paper-based system at all London hospitals and the nine smaller regional hospitals that partnered with LHSC.

Johnson knew that HUGO would bring some operational efficiency, but the main rationale for the project was to ensure patient safety and quality of care. HUGO was ultimately about preventing medical errors and saving lives. She also knew that the implementation of HUGO would be very challenging, including the risks of running over budget, missing deadlines and not getting everyone on board.

Just the previous week, in the hallway, she had run into a physician whom she had thought would have been a supporter of HUGO. Yet, surprisingly, the physician had stated, "Susan, I believe that we will have electronic order entry very soon, but you know, I will never enter my own orders. My secretary will do this for me. I'm not a data entry clerk."

Johnson knew that diverting this process to clerical staff would dilute the gains in safety. She also recalled a conversation with the dean of the medical school who had stated unequivocally that by introducing electronic order entry medical students would not learn how to prescribe orders and properly care for

patients. "This is 'cookbook' medicine," the dean had said. "I treat my patients as individuals. Standardization will not work!"

THE GLOBAL HEALTHCARE INDUSTRY AND THE NEED FOR CHANGE

The global healthcare industry provided healthcare services and products, including medical equipment, pharmaceuticals and biotechnology. Services could be broadly divided into hospital activities, medical and dental practice, and other medical services, such as those delivered by registered dieticians and optometrists. In many countries, healthcare was one of the largest industries and often one of the most inefficient. In many countries, healthcare consumed about 10 per cent of gross domestic product (GDP).

Although healthcare spending absorbed more than US$1.7 trillion per year in the United States and more than Cdn$175 billion in Canada, premature mortality in North America remained higher than in many other developed countries. Most medical records were still stored on paper, which precluded the coordination of care or routine measurement of quality, and often led to critical, often fatal, medical errors. Recent media reports had highlighted the tragic consequences of medical errors:

- "Deaths of 3 Babies in Indiana Spotlight Medication Mix-ups" — *Boston Globe*, September 23, 2006
- "Quaids Sue Blood-thinner Manufacturer" — *Los Angeles Times*, Dec 5, 2007
- "Heparin Overdoses Hit Babies in Texas Hospital" — *Wall Street Journal*, July 9, 2008
- "3 Philadelphia Infants Die After Mix-up at Hospital Pharmacy" — *Philadelphia Inquirer*, June 1990
- "Two Die in Hospital Dialysis Mix-Up" — *National Post*, March 19, 2004
- "Hospital Error, Woman Dies" — *BBC*, Wednesday, April 4, 2001

In addition to these alarming media reports, the academic literature also painted a bleak picture. The Institute of Medicine published findings of widespread medical errors in its report, *To Err Is Human*.[1] The report suggested that as many as 98,000 Americans died every year as a result of medical error. A subsequent Canadian study[2] echoed these findings, reporting that 7.5 per cent of patients admitted to hospital had experienced an adverse event. Of those patients, 37 per cent were considered to have experienced preventable events, and 21 percent had died as a result of their adverse events. Across key steps in the medication process, different types of errors occurred with different frequencies. Errors were classified into ordering errors, transcription errors, dispensing errors, and administration errors (see Exhibit 1).

BACKGROUND ON THE ORGANIZATIONS

Included in the HUGO project were a total of 11 hospitals, all located in and around London, Ontario, in southwestern Ontario, Canada. These hospitals included London Health Sciences Centre, St. Joseph's Health Care London and nine smaller regional hospitals (see Exhibit 2). In total, HUGO would affect more than 10,000 staff members across the different hospitals and sites.

LHSC, one of Canada's largest acute-care teaching hospitals, cared for the most critically ill patients and the most medically complex cases in the region. In 2010, 150,000 patients visited the emergency departments, 700,000 patients visited outpatient departments and 40,000 patients were admitted. LHSC

[1] *Institute of Medicine, To Err Is Human: Building a Safer Healthcare System, National Academy Press, Washington, D.C., 1999.*

[2] *G. Ross Baker et al., "The Canadian Adverse Events Study: The Incidence of Adverse Events among Hospital Patients in Canada," The Canadian Medical Association Journal, 2004, vol. 170, no. 11, pp. 1678-1689.*

was the largest employer in London, with more than 2,200 doctors and medical students, almost 3,500 nurses, 500 clinical staff (such as pharmacists, nutritionist and physiotherapists), and approximately 7,000 other staff and volunteers. It encompassed the South Street Hospital, University Hospital, Victoria Hospital and Children's Hospital, Byron Family Medical Centre and Victoria Family Medical Centre, and was home to the Fowler Kennedy Sport Medicine Clinic, Canadian Surgical Technologies and Advanced Robotics (CSTAR), Lawson Health Research Institute, Children's Health Foundation and London Health Sciences Foundation.

St. Joseph's Health Care London (St. Joseph's) was a major patient care, teaching and research centre. It included St. Joseph's Hospital, Parkwood Hospital, Mount Hope Centre for Long-Term Care, Regional Mental Health Care London and Regional Mental Health Care St. Thomas. Annually, more than 500,000 patients visited the outpatient clinics at St. Joseph's, 20,000 surgeries were performed and 41,000 urgent care cases administered. St. Joseph's more than 5,000 staff members included almost 1,500 physicians, residents and medical students and 1,100 nursing and allied health professionals.

Both LHSC and St. Joseph's had newly appointed chief executive officers, who were redefining the vision for their organizations (see Exhibit 3). While the organizations were slightly different in some ways, both organizations were "obsessed" with quality of care and patient safety.

Johnson knew that staff differed and could be categorized into physicians, nurses and allied health professionals. Because physicians were independent and not regular employees of the hospital, hospital administration was permitted only limited direct influence over physicians' workflow. Physicians were more likely than nurses or allied health professionals to switch hospitals several times in their careers. They often compared the performance of their hospital with the performance of other hospitals in Ontario and Canada. Many physicians resisted change in their routines and resented purely administrative tasks. This group valued independence, time, money and professional prestige. Physicians were ultimately responsible for the patient healthcare that was ordered. Nurses were employees of the hospital where they worked and typically remained at the same place of work for a longer duration than physicians. They valued excellence in patient care, time efficiency and consistent and ongoing employment. The age and tenure of nurses ranged widely, with some senior nurses having been employed for several decades. The group of allied health professionals was the most diverse group of hospital staff, including several smaller groups of professionals, such as pharmacists, physiotherapists, occupational therapists, dieticians, lab technicians, radio technicians and massage therapists. These professionals were driven by their ability to provide safe and effective care for patients in an efficient manner. They were also concerned with communications with both physicians and patients. For all three groups, the ability to access patient records from anywhere in the hospital and before seeing a patient would significantly improve their ability to provide high-quality, effective care in an efficient manner.

SUSAN JOHNSON

Susan Johnson had taken on the role as director of Pharmacy at LHSC six months earlier. She had been trained as a clinical pharmacist and had gained related experience in multiple areas over almost 20 years. She had practiced clinical pharmacy in pediatric specialty areas, general surgery, gastrointestinal medicine, infectious disease and adult intensive-care programs. Additionally, she had spent two years as a pharmacist in a teaching family medicine clinic, providing pharmaceutical care to an ambulatory patient population. In 2000, Johnson became the coordinator of Pharmacy Operations at St. Joseph's Health Care in London, Ontario. In this administrative role, she had played a key role in the implementation of smart infusion systems, a purchasing system and a pharmacy information system.

In 2008, Johnson had established the new Medication Safety Department at St. Joseph's Health Care and had been the coordinator since then. In this role, she had implemented several medication safety initiatives, including Medication Reconciliation, a high-alert medication safety program and had introduced an independent double-check system. In 2009, she had established the new Department of Clinical Informatics at London Health Sciences Centre and St. Joseph's Health Care. Over the two years that Johnson was director, this department had grown to a staff of 20 full-time equivalents.

Previously, she had received her bachelor of science degree in pharmacy from the University of Toronto and her master's degree in health studies (Leadership) from Athabasca University.

HISTORY OF ELECTRONIC PATIENT RECORDS AT LHSC

HUGO was LHSC's second attempt to implement an electronic patient record (EPR) system. From 2003 to 2005, a monumental effort had been undertaken to implement computerized provider order entry (CPOE) and clinical documentation. Information technology staff, not clinical staff, had driven this project. Several consultants from the United States had been "parachuted in" to the organization to build the system. In the spring of 2005, the project was over-budget and had failed to meet key deadlines. Clinicians had considered the system cumbersome and unsupportive of patient care. Hence, they were frustrated by the system before it had even been launched, and they had clearly indicated they would never use it. The project was put on indefinite hold and had remained dormant until 2009; however, the organizational memory of the failed attempt to introduce EPR had stayed alive in the minds of the many staff who had remained at the hospital.

In 2009, under Johnson's leadership, a new team was formed, the Clinical Informatics Team. This team was staffed with clinicians, including nurses, pharmacists and nutritionists, and was tasked with the design, implementation, education and training of the clinical systems. This team acted as advocates for the clinical staff and for the use of technology to enhance quality of care and patient safety. They also played key roles as translators between the information technology staff and clinical staff, two groups that often used very different language.

In 2010, with the Clinical Informatics Team on the ground and two Toronto hospitals reporting successful CPOE implementations, the London hospitals experienced renewed interest in a second try at implementing CPOE. A report was released that compared Canadian hospitals' adoption of new technology. London, typically a national leader, was starting to fall behind much smaller Canadian hospitals. In addition, reports were emerging from every major organization regarding the tremendous gains in patient safety being realized as a result of the implementation of an electronic patient record. Under President Obama, the U.S. administration had invested billions of dollars in U.S. hospitals for electronic patient records. Expected to follow suit was Canada Health Infoway, a federally funded government organization created to foster and accelerate adoption and implementation of electronic health records.

PROJECT HUGO

Senior leadership at the hospital had asked Johnson to determine what it would take to launch a full electronic patient record project at LHSC. In response, she had completed an extensive analysis of the change effort required, the human and physical resources needed and the proposed roll-out plan. The estimated cost of HUGO was more than $25 million. Part of this cost was the technology that was new,

sophisticated and expensive. The scope of Project HUGO was massive, considering the number of hospitals and staff involved. The amount of data that would be processed electronically instead of manually was also staggeringly high. Information on approximately seven million patient visits was already stored, and new information would be added quickly, due to rapidly increasing health care needs.

Johnson's plan included an aggressive time schedule that would see the project rollout occur over a 24-month period, beginning in October 2012. At least 100 additional staff members would need to be hired, and the current clinician workflow would need to change dramatically.

Workflows in hospital healthcare systems were highly complex, resulting in inefficiencies and room for error. A process analysis, from a physician ordering a medication to the administration of the drug to the patient, showed the involvement of at least five people and 24 key steps (see Exhibit 4). HUGO would shorten this process considerably (see Exhibit 5). Handwritten orders that were often illegible added to the risk of serious errors (see Exhibit 6). HUGO would eliminate the need to decipher poorly written orders and would produce easily readable and traceable medication orders (see Exhibit 7).

LHSC, St. Joseph's and the regional hospitals already had in place the foundational components of the EPR; however, to achieve the promise of a fully functional and integrated EPR, further development was necessary. All of the programs would require significant process redesign and changes in clinicians' behaviour and thinking. Systems, structures and processes would need to be aligned and intentionally designed to achieve the desired outcomes.

The project included two main components. The first was computerized provider order entry (CPOE) (by physician, nurse, or practitioner), the second was a closed-loop medication administration process (CLMP), which included electronic medication administration records (eMAR) and closed-loop medication administration (CLMA).

CPOE referred to the process by which a physician or other healthcare provider entered orders (e.g., lab test, X-rays, medications) directly into the computer rather than handwriting the orders on a paper chart. CPOE decreased delays in order completion, reduced errors related to handwriting, allowed order entry at either point-of-care or off-site and provided both automated error-checking and alerts. Alerts would occur when a physician ordered a drug that a patient was known to be allergic to or ordered a test that had already been completed (see Exhibit 8).

CLMP and eMAR put the power of technology at the patient's bedside. Patients received a barcoded patient identification band when admitted to the hospital. When a nurse or a therapist administered a medication, they used the list of medications on the eMAR and verified that the patient was given the correct medication by scanning each dose at the bedside. Next, the nurse or therapist scanned the patient's armband to verify that each patient received the correct medication. In the case of an incorrect match between patient and medication, the safety software issued a warning. Lastly, the nurse scanned her own identification badge. The administration of the medication was then automatically documented on the patient's electronic record.

The broad adoption of electronic patient record systems was widely believed to lead to major healthcare savings, a reduction in medical errors and improved health.[3] A patient's blood type, prescribed drugs, medical conditions and other aspects of medical history could be accounted for much more quickly. At the very least, an EPR could save time at the doctor's office. At most, quick access to records could save

[3] *Richard Hillestad et al., "Can Electronic Medical Record Systems Transform Health Care? Potential Health Benefits, Savings and Costs," Health Affairs, 2005, vol. 24, no. 5, pp. 1103–1117.*

lives in an emergency situation when questions need to be answered quickly during the emergency decision-making process. For example, during such tragic events as 9/11 and Hurricane Katrina, the benefits of electronic record keeping were highlighted. The injured were more easily treated and may have had better outcomes than those whose paper records had been destroyed.

Despite the staggering costs and the magnitude of this organizational change challenge, the senior leadership team had decided that the potential gains in quality of patient care and patient safety were too great to delay any further, and hence, had recently approved Project HUGO.

A 50:50 CHANCE

While Johnson knew that getting HUGO off the ground was a monumental challenge, she also knew that the results would be well worth the effort. She had spent much of the last four years researching the causes of medication errors and advocating for changes to the system. She knew that HUGO wasn't about efficiency or saving money; it was about saving lives. She thought about the media headlines that were burned into her memory forever. She knew that all of those tragedies could have been prevented by systems like HUGO.

Yet, Johnson was also acutely aware of the many factors that could have a serious negative impact on the adoption of this project. She also knew that the odds of success were not in her favour, with up to 50 per cent of CPOE projects typically failing because of resistance from clinicians. She remembered reading about Cedars Sinai Hospital in California. In 2002, the organization had been forced to scrap a $34 million system when physicians had "walked out" of the hospital and refused to work until the system was removed.[4] Many reasons had been noted for why EPR systems had failed (see Exhibit 9).

Thinking back to her prior conversations with physicians, Johnson knew that the clinicians she had worked with on a daily basis had their own personal reasons for resisting HUGO. And it was not just physicians that Johnson had heard from while working on the HUGO proposal. Nurses were also vocal in their opposition. They had cared for patients for many years using pen and paper (often even just a paper towel), which they felt had worked just fine. These nurses claimed that mistakes did not happen to them because they had perfected the manual processes. Johnson was reminded of a report from a hospital that noted in the first six months after the implementation of barcoded medication administration, a total of 746 medication errors had been avoided. Most of these errors would have gone unnoticed by nursing staff. Even Johnson's own pharmacy staff and other allied health providers had reservations about HUGO. Most staff believed that the physicians would find a way to deflect order entry responsibility to a pharmacist or nurse and thus resented the expected increase in their workload.

"Resistance to change is normal," Johnson thought, but she could not help but wonder whether the timing was right to embark on HUGO. Within the clinical areas, staff was dealing with pressing issues. Infection transmission of antibiotic-resistant organisms was at an all-time high, and staff felt they were being blamed for poor infection control practice. Wait times in the emergency departments were much longer than in any other hospital in Canada; patients were waiting up to three days for a bed after a physician's decision to admit them. In addition, the information technology (IT) services were being outsourced to the United States, and many of the expert technical staff that LHSC needed to rely on had been laid off. Staff throughout the organization was exhausted, morale at an all-time low and sick time was at record levels.

[4] *Cedars-Sinai Doctors Cling to Pen and Paper, by Ceci Connolly, Washington Post, 2005, March 21, 2005; page A01.*

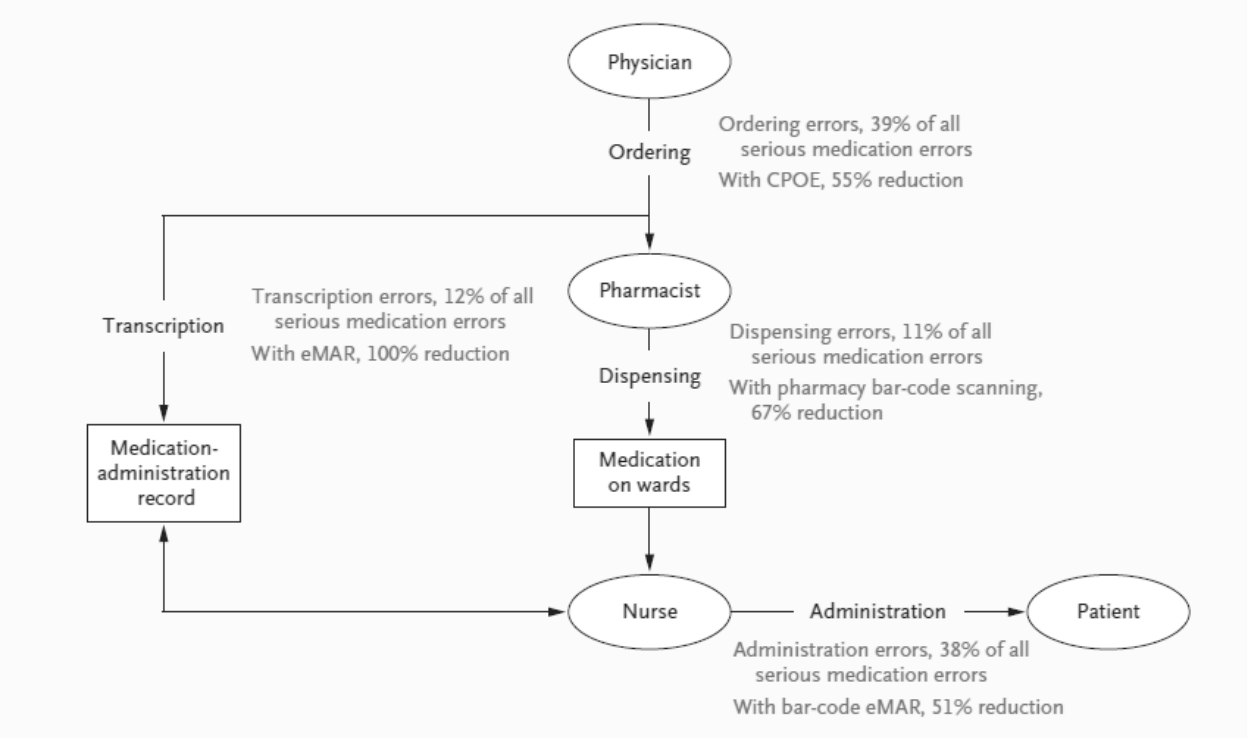
HOW TO MAKE HUGO WORK (AND STICK)

Johnson was well aware of the magnitude of the organizational change challenge that she faced. She knew that the implementation of an EPR was like a hurricane whipping through an organization. Everything that staff once knew would change.

"The happy excitement for the new school year that my children feel could not be more different from the not so joyous anticipation of HUGO for hospital staff", Johnson thought.

Exhibit 1

EFFECT OF HEALTH INFORMATION TECHNOLOGY AT KEY STAGES IN THE PROCESS OF MEDICATION USE



Source: Eric G. Poon, et al, "Effect of Bar-Code Technology on the Safety of Medication Administration," New England Journal of Medicine, 2010, vol. 362, pp. 1698–1707.

Exhibit 2

SUMMARY OF HOSPITALS INVOLVED IN PROJECT HUGO

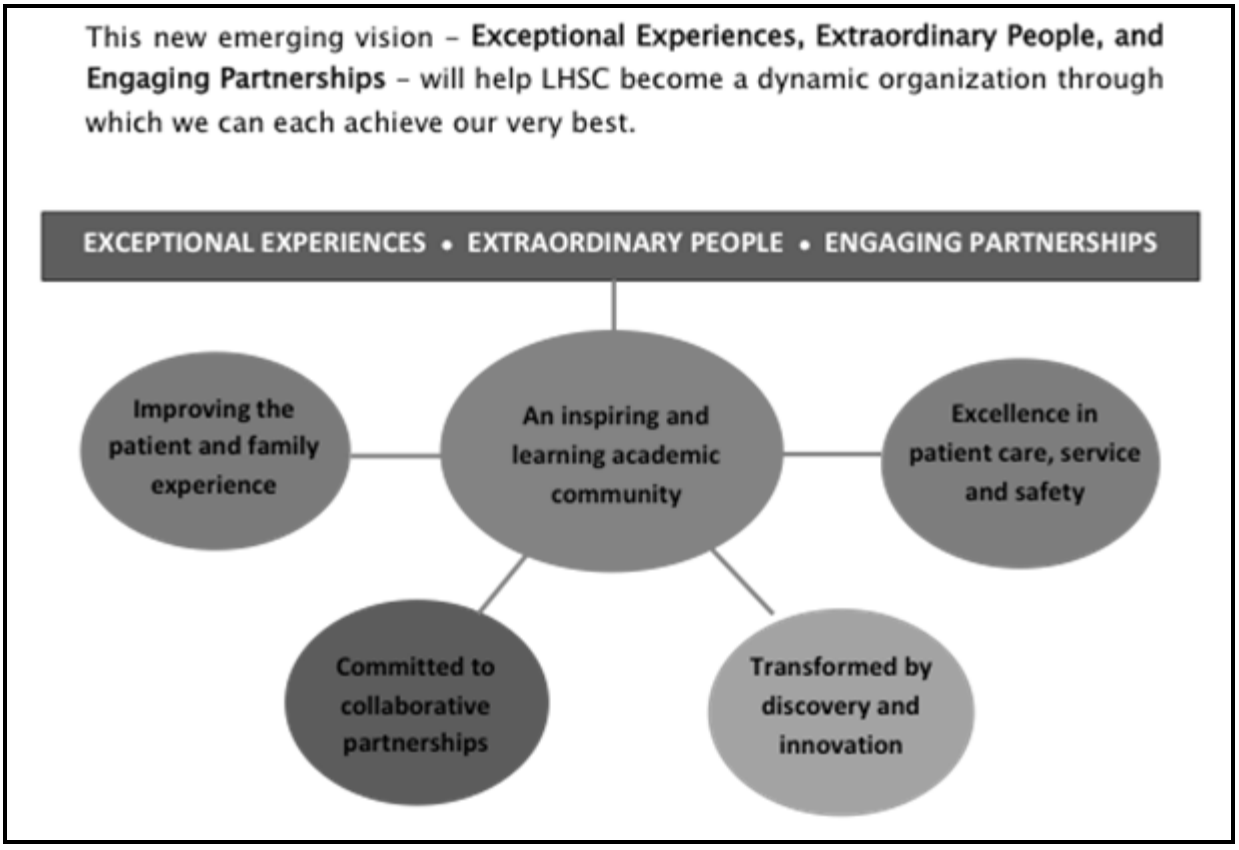
Organization	Type	Bed Count	Description
London Health Sciences Centre	**Acute-care teaching and research hospital**	**998**	Provides the broadest range of patient services of any hospital in Ontario (offering care in 51 different specialties) Provided care to more than 1 million patients in the past year, including the most medically complex and critically ill patients in the region Home to South Street Hospital, University Hospital, Victoria Hospital, Children's Hospital, Byron Family Medical Centre, Victoria Family Medical Centre, London Regional Cancer Program, Fowler Kennedy Sport Medicine Clinic, CSTAR (Canadian Surgical Technologies & Advanced Robotics) and Lawson Health Research Institute
St. Joseph's Health Care	**Major patient care, teaching and research centre**	**1,278**	Provides a broad range of patient care, including outpatient, long-term, regional mental health, rehabilitation, palliative, veterans and specialized geriatric services Home to St. Joseph's Hospital, Parkwood Hospital, Regional Mental Health Care (London & St. Thomas), Mount Hope Centre for Long-Term Care, the Ivey Eye Institute and Lawson Research Institute
LHSC/SJHC provides services to the following regional hospitals, including the operation of a shared electronic health information management system.			
Alexandra Hospital	Community healthcare provider	35	An acute- and continuing-care hospital offering a variety of services, including medical, day surgery and therapy to more than 20,000 patients annually Serves Ingersoll and the surrounding area
Listowel & Wingham Hospital Alliance	Community healthcare provider	LMH: 47 WDH: 34	Composed of Listowel Memorial Hospital (LMH) and Wingham and District Hospital (WDH) Provides numerous services including Medicine, Emergency, Oncology and Surgery to the areas of Listowel and Wingham
Middlesex Hospital Alliance	Community healthcare provider	SMGH: 54 FCHS: 16	Composed of Strathroy Middlesex General Hospital and Four Counties Health Services; serves a combined area of 58,000 residents Focuses on providing outpatient, diagnostic and ambulatory care to the surrounding community
South Huron Hospital Association	Community healthcare provider	19	Serves approximately 19,000 clients within the Municipality of South Huron and adjacent communities, offering both acute and chronic care
St. Thomas Elgin General Hospital	Community health care provider	166	Provides medicine, surgery, obstetrics, pediatrics, anesthesia, emergency and family medicine services to St. Thomas and to Elgin County, which is a catchment area of 89,000 residents
Tillsonburg District Memorial Hospital	Community healthcare provider	51	Provides numerous care services, including medicine, surgery, emergency and mental health to the residents of the Tillsonburg area
Woodstock General Hospital	Community healthcare provider	113	Serving a catchment area of more than 54,000 residents, WGH provides a host of services, including critical care, surgery, ambulatory care and rehabilitation

Source: LHSC Internal Documentation.

Exhibit 3

ORGANIZATIONAL VISION STATEMENTS

London Health Sciences Centre's Vision



Source: LHSC Internal documentation.

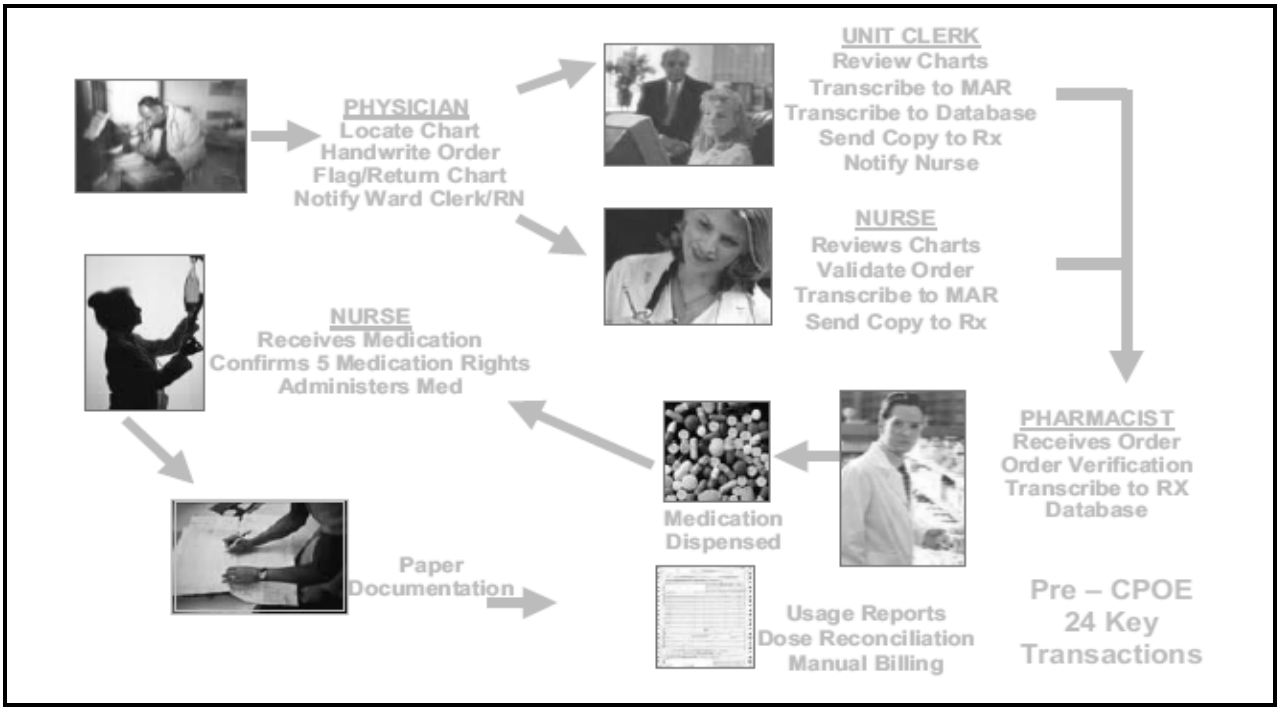
St. Joseph's Health Care's Vision

From the shortest visit to the longest stay, we earn complete confidence in the care we provide, and make a lasting difference in the quest to live fully.

Source: St. Joseph's Health Care, London http://www.sjhc.london.on.ca/missionvisionvalues

Exhibit 4

CURRENT MEDICATION WORKFLOW

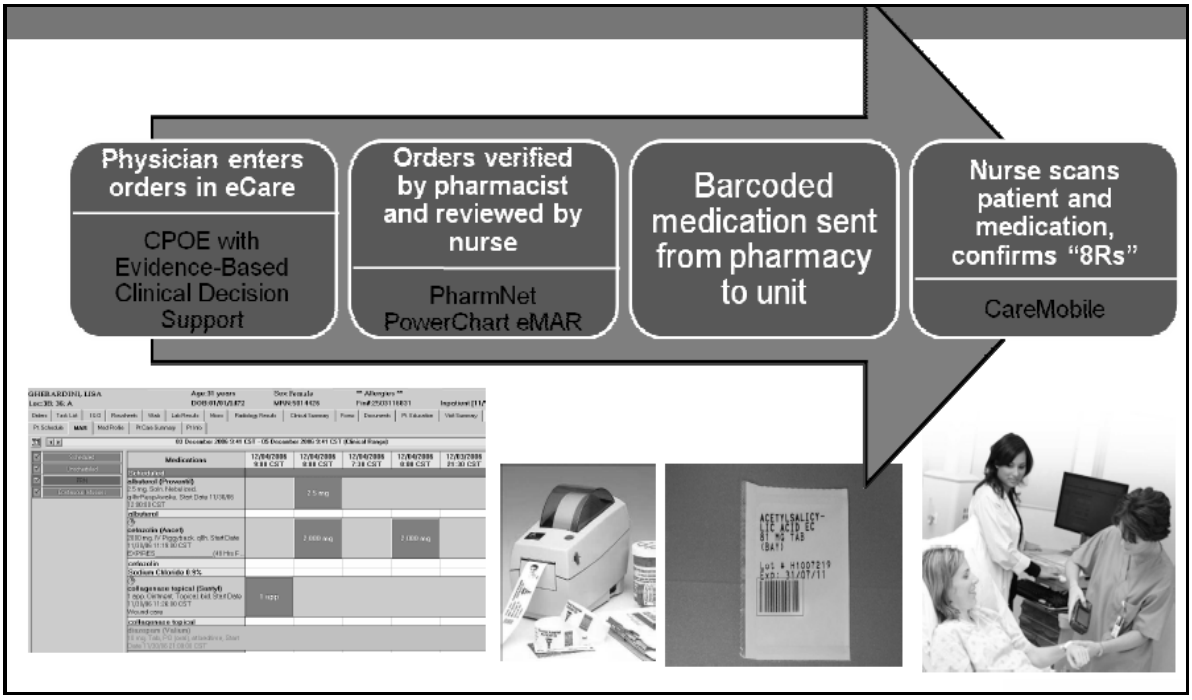


Note: RN = registered nurse; MAR = medical administration record; Rx = pharmacy; CPOE = computerized provider order entry

Source: LHSC internal documentation.

Exhibit 5

PROPOSED HUGO WORKFLOW

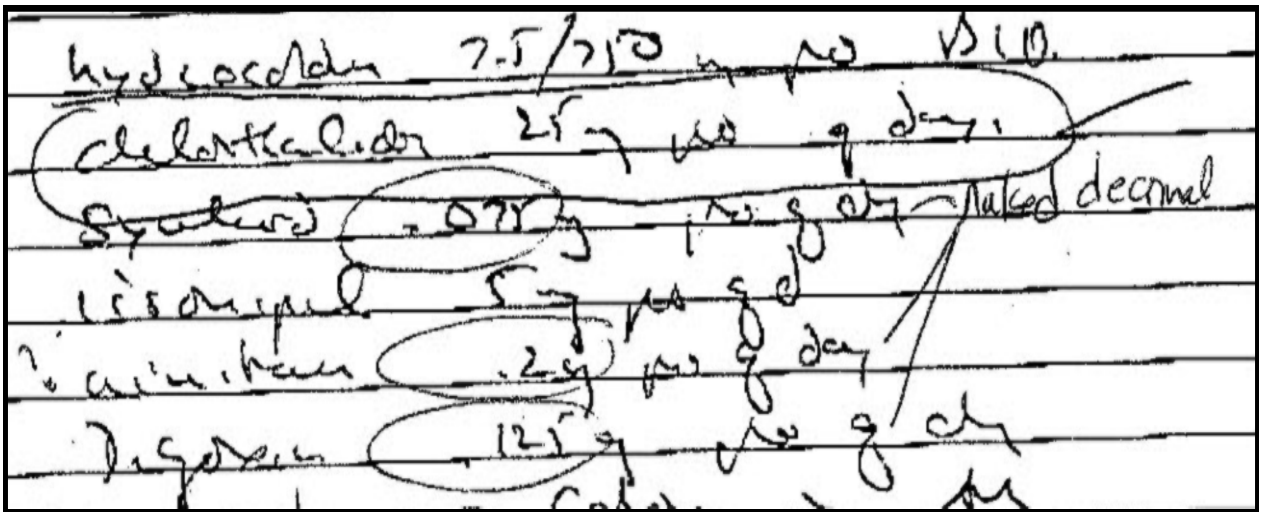


Note: CPOE = computerized provider order entry; eMAR = electronic medical administration record

Source: LHSC internal documentation.

Exhibit 6

SAMPLE HANDWRITTEN MEDICATION ORDER



Source: LHSC internal documentation.

Exhibit 7

SAMPLE HUGO MEDICATION ORDER

	Order Name	Status	Details
Medications			
☑	amiodarone	Ordered	200 mg, TAB, PO, Daily, Routine, 11/12/08 9:00:00 EST
☑	chlorthalidone	Ordered	25 mg, TAB, PO, Daily, Routine, 11/12/08 9:00:00 EST
☑	digoxin	Ordered	0.125 mg, TAB, PO, Daily, Routine, 11/12/08 9:00:00 EST Record apical pulse prior to administration.
☑	levothyroxine (Synthroid)	Ordered	0.075 mg, TAB, PO, Daily, Routine, 11/12/08 9:00:00 EST
☑	lisinopril	Ordered	5 mg, TAB, PO, Daily, Routine, 11/12/08 9:00:00 EST
☐	acetaminophen-HYDROcodone (Vicodin 5/500)	Incomplete	PO, BID (2 times a day), 11/11/08 21:00:00 EST

Source: LHSC internal documentation.

Exhibit 8

CHANGES FOR CLINICIANS

	Today	**With Electronic Patient Record**
Physician Orders	• Orders are handwritten on paper. • Handwriting is often difficult to decipher! • No automatic alerts or warnings if dose is wrong or patient is allergic to the drug. • Physician must have the chart in their hands to write the order.	• Physician can order medications for any patient, anywhere, anytime because they access the chart through a computer. • Handwriting legibility is a non-issue. • Dose-range checking, rules and evidence ensure safe, high-quality care. Physician receives a warning if the drug ordered is inappropriate.
Medication Administration	• Nurse manually writes new orders to paper administration record. • Nurse administers medication with no double check or safety net. • Nurse documents administration manually on the paper record.	• Medications appear directly on electronic medication administration record. • Medications, patient and nurse are barcoded to automatically confirm that they are correct. • Nurse finally has a check at the bedside!
Processes and policies	• In the paper world, many policies and processes are not adhered to, particularly if they are not perceived by staff to be important. For example, medications must be administered within one hour of the time they are due. This time required is not tracked carefully in a paper world and no repercussions result when a dose is given early or late.	• In the electronic world, the nurse will receive a warning when a dose is late or early. If the dose is not given, an incident report is generated, leading to an explanation being required by the nurse.

Source: LHSC internal documentation.

Exhibit 9

TOP 10 REASONS COMPUTERIZED PROVIDER ORDER ENTRY (CPOE) EFFORTS FAIL

Reason	Description	Mitigation Strategy
1. Motivation for implementation is driven by anything but patient care	The purpose of implementation must be quality of care and safety (not an information technology [IT] or administrative project). Cannot be perceived to be "forced."	Promotion of CPOE as a process of medical management and not merely the entry of orders.
2. Lack of clarity in CPOE vision	The organization must have a shared vision regarding the purpose of CPOE.	Implementation of a clear communication and change strategy. Why is change needed?
3. Lack of visible leadership support	Senior leadership is not visibly supportive of the change.	Senior management must have an unwavering commitment to the change and all behaviours must reflect this commitment.
4. Costs are underestimated	Organizations forget about the ongoing costs of ownership. They must account for temporary decreases in productivity.	The organization must consider the total costs of ownership. Extra staffing is required during the go-live process to reduce the impact of decreased productivity. Consider a decrease in patient admissions and volume?
5. Workflow and processes are not accurately and completely mapped and understood.	Organizations do not fully appreciate the complexity of current workflow processes. Staff is often tempted to simply recreate their paper/manual processes in the electronic world.	The organization must consider the total costs of ownership. Extra staffing is required during the go-live process to reduce the impact of decreased productivity. Consider a decrease in patient admissions and volume?
6. Value to users not apparent	Clinicians must understand the value proposition. Clinicians cannot see the CPOE as clerical work.	Use decision-support and evidence-based order sets. Demonstrate that the benefits of the system cannot be provided by the paper-based processes.
7. Project management methodology is not followed to enhance speed to implement. The mistaken belief that hospitals can do it on their own!	Requires very tight project management and accountability	Budget included for senior project manager. Recruitment criteria will include experience with CPOE implementation. We will engage Cerner to assist in our implementation — they have successfully converted 53 CPOE projects and have more than 60 CPOE projects in progress.
8. Technology	Consider usability, system performance, sign on, clicks. Device deployment and access.	Sign-on strategy will be in place before go-live. Clinical informatics, IT staff and clinicians will design interfaces to ensure usability. Planning on two devices per nurse!
9. Training and support removed too soon	Require "live" help at the elbow.	Will have 24/7 support on site for 6 weeks (planned). Will have specific physician help line.
10. No optimization process	Need a plan for rapid action and change after the go-live date to deal with unexpected issues. Need a plan to optimize the system based on feedback.	IT staff will support the system 24/7 after the go-live date. For ongoing optimization issues an e-suggestion box will be in place. Clinical Informatics team will be deployed to interact with teams.