

Automating the medication use process: North York General Hospital Pharmacy Services

ABSTRACT

North York General Hospital in Toronto, Ontario, Canada is a 434-bed healthcare facility with approximately 2200 medications listed on its hospital formulary. In the later part of 2005, the hospital began research to develop a bar coding strategy to reduce potential medication errors at the point of care, and to streamline their pharmacy operation processes. The outcome of research performed by North York General Hospital, Pharmacy Services has resulted in its endorsement of GS1 standards for its bar coding strategy and leveraging their established criteria of using “unique, static data” that defines the Global Trade Item Number (GTIN) – helping to move the healthcare sector to an increasingly e-driven global supply chain.



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Background

In Canada, the federal government’s healthcare arm – Health Canada – does not mandate bar coding of pharmaceutical (Rx) drugs. However, manufacturers are required to mark the product packaging with the drug’s unique Drug Identification Number (DIN). DINs are assigned by Health Canada to a pharmaceutical product prior to it being marketed. The DIN is a computer-generated eight-digit number that uniquely identifies all prescriptions and over-the-counter (OTC) drug products sold in Canada.

However, the attributes associated with the DIN are limited; the DIN is not unique to the drug package hierarchy and does not enable globally unique identification of a product. This poses challenges in the implementation supply chain improvements. As well, the DIN does not support automatic identification technologies, which inhibits implementation of improved patient safety measures that would enable a healthcare provider to more effectively confirm that a particular medication is being administered to the right patient, at the right time, and in the right dosage.

With these circumstances in mind, North York General Hospital, Pharmacy Services set about on a journey to identify patients and drugs effectively and correctly, seeking a method to track and trace medications from the point they enter the hospital, to when they are administered to patients. The goal was to do so by augmenting the capabilities provided by Health Canada’s DIN and by meeting the hospital’s Pharmacy Services bar coding criteria of unique and static information.



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First steps

Medication error literature consistently documents that approximately 39% of potentially serious medication errors occur at the point of administration. This is due to the fact that, after a medicine is administered to a patient, it cannot be retracted. Types of medication errors that may occur include:

- Wrong patient
- Wrong drug
- Wrong dose
- Wrong dosage form
- Wrong strength
- Wrong time

Most significantly, literature reports that only 2% of administration errors are actually caught prior to administration.

The hospital's Pharmacy Services was determined in its goal to find alternatives to the processes and solutions already in place in order to improve safety at the point of care, thereby preventing the types of errors reported in the literature. North York General Hospital has a culture of safety and believes that errors reflect failures in processes. No healthcare provider comes to work wanting to make a mistake. And while some errors simply cannot be identified by bar coding, the majority will be.

The hospital's first step was to take a systematic look at what it needed to do to improve its own medication error rates. This was completed by methodically assessing the touch points of the hospital's medication-use process as a whole, which led to the identification of approximately three dozen touch points in all. As with any hospital, the medication-use process begins with procurement and inventory management, followed by dispensing the medication – enabling the drug to be available at the point of administration for nursing units.

As a result of its research of point of administration errors and its medication-use process, North York General Hospital, Pharmacy Services determined that their bar coding strategy had to be able to identify preventable errors by triggering the healthcare provider at the point of care to re-evaluate the patient, the medication, the dose and the dosage prior to administration. Following this determination, the pharmacy was set to identify the following:

- Its preferred bar code;
- How bar codes could be affixed to each of its medications as a unit dose entity;
- How medications are provided to the nurse; and
- How the bar coded medication is administered to the patient.

In the absence of a national standard for a bar code strategy in healthcare, Pharmacy Services developed its own criteria for a bar coding solution. The criteria included ensuring that the bar code would be unique, specific and static, enabling Pharmacy Services to identify the pharmaceutical product at every level

of packaging. This endeavor included strong collaboration with internal and external stakeholders in order to arrive at the right bar code strategy.

The only solution that met all of the criteria was the GS1 standard GTIN.

The GTIN

North York General Hospital, Pharmacy Services first approached GS1 Canada for additional information on the Universal Product Code (UPC) in the later part of 2005. There were just a handful of GS1 Canada members at this time in the hospital sector, meaning the GTIN was not leveraged beyond the point of the manufacturer and therefore placing a lot of responsibility on hospital pharmacies to effectively track and trace their products.

Pharmacies, specifically hospital pharmacies, face the challenge of managing the organization of medications received in bulk. For example, hospital pharmacies will obtain medication packages containing 100 doses and the only bar code that appears is placed on the secondary packaging (e.g. the container). The hospital pharmacy is therefore obligated to repackage each unit dose within that larger package, repackaging each dose with a hospital-generated, bar code identifier.

Following the determination that the GTIN was the hospital's preferred standard, North York General Hospital, Pharmacy Services prepared a spreadsheet that contained all of the different pharmaceutical manufacturers from whom they purchased medications. From there, the pharmacy determined which manufacturers were already using the GTIN and which were not.

With 2200 medication types on the hospital's formulary, and only a small percentage of those containing a unit dose GTIN bar code at the time, the pharmacy – along with every other hospital pharmacy in Canada – faced a lot of work in regards to tracking and tracing its medications safely and effectively.

The bar coding strategy: The process

In order to meet the needs of the hospital and ensure that each medication unit dose could be tracked and traced to support the hospital's commitment to a culture of patient safety, the North York General Hospital, Pharmacy Services developed the following processes as part of its strategy in order to identify each unit dose with a bar code.

Point of procurement

When a formulary medication comes into Pharmacy Services' locale, it is recorded on the previously mentioned spreadsheet whereby each pharmaceutical manufacturer is noted as being GS1 GTIN-compliant or not.

Virtually all pharmaceutical (Rx) and OTC products are marked with a GTIN at the bulk level, as well as those medications that come into Pharmacy Services already packaged as unit doses for patients. Products at patient-level that are administered in the manufacturer's original packaging or that are stocked at nursing stations are also identified with GTINs.

However, for those products a part of bulk medication shipments requiring repackaging as unit doses, a proprietary bar code is affixed as an identifier until all hospital suppliers become GS1 GTIN compliant.

Affixing bar codes to unit doses

It is crucial for the infrastructure of a hospital pharmacy matches its medication-use process – which means that a hospital's already stringent budget needs to be stretched to meet the necessary requirements that come with implementing a bar coding strategy.

North York General Hospital therefore purchased an automated repackaging machine to provide unit dose dispensing – removing manual processes to help Pharmacy Services realise operational efficiencies with unit dose packaging, as well as prevent potential errors that occur by prepackaging medications. The capital for this system is extensive – priced at approximately \$300,000CAD.

In order to affix proprietary bar codes to those unit dose packages that the hospital creates via its automated repackager, a bar coding station was established by purchasing a machine that would create and generate bar codes – this system is approximately \$30,000CAD. With the bar coding station, North York General Hospital Pharmacy is enabled to input bar code numbers and print off bar code labels to be affixed to unit doses.



Bar coding station, including test scanner

As an added layer of safety, medications identified with either a GTIN or proprietary bar code are validated at the bar coding station before being added to the pharmacy's inventory. The pharmacy retains a hand-held device that tests unit dose bar

codes to ensure they are identifiable and readable, thereby preventing them from being rejected when they are scanned at the point of administration.



Testing bar codes

Only after a unit dose is bar coded and tested can it make its way into inventory for eventual administration to a patient.

Cost savings

Despite the costs, North York General Hospital's executive committee supported the hospital pharmacy's proposal to purchase the above systems and implement the bar coding processes proposed – a direct reflection of the hospital's dedication to patient safety. This encouraging decision was largely due to Pharmacy Services' awareness presentation, given to the hospital executive committee in 2005 to identify areas of breakdown leading to medication errors and highlighting errors occurring at the point of administration. Through this presentation, the hospital pharmacy enhanced overall knowledge internally and leveraged executive support to proactively prevent errors.

As a result, the bar coding station and automated repackager have already enabled North York General Hospital to realize a cost savings of 7-8% each year in terms of its medication purchasing and packaging activities.

Mandating the GTIN

With the hospital's executive support, a logical next step would be to attain support from the supplier community to assist all Canadian hospitals to wholly implement the GS1 standard GTIN, which would enable interoperability on a national scale and remove the need to affix proprietary bar codes to medication unit doses.

North York General Hospital, Pharmacy Services has unarguably identified the need to include GS1 bar code adoption as a factor when procurement groups are evaluating drug products

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during the contract process. However, individual hospitals are not in a position to mandate bar coding standards; this is a government decision.

To this end, GS1 Canada is collaborating with leading Canadian pharmacy supply chain stakeholders, the Institute for Safe Medication Practices (ISMP Canada) and the Canadian Patient Safety Institute (CPSI), having launched a national project to promote automated drug identification in Canada using global GS1 bar coding standards. The goal of both ISMP Canada and CPSI, along with all healthcare partners, is to reduce preventable medication errors affecting patients in both institutional and community settings. The collaborative efforts of ISMP Canada, CPSI, GS1 Canada and healthcare industry stakeholders resulted in a national consensus in 2010 to use GS1 bar codes as the standard format for labeling medication packaging in Canada.

Next steps

Approximately four years have passed since the North York General Hospital, Pharmacy Services began taking steps to augment its medication-use processes and improve patient safety at the point of care. The hospital pharmacy's bar coding strategy will officially roll-out to all hospital departments in early November of 2010, when anticipated additional benefits and cost savings will be realized.

Due to the anticipated success of this initial undertaking, the hospital pharmacy is moving forward with implementing bar coding strategies for all medication dosage forms, including oral, injectibles, topical, and other dosage forms dispensed through North York General Hospital, Pharmacy Services. In addition, Pharmacy Services has also engaged in discussions with GS1 Canada to leverage additional GS1 standards in the future, namely the GS1 Company Prefix Licence. A Prefix will enable the pharmacy

to create GS1-compliant bar codes, streamlining their bar coding process by removing the need for proprietary identifiers.

Today, there is increasing momentum in the Canadian healthcare sector to reach consensus on business processes that support GS1 standards. With collaborative efforts and community management initiatives, such as North York General Hospital's representation on the GS1 Canada Healthcare Pharmacy Sector Board – multiple industry sectors across Canada are working together to make enhanced patient safety a reality with critical mass adoption of a standardized and automated medication use process.

ABOUT THE AUTHOR

Doris Nessim has over 15 years of experience in healthcare and pharmacy leadership positions, including project management in implementing healthcare technologies, as well as pharmacy practice, education and research experience.

Currently, Ms. Nessim is the Director of Pharmacy Services at North York General Hospital, a large community teaching hospital located in Toronto, Ontario, Canada. In addition to providing overall strategic leadership, fiscal planning, and managing acute and ambulatory care pharmacy services, Ms. Nessim's visionary leadership is advancing safe medication practices at each stage of the medication use process.

Ms. Nessim received her MA in Higher Education from the Ontario Institute for Studies in Education, University of Toronto, and is a graduate of the Faculty of Pharmacy, University of Toronto. She completed her residency in Hospital Pharmacy Practice at Toronto General Hospital.