

RFID in Pharmacy Management with an IntelliGuard® RFID Solution for Critical Inventory

A CASE STUDY AT SHARP MEMORIAL HOSPITAL




Sharp Memorial Hospital Pharmacy Department annually spends over \$22 million on pharmaceuticals. With around 5,000 drug products on its formulary, this represents approximately \$2 million in inventory at any one time.

Sharp estimated that thousands of dollars could be saved every year if they could confidently lower inventory with tighter par levels and consistently and accurately identify drugs that were expiring within their return window.

The Problem:

To manage and control medication inventory, Sharp uses automated dispensing cabinets (ADCs), open shelves and pharmacy refrigerators. Despite this, Sharp identified a number of potential failure points in their current processes. They knew that these failure points limited accurate inventory visibility and precise controls of critical dose, high-value drugs. These drugs in particular require constant monitoring of utilization metrics and expiry data of each individual item to prevent stock-outs, overbuying and expired drug waste. Two critical issues underlying many of the failure points in their current processes are:

 Barcode scanning requires a manual step conducted by a human operator.



Because the human operator is not required to scan each medication individually when it is dispensed or restocked, inventory changes are missed and cannot be relied upon to correctly identify usage or stocking levels.

Additionally, ADCs, open shelves and current pharmacy refrigerators do not provide an automatic way to identify and provide notifications of expiry data.

The Solution:

Sharp Memorial Hospital Pharmacy Department installed an IntelliGuard® RFID Controlled Temperature Inventory Management System stocked with 26 high-value, critical dose drugs representing nearly \$350,000 of inventory. Utilizing RFID-enabled temperature-controlled cabinets, usage information is automatically captured so managers always know what they have in stock and receive automatic restock, expiration and reorder reminders.

The Results:

- Reduced daily inventory spend by **17.2%**
- Reduced daily inventory quantities by **10.6%**
- During the 15 months of the study, there were no stock-outs and no medications expired unused

The IntelliGuard® RFID Controlled Temperature Inventory Management System enables automated inventory

management of high-value drugs for only a fraction of the cost of the drugs to which they are applied. Pharmacy leaders receive continuous visibility to precise inventory levels, utilization metrics and expiry data needed to right-size inventory without putting patients at risk of stock-outs.

To learn more visit: www.IG.Solutions

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The Mission

Managing a Modern Hospital Pharmacy

As drug therapy in hospitals has become more complex, hospital pharmacists have assumed essential clinical roles as part of interdisciplinary medical teams. Their multifaceted functions now include, but are not limited to: reviewing physician orders to optimize the medication regimen; compounding parenteral solutions for immediate patient use; and reducing adverse drug events by advising on the uses, contraindications and interactions of the thousands of drugs the pharmacy stocks.

With the advent of RFID, hospitals have a technological solution to the problem of inventory management that allows actionable insight to ensure that the right drugs will be available for patients at the right times, while confidently reducing inventory costs.

Yet the bottom-line reality is that much pharmacy work still involves maintaining inventory levels within shrinking budgets. Pharmacists are caught in a constant balancing act between inventory duties, budgets and patient care. Hospitals may lose hundreds of thousands of dollars each year on expired drugs. These expirations could have been avoided, and some drugs even returned for credit, if only timely inventory systems were in place. “Fear factor” over purchasing is widespread, increasing the cost of held inventory to alleviate the very real concern that a critical drug might not be in stock when a patient needs it.

“The goal of supply chain management operation is to have the right quantity of product in stock at the right time,” says S. John Johnson, Director of Pharmacy for Sharp Memorial Hospital, “It’s very easy to over purchase, and in today’s environment we’re evaluated on our ability to manage costs, and a big cost is held in inventory.”



“Fear factor” over purchasing is widespread to alleviate the risk that a critical drug might not be in stock when a patient needs it.

The Challenge

Cost-Effective Inventory Management of High-Value/Low-Use Medications

Sharp Memorial Hospital, part of the Sharp HealthCare system, is San Diego's largest emergency and trauma center, with advanced patient care services ranging from oncology to multiorgan transplantation. It is also well known as one of the most technology-forward hospitals in the United States, having been named one of the "100 Most Wired Hospitals and Health Systems" in *Hospitals and Health Networks Magazine's* Most Wired Survey and Benchmarking Study. Sharp is one of only six health care systems in the nation to have been recognized in each of the eleven years the survey has been conducted.

The Sharp Memorial Hospital Pharmacy Department annually spends over \$22

million on pharmaceuticals. With around 5,000 drug products on its formulary, this represents approximately \$2 million in inventory at any one time. Many of the items have a shelf life of several years or are prescribed so often, in many cases on a daily basis, that waste through expiration is rarely a concern. However, Sharp also stocks high-value medications that are so infrequently prescribed, it may be months or even years before they are required. With these drugs, the likelihood of waste through expiration is high. Yet, while some can cost as much as \$50,000 per dose, Sharp cannot risk not having them in stock, because they are necessary to treat life-threatening conditions, ranging from snake bites to cancer.



Sharp Memorial Hospital Pharmacy spends over \$22 million on pharmaceuticals annually. With around 5,000 drug products on its formulary, this represents approximately \$2 million in inventory at any one time.

Inventory Levels – The Limits of Par Levels and Kanbans

Sharp's current inventory system combines "Kanban" cards, developed by Toyota to manage par levels in "just-in-time" or "lean" manufacturing. Most medications in the Sharp pharmacy have been assigned their own individual Kanban card, which specifies their minimum and maximum stocking levels. The levels are set and reset based on historic data from Sharp's wholesaler. If the trend indicates more of a drug is being used, the minimum will be recalibrated upwards. If less, the minimum will be decreased.

Despite the rigorous logic of the system, much of the ordering process is still based on the very human concern that one day a critical medication might not be on the shelves when needed. Because many medications expire unused and most wholesalers have a limited window for returns, Sharp estimated that thousands of dollars could be saved every year, if they could both lower their par levels and identify drugs that were expiring within their return window and could be returned for credit.

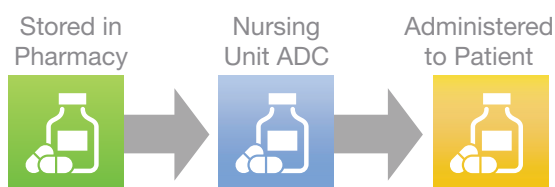


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Medication Inventory Errors – The Limits of Barcoding, Conventional ADCs, Open Shelves and Standard Pharmacy Refrigerators

The process of how a medication makes its way from the wholesaler to the patient is complex. In simple terms, medications are stored in the pharmacy on open shelves or within pharmacy refrigerators; eventually delivered to a storage area on the nursing unit (in many cases within an ADC); and, when needed, the medication is retrieved from the ADC and administered to the patient.

WHOLESALER-TO-PATIENT PROCESS



Each one of these stages represents a touch point, and accurately performing them all at the right time requires choreographed precision. When a step is missed or done incorrectly, it can have downstream effects that result in inventory discrepancies and medication errors.

To reduce errors, manage inventory and provide better clinical access to medications, Sharp uses ADCs, as do most modern hospitals. The primary purpose of these inventory management cabinets, which were developed in the 1980s, is to ensure the well-known “five rights” of medication safety (right patient, right drug, right dose, right time, right route). Since most drugs are now packaged and dispensed as unit dose, ADCs have drawers with “pockets” to fit various sizes of containers, as well as automated controls for opening and closing. Newer models can also scan barcodes.

Despite this, Sharp identified a number of potential failure points in the filling/dispensing process that limit the reliability

of accurate inventory levels and medication expiry data tracking.

The two critical issues underlying many of the failure points of ADCs are:



Barcode scanning requires a manual step conducted by a human operator.



The human operator is not required to scan each medication individually when it is dispensed or restocked.

Whether kanban or barcode, there are still too many manual steps—and too many humans—in the mix, leading to too many failure points.

None of the current solutions (open shelves, ADCs or standard pharmacy refrigerators) provide an automatic way to inventory medication stocking levels and expiry data. The most sophisticated solutions currently on the market ask a clinician to type on a computer keyboard how many items she or he has taken and/or how many items remain after they have taken what was requested. Because this process relies on human intervention, and to some extent, on an “honor system,” there’s no way to know if an inventory report is actually accurate.

In addition, these solutions require manual checks for outdating. Expiration date reports are run (typically monthly), and each medication storage location is manually checked for expiring items. This presents a similarly unreliable and time-consuming process, and in the case of high-value medications, a missed expiration can be very costly.

The Solution

The IntelliGuard® RFID Controlled Temperature Inventory Management System

Overcoming Reliance on Human Perfection

The IntelliGuard® RFID Controlled Temperature Inventory Management System uses RFID technology to automate the manual inventory process. Radio Frequency Identification (RFID) tags eliminate manual scanning or other human data input.

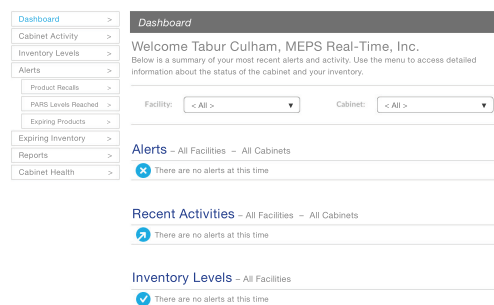
Staff simply maintains their current workflow—open the cabinet door, remove what’s needed, close the door. The IntelliGuard® RFID Solution is equipped with an embedded reader that scans for RFID tags and updates inventory every time the unit door is closed.

Information is automatically captured and reported to a web-based portal, so Sharp’s pharmacy managers always know what they have in stock and can enable auto restock alerts and reorder reminders. The IntelliGuard® RFID Controlled Temperature Inventory Management System also tracks and alerts on the temperature conditions in which drugs are stored and maintains a database and notification of expiry data of each drug.

Reports are available on demand through the portal, and notifications keep the hospital pharmacy informed.

Using the IntelliGuard® RFID Solution, hospital pharmacy leaders can:

- Quickly find and remove expired, near expired or recalled medications
- Process reorders based on par levels
- Confidently reduce inventory and prepaid inventory costs
- Improve patient safety by reducing stock-outs
- Increase inventory control through par level, expiration and lot number alerts and reports



From a budget point of view, the IntelliGuard® RFID Solution enables automated inventory management of high-value drugs for only a fraction of a percentage of the cost of the drugs to which they are applied.

How It Works

A unique RFID tag is affixed to each individual drug. Item-specific data (NDC data, lot number and expiration date) is then associated to the RFID tag using a quick machine scan. The item is now ready to be placed in IntelliGuard® RFID Solution controlled-temperature cabinets (CTC).

When items are loaded or dispensed, there's no need to type in how many items have been added or removed. The System's RFID receiver automatically detects and recalibrates its own inventory. Expiration notification, based on the hospital's specific parameters, is also provided for each drug in the system, so that stock can be rotated and used, or returned for credit.



The Result

RFID-Enabled Inventory Management at Sharp Memorial Hospital

Sharp Memorial Hospital's system was provided by MEPS Real-Time, Inc. (Carlsbad, CA) in exchange for testing and gathering data on ROI over a 15-month study period. Sharp stocked the IntelliGuard® RFID Controlled Temperature Cabinets with 26 high-value, critical dose drugs that required constant monitoring of utilization metrics and expiry data of each individual item. The study tracked nearly \$350,000 of inventory.

Methodology

Sharp installed multiple IntelliGuard® RFID controlled-temperature cabinets (2c-8c degrees for Cold storage and 20c-25c degrees for Controlled Room Temperature storage). The 5.2 cu. ft. cabinets were strictly used to store and track high-value/low-use medications in the central pharmacy.

Inventory came into the Sharp Pharmacy as usual. Once received, each individual dose was RFID tagged and encoded with details about the specific drug (name, manufacturer name, expiration date and lot number). Doses were then stored in the IntelliGuard® RFID-enabled cabinets.

After every stock or removal, the IntelliGuard® RFID Controlled Temperature Inventory Management System automatically updates the inventory of the cabinet(s). At the end of the day, the system automatically sends a daily reorder report to the hospital supply chain. (The timing of reorder reports also can be custom set.) Pharmacy management is provided alert notifications about upcoming expirations, which are custom set to the timing window to best fit their stocking/return schedule.

Sharp Realized Benefits in These Areas:

- Initial Savings: Sharp realized a one-time inventory reduction in par levels based on real-time visibility attained from automated reordering and just-in-time delivery.
- Ongoing Savings: Reduced daily inventory spend by 17.2% and reduced daily inventory quantities by 10.6%.
- Stock-Outs: Sharp used loan/borrows as a surrogate marker for stock-outs. There were 23 loan/borrows in the two years prior to the IntelliGuard® study. During the 15 months of the trial, there were none.
- Expirations: No medications expired unused, therefore equating to zero dollars lost during the study period.

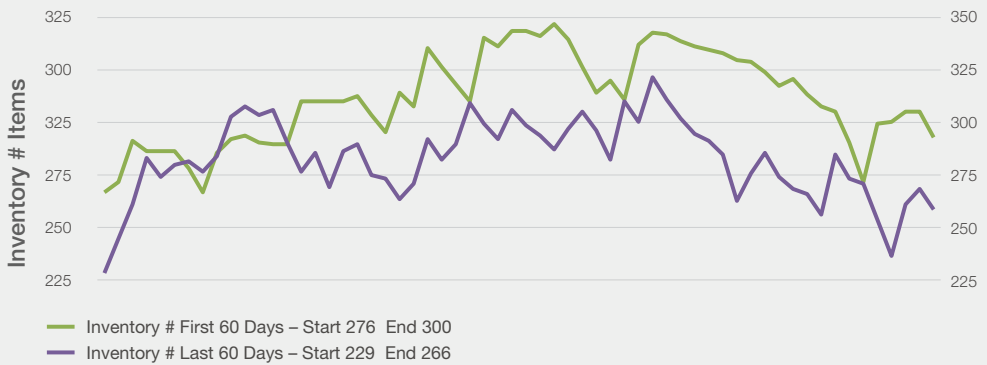
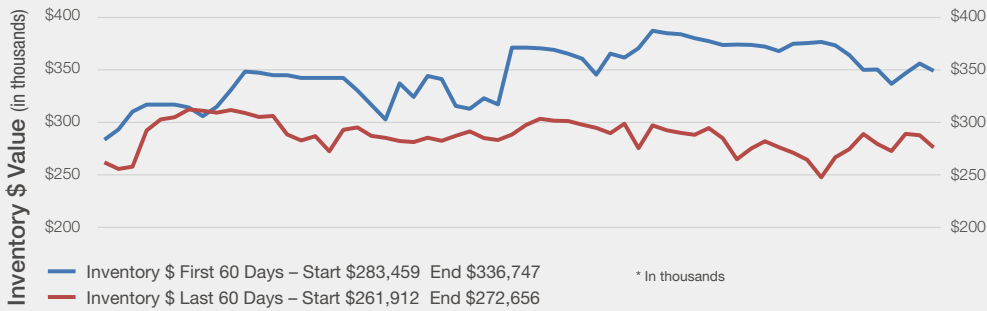
Sharp Additionally Gained the Ability to:

- Set up real-time trigger reports for target drug usage
- Take action (rotate or return) 100 days prior to the drug expiration date
- Monitor drug use and examine objectively if par levels were set up correctly or in need of adjustment
- Take the panic out of recalls, knowing that recalled lot numbers could quickly be located



The study provides quantitative data to show even the most experienced staff can make mistakes using a manual process, which is hard to quantify and prevent without the use of an automated system.

Intelliguard® RFID Solutions Study – Sharp Memorial Hospital
 15-Month Study Comparing First 60-Day Baseline with Last 60-Day Result



17.2% reduction in daily inventory spend

10.6% reduction in daily inventory quantities

Zero stock-outs

Zero medications expired unused

**Conclusion:
 Expectations and Goals Met**

The study provides quantitative proof that RFID-enabled inventory management of critical dose inventory can be used to confidently right-size stocking levels, prevent waste from drugs expiring before use, and decrease stock-outs (medication not available when dose is required).

