



Implementing a Web-Based Inventory Tracking System: A Quality Improvement Initiative



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A B S T R A C T

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Inventory control of supplies in radiology is a major contributor of time loss with potential negative effect on patient care in interventional radiology. Using Lean principles, we evaluated an outdated process and instituted an inventory control system with good results, saving time and money.

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Introduction

In response to organizational pressures, reimbursement issues, and regulatory standards, projects to improve efficiency and reduce costs are continually occurring. Supply areas in hospitals are generally estimated to be up to 25% of a hospital's operating budget, and they are increasingly an area of intense focus to help achieve budgeting goals. Automation of supply inventory has shown to be a measure that effectively reduces costs related to overstocking. A study by Healthcare Financial Management Association estimates that a 3% reduction in supply inventories can result in as much as a \$10 million reduction in operating expense for a typical 300-bed hospital with a \$300 million supply budget (Curtis, 2004; Hall, 2003). We recently successfully implemented a web-based inventory system in our radiology department.

In addition to financial considerations, health care organizations also need to maintain standards for patient safety and satisfaction to avoid complaints and patient safety never events that can result from errors or gaps in the supply inventory process, specifically standards related to infection control and removal of expired equipment.

Discussion

The MetroHealth System is a public hospital in Cuyahoga County (Ohio, United States) with level 1 trauma and comprehensive stroke center designations serving a diverse population. The interventional radiology (IR) department performs

approximately 10,000 cases in interventional and neuroradiology every year. Recently, the project manager reviewed our supply management process. That review uncovered a labor-intensive, outdated process which was leading to inefficiency, error, concerns about not having needed supplies, and the presence of expired supplies in the system.

A recent Cardinal Health Study, cited in Becker's Hospital Review, reported that 78% of survey respondents continue to manually count inventory in some supply chain areas and nearly one-third of respondents said it has been 6 years or more since their hospital has implemented a new inventory management system. The study also revealed that improvements in supply chain management creates better quality and promotes patient safety (Bean, 2017).

Actual danger to patients from the use of an expired medical device does not always occur because expiration dates indicate packaging integrity, not device integrity. However, these incidents can present a risk of legal and regulatory issues if they are not properly managed. "Patients who later learn that an expired device was used during a procedure may elect to file a lawsuit against the hospital (Mandava, 2017)."

Using Lean methodology, we compiled a workflow document and saw many opportunities to correct the gaps in the current workflow, so we proceeded to develop and implement this project. (Lean tools are used to manage the transition from the current state to the desired state.) Four areas of focus were identified:

- Not having supplies available when needed,
- Absence of tracking numbers for supplies,
- Expired supplies and overstock, and
- Inefficient use of personnel and costs related to the use of a paper labeling system.

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Our project goals were to implement a web-based automated inventory management system in IR and improve our supply management and patient charge capture, by using the PAR method (periodic automatic replenishment), in which items are replenished based on their PAR level, or the number of items necessary to have on hand to meet demand.

Implementation of the automated system helped our department reduce overstock by 60%.

Buy in

Lean principles (LEAN Enterprise Institute, 2019) are increasingly being adopted by health care organizations to improve operational efficiency, eliminate waste, and enhance service value. In the case of supply inventory in hospitals, there is also a need to incorporate compliance standards for infection and environment of care that requires removal of expired stock from the patient care areas. One of the tenets of Lean philosophy is to “make problems ugly”: to draw attention to what is wrong so that it can be addressed. (Kruskal et al., 2012) Buy-in and engagement are key to success.

Bean’s article in Becker’s Hospital Review offers suggestions for initiating and gathering support for Lean projects, which is integral to success. Preliminary work would include involving stakeholders in a vision by asking them to help review the current business state and offer input into what is needed. Creating a vision that focuses on the benefits and shared positive results across departments, combined with strategic outlining of roles

and deliverables, will put your project in alignment for a successful outcome (5 Ways to build your case for inventory management technology, 2016).

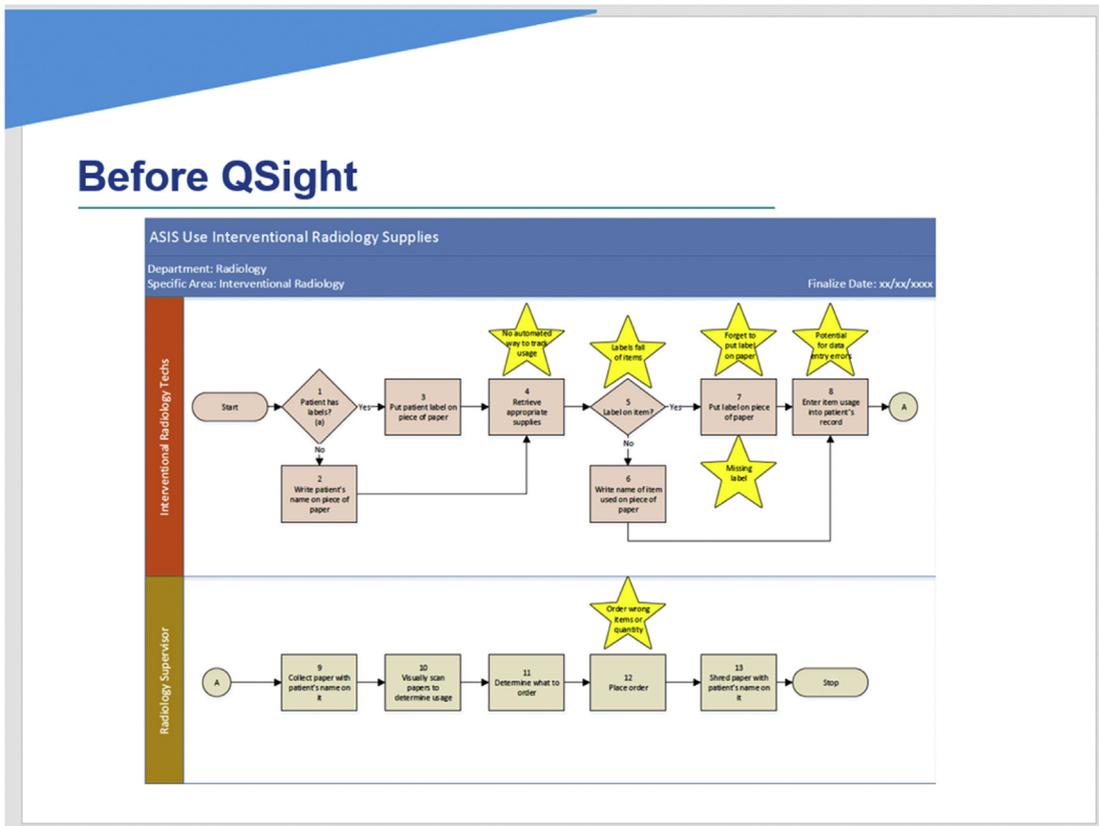
“Use of a Lean approach for improvement projects in an organization or workplace is based on several fundamental principles. These include respect; direct observation; elimination waste; standardization; improved process flow; added value; and the appropriate application of Lean tools” (Kruskal et al., 2012, p. 575).

Change management is an important concept in Lean projects. A comprehensive approach, including incorporating an investigation into root causes is needed to ensure success and ensure that new or modified processes add value (Kruskal et al., 2012, p. 586).

This was a collaborative pilot project involving IR, enterprise program management, information services, supply chain, and revenue cycle that we plan to standardize and roll out on a quarterly timeline system wide with our other procedural departments.

Data collection

We collected data in some initial project meetings to gather input from providers, managers, and supply staff and developed the initial workflow document that shows the gaps and error points; with our manual inventory system, 13 steps were occurring, as shown in the diagram, the stars indicate the 6 gaps or errors in process that could be corrected by implementing an automated process (Susi and Spengler, 2019).



Initial interviews with staff revealed the following issues:

- “The basic challenge is running out of things (that the providers need for patient care). If a physician needed an item, we might have to run down to the loading dock or storeroom to find it. We have been using a laborious, manual process that was out of date 30 years ago. There was lots of room for error and lots of inefficiencies.” (IR supervisor)
- “Do you know how long I’ve been doing this? 17 years! I am going to have so much time freed up to do other things!” (inventory control technician)
- “This system means complete control over our inventory which was a mystery before. The reporting function is really good. And we’ll be able to get rid of overstock and reduce excess inventory by reducing par levels (the minimum quantity that must be kept on hand to meet operational needs) on some things.” (IR supervisor)

- Purchase of bar code scanners.

Phase 2: Technology Go-Live

- On-site staff training and support.
- Initial count of every item in inventory.
- After go-live support.

Phase 3: After Implementation

- Ongoing technical support.

In reviewing the findings, we found the following:

- We could eliminate the cost of the specialized tracking labels—\$75.00 per 100 labels (we were using several hundred labels every week).
- We reduced the need to ship items overnight from 2 to 3 times per week to 1-2 times per month.
- We reduced our overstock from \$136,000 to \$85,000, which will allow for the reduction in par levels because of the efficiency gain in ordering and restocking inventory.
- An initial survey of our providers before **QSightsm** revealed the following issues: 4 of 5 stated that only “sometimes” they rely on having all the items needed for the case, and if the items were not in the room, 3 of 5 providers said it took up to 5 minutes to obtain them, and 2 of 5 said they “had to improvise”; 3 weeks after **QSightsm** implementation, 4 providers answered they could rely on having all needed items “most of the time”; if the items were not in the room, they responded it took up to 15 minutes to obtain them, and no one responded that they had to improvise.
- We were able to eliminate expired items from the supply system.

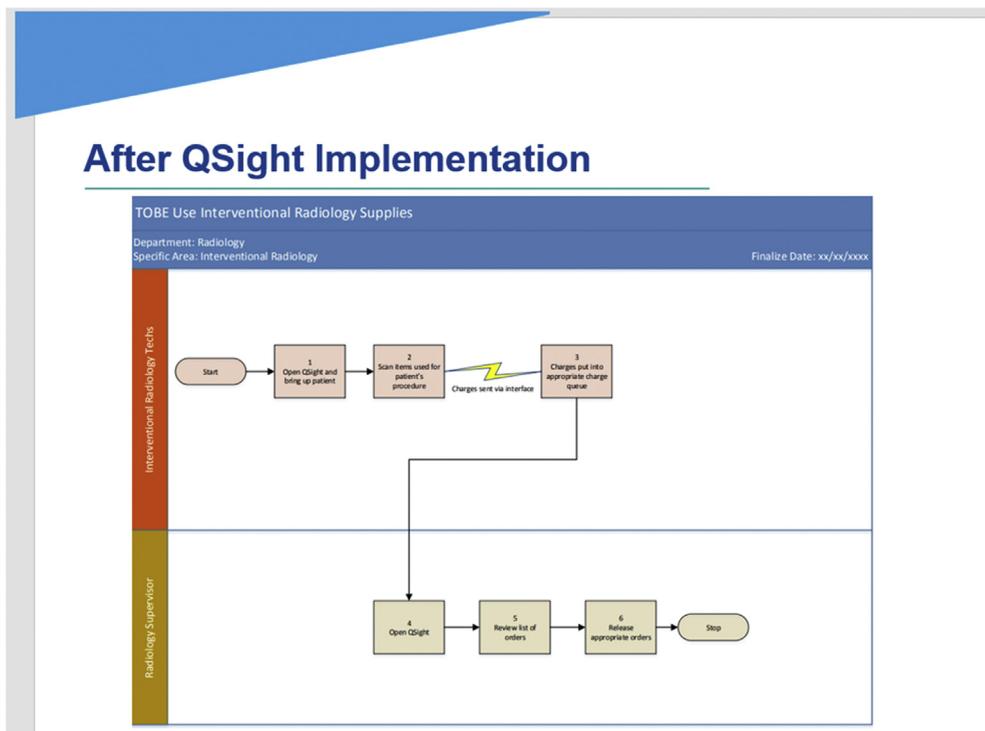
We then rewrote our workflow diagram to show the steps required with **QSightsm**, a web-based automated system, which were reduced from 13 to 6 with no further gaps identified:

Implementation

We initially worked with our supply chain director to establish the need to invest in a web-based system, and a representative from **QSightsm** (<https://qsight.net/default.aspx>. [Owens & Minor, Mechanicsville, VA].) provided a demonstration by scanning a closet in IR. The scan showed that items were expired, and the cost of this in dollars. This was enough evidence to support moving forward with transitioning our system, which was carried out in three phases:

Phase 1

- Inventory before scan—we scanned one of every item in our inventory.
- A tracking number was added to every item.
- Interface preparation—we added 6 interfaces connecting our electronic medical records to the supply tracking system (Susi and Spengler, 2019).



Lessons learned

Change management and Lean principles were helpful to improving our process, and what we learned with the pilot will help smooth the transition of the automated system to other areas. It was important that our vendor team was present, accountable, and honest. There were some issues that occurred with security and go-live, which were resolved quickly because of staff advocacy and engagement. Implementation of the latest automated technology improved supply management and charge recapture, eliminated issues with expired equipment and costs associated with overstock, and improved our labor allocation.

Additional benefits realized included significant cost savings obtained by no longer buying labels, reduction in par levels and costs related to overnighting supplies, increased number of charges and corresponding accuracy of charges, and reduced stress on staff caused by an inefficient manual process.

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