McKESSON Canada

White Paper

Hospital Automation Solutions

Hospital pharmacy automation | Optimizing safety and efficiency

INTRODUCTION

Preventing a medication incident in an often chaotic hospital environment is a key concern for doctors, administrators and governments. Patient safety and wellbeing may be dependent on the accurate and timely dispensing of a treatment regimen that is often contingent upon effective drug therapy.

With thousands of medications at the disposal of practitioners, many of which are varying compounds of the same medication, error in the type and dosage of medication is not uncommon within a hospital pharmacy.

Thankfully, not all errors result in an adverse event for the patient; however, ineffective treatment can result in prolonged illness, side effects or the presence of new symptoms.

In a recent survey, nearly one in ten adult Canadians with health problems reported receiving the wrong medication or the wrong dose when filling a prescription at a pharmacy or when hospitalized within the previous two years. [i]

The Canadian Adverse Events Study found that the administration of drugs and fluids frequently causes harm to patients in Canadian hospitals [ii] and harmful medication incidents have received extensive media coverage.

AcuDose-Rx®

Protecting the patient's health is the number one concern of hospitals and their pharmacies across the country. Technology, when used effectively, can reduce medication errors and improve operational efficiency in the health care system, while curtailing financial losses due to inventory, dosage and dispensing issues.

In fact, in the *Canadian Hospital Pharmacy 2015 (CSHP 2015) Goals and Objectives for Pharmacy Practice in Hospitals and Related Healthcare Settings to Be Achieved by 2015* document, Goal 5 has been set at increasing the extent to which hospitals and related healthcare settings apply technology effectively to improve the safety of medication use. [iii]

By examining the chief demands affecting hospital pharmacies, this white paper will propose a scalable solution that will improve the capacity of Canadian hospital pharmacies and increase their resilience in an over-extended health care system often dependent upon medication to sustain patient health.

The intent of this white paper is to present an integrated pharmacy automation solution that will help overcome the challenges in hospital pharmacy operations and alleviate the possibilities of human error by automating processes in areas where patients will benefit most.

CURRENT HOSPITAL PHARMACY CHALLENGES

Throughout the country greater demands are being made on our health care system. Medical facilities are being asked to do more with less. A shortage of qualified medical staff, an overextended medical infrastructure and a growing population needing care are developing into the perfect storm.

Hospital pharmacies, within the health care system are also navigating through a sea of challenges as a result of the high cost of medical treatment. The inefficient use of resources (personnel, space and technology), managing their inventory and the availability of certain drugs while ensuring patient safety, are key areas of concern.

Health Care Costs

The Fraser Institute noted in 2011, "across Canada, government spending on health has grown faster (8.1% annually) on average than GDP (6.7% annually) since 1975. As of 2011, provincial health spending in Ontario and Quebec currently consumes more than 50% of total revenues." [iv]

With limited resources available, hospitals are being asked to optimize their resources, without jeopardizing the safety of their patients. Hospital pharmacy operations are a significant component of a hospital's service and, as such greatly impact their costs.

Supplies and drugs account for approximately 30-35% of a hospital's operating budget. [v] Staffing, which represents close to over 60% of the remaining cost, must work with the hospital's given medication processing system. Unfortunately manual pharmacy management operations experience inherent losses when medications expire or dosage issues require disposal of medications that would otherwise have benefitted hospital patients. Misplaced, lost or stolen medications on the ward or in the pharmacy not only affects the hospital financially, both in drug cost and personnel time, but can also be dangerous to users.

Resource Issues

As effective members of the health care team, pharmacists are educated to play a key role in the care and treatment of patients admitted to health care facilities, however, according to a 2008 study by the Canadian Association of Pharmacy Students and Interns (CAPSI), only 19.2% [vi] of their time was related to direct patient care. According to the Hospital Pharmacy in Canada 2011/2012 Report released in 2013, over 50% of hospital pharmacists' time continued to be involved in non-patient centered activities. Significant gaps still exist in medication management, counselling and reconciliation towards CSHP 2015 targets.

Time and personnel restraints are causing resource issues that if unmanaged, result in a reduction in patient care and possible errors in their treatment. Pharmacists and technicians are often underutilized in their areas of expertise due to administrative and logistical tasks that consume their time.

Inventory and availability of medication

With less hospital space attributed to storage and inventory and the vast array of medications and compounds available

An adverse event represents an unintentional harm to a patient arising from any aspect of healthcare management.

for doctors to prescribe, the drug managing and ordering process is a complex, yet critical element in the efficiency of patient care.

Ensuring the right medications are in stock and available and in the correct doses when and where they are necessary, can sometimes mean the difference between effectively treating a patient and delaying their care.

Efficient inventory control and intuitive ordering can often prevent the negative results of a drug shortage.

In the 2010 Canadian Drug Shortages Survey Final Report, 93.7% answered yes on a national level to the question "In the last week, did you have trouble locating medications to fill a prescription?" [vii]. Of those respondents 69.8% noted that their patients were adversely affected by the shortage in the following ways:

- Patients are stressed, confused, angry, frustrated, and experience a loss of trust in medication and the pharmacist
- Disruption in the continuity of care
- The alternative drugs have been less effective, especially as 3rd or 4th line alternatives are used
- Antibiotics and anesthesics have been in short supply
- There have been no alternative medications available
- Alternatives cause side effects, allergies, and/or adverse events
- Patients have stopped taking the medications

Patient safety

The traditional hospital pharmacy model is prone to human error that may result in an adverse medical event. Defined as an error that causes an injury to a patient as the result of a medical intervention rather than the underlying medical condition, it represents an unintentional harm to a patient arising from any aspect of healthcare management.

According to David E. Attarian, MD, "Most adverse events are multifactorial, resulting from an overlap of system and human errors. Some adverse events may be new or unanticipated, due to changing technologies. Systems failures—such as poor management decisions, dysfunctional corporate cultures, poor communications, inadequate resources, poor staffing, poor documentation, or a lack of safeguards and check points—generally facilitate human errors. Human errors may be knowledge-based, skill-based, fatigue-based, or may result from a failure to follow rules, technical mistakes, and/or an inability to cope with the complexities or demands of the healthcare system." [viii]

Hospitals and their pharmacies must do all to ensure exemplary patient safety and remove elements that contribute to shortages or errors. Human fallibility and errors caused by a misunderstanding of a doctor's prescriptions due to handwriting or other factors can be eliminated when technology is used to order and dispense medication.

MCKESSON'S PHARMACY AUTOMATION SOLUTIONS

Simply fixing parts of the supply chain is not the solution. It requires a concerted effort throughout the entire process:

- Decision support –There is a need for collaboration and connectivity in the continuum of care to ensure best outcomes for patients and optimal use of time and human resources.
- Accountability – Recording and tracking of medications throughout the supply chain to ensure proper dispensing, administering, and availability of medications and to identify and eliminate diversion.
- Safety – By automating supply, storage, inventory and dispensing of medication, human errors and drug shortages are minimized, thereby improving patient outcomes and safety.
- Inefficiencies – Financial losses, time spent by pharmacists and nurses checking, dispensing, ordering give rise to inefficient operations and management of time and resources.

McKesson Canada offers a suite of automation solutions that dramatically improves workflow, reduces costs and

Simply fixing parts of the supply chain is not the solution.

intrinsically reinforces medication safety at each step of the medication use and supply processes. By increasing communication between nursing and the hospital pharmacy, improving medication safety and optimizing productivity, costs in hospitals of all sizes are significantly reduced.

Through the use of robotics, bar-code scanning automation, and Web-based virtual technologies, McKesson Automation's array of pharmacy solutions enhance medication ordering, dispensing, administration, charge capture and inventory management processes.

The functionality and features of each product drive the medication safety process deeper into the normal workflow patterns of pharmacists, technicians, nurses and clinicians. McKesson Automation Solutions free them from time-consuming, repetitive, manual tasks so they can focus on clinical activities and improve the quality of patient care; an issue that plagues medical professionals across the country.

The McKesson suite of automated solutions can enhance the performance of any hospital pharmacy, whether the system is fully centralized, decentralized or a hybrid combination of the two. Moreover, McKesson Automation Solutions are completely modular, integrating or interfacing respectively with McKesson's and other vendor's product lines; allowing all previous investments to be fully utilized; a feature unique to the McKesson solution.

The following products comprise the McKesson suite of automation solutions and can function together or separately, and can be interfaced with most competitor systems to develop an effective hybrid solution:

AcuDose-Rx® automated medication dispensing cabinets offer smart choices for medication storage, balancing safety, accountability, accessibility and economy for drug dispensing on the ward or unit. Medication is there when needed. The exclusive RightStock™ feature monitors and dynamically adjusts inventory levels, per medication and per cabinet.

PACMED® packager brings intelligent, formulary level management capabilities to high-speed, oral solid medication packaging. The multi-tasking PACMED® Server Plus software could standalone, interface with other existing pharmacy automation equipment or be integrated with the McKesson Connect-Rx® software platform to electronically process orders for specific patients, for AcuDose-Rx® cabinets, and for the MedCarousel®, ROBOT-Rx®, and MedShelf-Rx systems.

AcuDose-Rx®

MedCarousel®

MedCarousel® system automates the management of restock, first dose, and scheduled medications with as much as a 60% reduction in footprint requirement. The bar-code-based scanning and pick-to-light technologies increase picking accuracy and speed. By prioritizing orders for technicians to user specifications, the MedCarousel® increases staff efficiencies and decreases unit-based cabinet stock outs.

The ROBOT-Rx® system is the world's leading hospital pharmacy robotics system. Using bar-code scanning technology, ROBOT-Rx® automates the storage, picking, returning, restocking, and crediting of more than 90 percent of a hospital's daily unit-dose medications.

The McKesson suite of automated solutions will provide decision support to ensure safety and availability of medication to improve patient outcomes with a high level of accountability while reducing inefficiencies and freeing clinical staff to use their time where it is needed most; with the patient. In fact, we are the only vendor with the complete solutions set to ensure a closed loop.

Moreover, efficiency gains, reductions of expired or wasted drugs and costs associated with medication shortages result in a rapid return on investment (ROI) that is sure to be of interest to any hospital administrator.

CASE STUDY

Niagara Health System (NHS) : Ontario's largest multi-site hospital amalgamation comprised of six sites across the 12 municipalities making up the Regional Municipality of Niagara.

Managing a hospital pharmacy drug distribution system, ensuring that correct medication is available when and where it is required and in the proper dosage, is a manpower intensive exercise prone to human error. Proper medication tracking, recycling or disposal of expired or unused unit dosages and standardized drug distribution practices are required by Canadian government bodies.

Recommendations made by Accreditation Canada in 2006, prompted the NHS to review its drug distribution system.

The Regional Director of Pharmacy of Niagara Health Services, had a critical situation on hand:

- **Financial Losses**
  In their current traditional, multi-day dispensing system it was estimated that over $100,000 worth of non-unit dose oral solids were not recyclable and discarded. A substantial cost, this amount did not include the costs of overstocking in a manual, stock-on-demand system, which would add over $200,000 worth of medication waste a year due to expiration and loss.
- **Adverse Events**
  Based on a study evaluating preventable adverse event rates by Norton and Baker in 2004 and comparing case studies of similar sites, NHS would attribute $2.5M yearly in added expense as a result of adverse drug events and increased length of hospital stay. [ix]
- **Inventory and Tracking**
  40% of all drugs distributed came from a traditional ward stock, and was manually accessed by nurses with little to no tracking. No inventory intelligence was acquired, resulting in inconsistent drug fulfillment and frequent overstock situations.
- **Inefficient Use of Resources**
  - Nursing staff spent anywhere from 50-70% of their time dealing with medication related tasks. This included skilled nursing staff in the OR and ICU where there was already an acute shortage of personnel.
  - Ward clerks and nursing staff performed manual order transcription onto the medication administration record and checking while 85-90% of drug orders were already processed by the pharmacist in the Pharmacy Information System.
  - Standard medication administration times were used but there was an opportunity to improve pharmacy and nursing communication. There were multiple medication locations for nursing staff to access for any single patient's medication administration.

In need of a systems-based (or system-wide) solution, the Regional Director solicited the expertise of McKesson Canada to propose a solution that would integrate with their Meditech clinical software.

The goal was to support hospital staff with recognized state of the art proven technology to reduce human and drug costs and reinvest savings to continually improve pharmacy services by **centralizing purchasing** and the provision of a 24- hour unit dose cart fill at the St. Catharines General, which would service the NHS.

Additionally, the selected solution needed to support **decentralized nursing practices** on the ward for first dose, narcotic/controlled drugs and PRN, as needed medication dispensing. By investing in pharmacy automation that maximized the utilization of nursing and pharmacist clinical skills while improving the staff's quality of work life, recruitment and

retention, NHS would reap the benefit of exponential pay back in improved nursing efficiency and patient outcome.

Finally, the solution needed to bring NHS' pharmaceutical service level to the forefront of best practices and be prepared to set the stage in closing the loop on medication safety within a three year time frame, as identified in the Canadian Hospital Pharmacy 2015 (CSHP 2015) Goals and Objectives for Pharmacy Practice in Hospitals and Related Healthcare Settings.

By reviewing NHS's actual processes, analyzing acquired data and discussions about the alignment of their vision of an effective distribution system, McKesson proposed a **hybrid solution** that would centralize purchasing, medicine tracking and distribution to the wards, while decentralizing a controlled access for first dose, narcotic/controlle and PRN nurse dispensing.

This proposed solution maximizes the effectiveness of their Meditech clinical software by interfacing it with a single automation backbone, Connect-Rx®, that would keep manual process to a minimum.

McKesson's approach was to share and communicate the strategic plan with key stakeholders to obtain their requirements, input and buy-in to the new methods being proposed.

In order to ensure the greatest impact in resolving the identified issues, McKesson proposed the unit dose packaging of the top 10 expensive non-ward stock oral drugs to cut down on discard costs immediately. This was done as a stop-gap before any proposed automation equipment was brought in. This was soon followed by the roll out of NHS's first PACMED-500, IntelliShelf-Rx (replaced by MedShelf-Rx today) and 48 AcuDose-Rx throughout NHS.

With the initial implementation operational, NHS augmented their investment to deliver a solution that was able meet all of NHS needs and offer both centralized and decentralized capabilities to the pharmacy and to the ward. In 2013 when a new hospital site was opened in St. Catharines, the following components were implemented in this hybrid solution:

- Two MedCarousels®, which allowed for the centralized automation and management of restock, first dose, and scheduled medications. The bar-code-based scanning and pick-to-light technologies increased picking accuracy and speed while managing the hospital's medication inventory in real-time.
- A second PacMed 500®, which provided centralized intelligent, formulary level management capabilities to high-speed, oral solid medication packaging.
- The multi-tasking PACMED Server Plus software integrated with the McKesson Connect-Rx® software platform to electronically process orders for specific patients, for AcuDose-Rx® cabinets, and for the MedCarousel® and crediting functions systems.
- AcuDose-Rx® cabinets decentralized on critical care, expensive or high narcotic usage areas including OR, with up to 15 drawers with three security levels that allowed for decentralized medication dispensing for nurses to administer first dose, narcotic/controlled substances or PRNs, with secure tracking and accountability.

Together, this integrated solution allowed for the automation necessary to improve the efficiencies of hospital resources through centralized decision support, inventory management and accountability while assuring patient service and safety on the ward.

According to Susan Cubelic, the current Regional Director of Pharmacy of Niagara Health System, this scalable solution provided outstanding results to our hospital sites. "From a medication safety perspective, pharmacy automation has put us on a successful path to meet our overall goal of an integrated medication management system that closes the loop from when a patient medication order is obtained to when that medication is administered."

The return on investment (ROI) was less than three years with the initial phase, which allowed us to reinvest in additional components to further automate our pharmaceutical practices, improve patient outcomes and allow our staff to perform more valuable activities more directly related to patient care."

CONCLUSION

Almost 10 years ago the Baker Norton Canadian Adverse Events study uncovered several shocking statistics:

- The three most common areas for adverse events to occur include surgery, medication, and infection.
- 1 out of 13 adult patients admitted to a Canadian hospital encounter an adverse event.
- 1 out of 9 adults will potentially be given the wrong medication or wrong medication dosage.

- 187,500 out of 2.5 million patients admitted annually to acute care hospitals experience an adverse event.
- Between 9,000 and 24,000 patients die per year due to adverse events.
- 37% of adverse events are 'highly' preventable.
- 24% of preventable adverse events are related to medication error. [x]

The effective use of technology can considerably improve these statistics by reducing human intervention in the ordering, packaging and dispensing of medication. With the implementation of proven automation technology, medication errors can be significantly reduced.

Better yet, precious medical resources such as nursing staff, hospital pharmacists and technicians can be more effectively used in the direct treatment of patients. The quality of their work lives, as well as better patient outcomes are important end results of hospital pharmacy automation.

Moreover, scarce hospital space is maximized in the inventory and storage of medication, allowing it to be most effectively used by stocking medication that is required for immediate patient care and providing the decision support necessary for *just in time* delivery.

These benefits not only result in better patient care and outcomes, better utilization of human and real estate resources, but also produce important financial savings for the institution by eliminating misplaced, improperly dosed or expired medication, maximizing use of available space and by reducing hospital patient stays by providing a more accurate level of care. ROI, in most cases, is rapid and the solution can be implemented in phases, to ensure budget constraints are respected and hospital finances remain on track.

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About McKesson Canada

Founded more than 100 years ago, McKesson Canada is dedicated to delivering vital medications, supplies, information technologies and clinical care management that enable the health care industry to provide patients better, safer care.

Our solutions empower pharmacies, manufacturers, hospitals and other health care institutions by enabling them to get closer to the millions patients they serve every single day, while contributing to the quality and safety of care in Canada.

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