

Hospital OR Inventory Process Improvement Prior to ERP Module Implementation

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Abstract

This case study will provide details on how the operating room inventory management process was improved prior to implementing the ERP Operating Room Management (ORM) module of MEDITECH software at a small rural hospital. The methodologies included reviewing/observing existing processes, interviewing personnel, and reviewing documentation associated with materials/inventory management. Several different supply rooms were observed and the current processes were documented. A number of interviews of OR staff were conducted, both formally and informally. The outcomes included an overall reduction in the number of inventory items through the use of kits, establishment of a bin system commonly used in hardware stores and manufacturing was implemented to better locate supplies and manage the inventory, and a locational system to quickly locate inventory. After the process was streamlined, the inventory management portion of the module was successfully implemented.

Keywords

Integration, ERP, health care, inventory management, kits, bin system

Introduction

The objective of the project was to provide an analysis of the existing Operating Room (OR) supply room operations using an operations analysis methodology prior to implementation of an Enterprise Resource Planning (ERP) module for OR inventory management and scheduling. Recommendations on process improvements, resource requirements, personnel skills, and training time necessary to successfully implement the ORM module of MEDITECH in the OR supply room was the final goal.

The methodologies used to complete the project were reviewing existing processes, interviewing personnel, and reviewing documentation associated with materials/inventory management. Several different supply rooms were observed and the current processes were documented. A number of interviews of OR staff were conducted, both formally and informally. A standard set of interview questions was used for the formal interview questions (Appendix A). The informal communications were done randomly as additional information was needed. Members of the Materials Management (MM) staff were also interviewed and observed as they completed their tasks. The available documentation on both MEDITECH and the hospital's procedures were reviewed.

The information garnered from the above mentioned steps was compiled and reviewed to identify operational areas for improvement that affect the OR supply room. A list of prioritized recommendations is outlined at the end of the case study

Findings

To fully understand the OR supply process, observations were made of this process from its origination and the downstream processes to the end user. Initially the main supply room (MSR) was observed, the transfer of materials to supply areas, and finally the OR supply room. The following is the documentation of the processes and procedures that were observed.

The areas of the MSR that will be discussed are its location system, space utilization and layout, and finally its procedures. The transfer of materials section will outline the MM process, along with discussion on the process documentation and location system at the point-of-use. The last section will contain discussion of the OR supply room's layout, inventory management methods, storage systems, case carts, preference cards, and documented procedures.

Main Supply Room

Location System

The MSR operates efficiently. One of the strengths of the MSR is its location system. Each side of the aisle is designated with a letter, and each section of shelves is assigned a number. This makes finding item locations very easy either for picking or putting away supplies. In most location systems the individual shelves are also numbered to create an even easier atmosphere for materials management (MM) employees (Kosa, 1991). The pick lists that are generated have all the location designations which allows for easy location of supplies as long as the MM employee knows if shelf one is on top or bottom. A typical location designation is as follows: F3-1, with "F" being the aisle, "3" being the shelving unit, and "1" being the shelf within that unit. Adding the location identifiers to the shelves would be an easy fix for MM department to make

Space Utilization / Layout

Another positive observation of the MSR was the space granted for carts and people. With the current capacity of inventory items, there is plenty of space in the aisles to move about and pick the needed supplies. The layout of the MSR allows for efficient picking of supplies. The MM employee can move through the aisles without having to move to an area more than once, meaning that the employee can successfully pick all items needed by moving in an "S" pattern throughout the aisles of the MSR.

Procedures

A major concern in the MSR is the lack of documented procedures. There are currently no written procedures on how to complete the functions that must be completed within the MSR. This doesn't create a problem when the regular staff is present, but could lead to potential problems if people leave, or are absent for an extended period of time. Written procedures will also help to reduce the learning curve of any new employees that potentially may be needed in the future.

Transfer of Materials

The transfer of materials from the MSR to the other supply locations, excluding the OR, is a rather simple process. For these areas the procedure is as follows:

- The MM employee prints the standard requisition form for the specific area.
- Visually inspects the locations supply level, referencing the par levels if available.

- The MM employee documents the quantity of each stock item needed.
- The MM employee then picks the quantity of items needed from the MSR.
- Delivers and stocks items in their appropriate place.
- The original supply list is then put in the “filled” box.
- The supply list is then used to electronically deplete the inventory at the earliest convenience within MEDITECH.

This process is used for Clinics, Pediatrics, and Internal Medicine on Tuesdays and Thursdays, and the Emergency Department, MU, Intensive Care Unit, MC and Obstetrics process is completed on Monday, Wednesday, and Friday. This system seems to be fairly efficient. A few of the above mentioned store rooms have labels for each item that contain the product description and some have a par level designated for each product. All of the areas should implement par levels on the identification labels. None of the areas have a location system in place. The OR is the only supply area that doesn't use this process, its processes will be discussed in the next section.

Operating Room Supply Room

The main barrier to using the above system in the OR is the accessibility of the MM staff to the OR. The MM staff would have to change into scrubs each time they entered the OR. This may not seem to be an efficient practice on the surface, but should be thought about in the future.

Layout

The OR supply areas are not a single room, but a series of 6 different satellite supply areas. The “main” part of the OR supply process is a narrow corridor that is used mostly for surgical items. In addition to this room, the five other areas are; recovery, c-section, treatment, central sterile, and anesthesia. All six of these locations are currently monitored and controlled by the OR staff, and reported to the Surgery Unit Manager. There are three different types of inventory used in the OR; stock, special order (non-stock), and consignment. According to the Surgery Unit Manager, one of the current difficulties in the OR, from a MM perspective is differentiating what is stock, non-stock, and consignment. This issue isn't apparent with the current system, but if alterations are made, or new staff members are introduced to the environment this could become an issue that would negatively affect efficiency.

Inventory Management Procedures

Within the OR there are numerous procedures that go into controlling, managing, and using the inventory. The current inventory management/control process used by the Surgery Unit Manager is enabled through repetition and experience. The basic approach taken is to use the following week's schedule to ensure that all items needed are going to be available for surgeries scheduled the following week. Considerations are made for surgeries that will happen during the lead time, as well as the possibility for emergency situations. Due to the manager's high experience level, and dedication to accuracy, the current system is working. When asked if there were any written procedures for the process, the answer was that she has them in her head. If the current Surgery Unit Manager was not available, an OR inventory disaster would be very likely. The Surgery Unit Manager mentioned that the OR already runs into issues when certain staff members who accomplish key tasks are not available. A major portion of this problem is from the lack of procedural documentation and training.

Storage Systems

The inventory held in the “main” OR supply room is in a variety of different storage systems. There are a series of cabinets at the end of the room, where in-house sterilized items are kept along with a variety of other supplies. Certain sterilized items are required to be within a closed door system. There is also a series of carts that contain inventory items within this room. Two of the carts are exchange carts, two are implant carts, one is a urology cart, and the other is known as the “Dr. Smith’s” cart. The exchange carts are controlled by the MM staff. There are four exchange carts, with two of them in the OR and the other two in MM being restocked. The OR staff notifies the MM department when the carts need to be exchanged. The exchange carts have product identification labels with par levels for each item. The other carts, along with the cabinets in the OR have no inventory levels documented on the item description label, and no location system for locating supplies. One of the concerns of an OR staff member was that the exchange carts seem different. This along with the lack of a locational system can create problems.

Case Carts

Case carts are used to pull items for the next days scheduled surgeries. An OR staff member will pull the appropriate preference card, and pick the cards items onto the case cart. The full case carts are then left in the “main” OR supply room until needed the following day. Currently there is no specified time frame or schedule for pulling the case carts. All of the OR staff interviewed said that this was completed when ever time was available.

Preference Cards

The preference cards received negative comments from some of the OR staff interviewed. The concerns varied in nature, but were all relevant to the operation of the OR. One of the concerns was that the cards were handwritten, and “shorthand” was used for some of the items which caused confusion. It was also mentioned that often times the preference cards weren’t properly updated with the surgeon’s specifications. These issues should be easily remedied by MEDITECH generation of the preference cards.

Process Documentation

The most prevalent problem with the OR supply room process is that there really isn’t one. The system works but there is potential for major problems, and also potential for great efficiency gains. As mentioned earlier, there is little consistency to the inventory containment systems, no location system is present, and there are no written procedures for OR staff to follow or learn from.

Recommendations

Information Technology (IT) is a common way to improve existing processes. Since the early 1990’s businesses in all sectors have been able to reap the benefits of using IT through what is typically referred to as Business Process Reengineering (BPR). One of the fundamental objectives of BPR is to improve the current processes before implementing the IT solution. In one of the most famous pieces of BPR literature Michael Hammer wrote:

“Unless we change these rules, we are merely rearranging the deck chairs on the Titanic. We cannot achieve breakthroughs in performance by cutting fat or

automating existing processes. Rather, we must challenge old assumptions and shed the old rules that made business under perform in the first place (Hammer, 1990).”

The essence of what Hammer was saying is that it is not acceptable to just automate processes; the processes must first be re-thought and made efficient with IT in the picture. With that in mind, the following sections contain recommendations, in a prioritized order, that will help streamline the supply process and increase the chances of successfully implementing MEDITECH in the OR.

There are numerous process recommendations that could be made to help streamline the MM process within the OR. Five recommendations have been selected as being the most critical for the OR supply room. Implementing a bin system, a location system, creating par levels, using kits and custom procedure trays, and finally creating procedures for MM processes within the OR will be discussed.

Implementing a Bin System

Currently the holding system(s) for inventory within the OR are comprised of many different styles. This in itself doesn't create a problem, but for consistency and uniformity throughout the process a standard system would be best. The more concerning issue is the lack of a holding system present on many of the carts. One OR employee mentioned that at times it is hard to find items on the carts because they are often tucked behind other items on the cart. This could potentially have adverse effects in times of urgency, and also creates inefficiency in the picking process.

While implementing a bin system, all of the cabinet doors that don't need to be in place should be removed. The area of the OR supply room with the existing cabinets has limited access with the doors in place. By opening one door, access is limited to the rest of the supplies in that area. Doors are needed by code for the storage of certain items, but those items constitute a small amount of the area being discussed. By removing the doors, inventory will be visible and easier to access which will make monitoring and picking items easier.

Many different manufactures have products available that could be used in this application. The Director of Materials Management has already evaluated these products, and a few are in use. A bin help to create consistency within the MM processes in the OR. Bins may also increase the relative storage area available in the OR. By carefully selecting sizes needed for each item, the current space may be utilized in a more organized manner. Using a bin system will also ease the process of implementing a locations system, by having single discrete places for each supply item.

Establishment of a Location System

In whatever manner inventory is held, it is crucial that the items are able to be found in an efficient and timely manner. The above mentioned bin system will partially help, but a location system will ensure that items can be found. As a rule of inventory management, all items should have no more than one stocking location, and a simple stock locator system should be in place to ensure that an item can be located quickly (Kosa, 1991). A location system is already present in

the MSR as mentioned in its section of the case study. The same methodology should be transferred to the OR supply room and potentially to the other supply areas. Along with a location system, there are other items that can be introduced to aid in locating items. A diagram of the supply room layout with the general location system identified on the diagram could be posted in all supply rooms. Also, a complete inventory catalog with product descriptions and locations should be available to all personnel that may need to locate inventory items (Kosa, 1991). The inventory catalog doesn't necessarily need to be a hard copy. MEDITECH's database should be sufficient as long as it's accessible, and it can serve as an electronic copy of the catalog as long as locations of all items are present. A location system is needed to get the full benefits of automating the inventory process in the OR. A location system will also help reduce the time needed to stock and pull supplies for both the MM and OR staff members.

Establishment of Par Levels

As mentioned throughout this case study, many of the supply areas do not have par levels documented in the supply areas. Whether the supplies are on an exchange cart, in a closet, in a bin, or on a shelf, labeled par levels are needed to ensure effective restocking. The labels will also help to ensure that the supplies are stocked in the correct location (Perrin, 1994). Par levels can be determined in a variety of ways. Historical usage can be used to determine "average" supply usage, or there are many heuristic methods that can be used when sufficient data is not available (Duclos, 1993). Regardless of the methods used, par levels need to be continually monitored by both MM and point-of-use staff to ensure that the par levels are working. The par levels should be monitored to ensure that both an appropriate service level and MM efficiency are maintained (Roeder, 1994). Depending on the inventory replenishment policy, it is not enough to just establish par levels within MEDITECH. The par levels need to be posted on the identification tags that should be on the above mentioned bins or the already in place systems. Having par levels documented on each of the supply bins will allow the staff member to accurately determine how much of a product is needed. This will also create consistency in ordering and allow for more accurate cost analysis to be completed for future MM initiatives. By determining par levels for each item in the OR supply room, the hospital may find that items are held in excess. Through evaluation the hospital may be able to decrease the amount of certain supplies which will reduce holding costs and total materials cost. Par levels along with the two previous recommendations will allow for a similar inventory management process to the other areas of the hospital as documented in the transfer of materials section of this case study. This would enable the OR staff to concentrate on their "medical" responsibilities, and leave the MM processes to the MM staff.

Usage of Kits & Custom Procedure Trays

The most popular comment from the OR staff interviewed was their response to using a "tote system", or kits as they are more commonly referred to in materials management. All of the employees questioned thought that using kits would allow them to spend more time concentrating on their "medical" job instead of MM related tasks. Effective January 6, 2006, kits began to be used for seven different surgeries. An ABC or Pareto inventory analysis could be done to determine what surgeries are of high volume, and to determine commonalities between surgeries. All of the "A" surgeries and possibly many of "B" surgeries could be completed by using surgical kits. According to the Surgery Unit Manager, kits would reduce the turnover time. This would create the potential for increased revenues, while also helping to

reduce the par level of many supply items. Another effect of using kits would be decreased inventory and inventory levels.

Custom Procedure Trays (CPTs) are also a popular OR supply tool. By definition a CPT is a billable medical or surgical pack containing linens, basins, and tubing. The actual price of CPTs may not be less than that of the individual items, but cost savings are created in other areas by using them. Standardization of procedures, reduced set-up time, capturing patient charges, and simplified inventory control are all areas of savings (DiGiacomo, 1991).

Creating Procedures

As mentioned earlier, there are little to no written inventory or materials management procedures available. Procedures are essential for ensuring that tasks are completed in an accurate and efficient manner (Zimmerman & Campbell, 1994). It is not that they don't have procedures, but the existing procedures are only present with those that complete the processes on a regular basis. These procedures are engrained in the minds of the employees. This makes it hard to adapt the procedures as the business changes over time. This is an opportune time to create procedures because the type of work being done is going to be radically changed with the implementation of MEDITECH. This will allow the MM department to put its stamp on the MM practices in the OR. Procedures can be documented in many ways, with each individual process having its own needs. For the OR, workflow diagrams may be more effective than written procedures. Workflow diagrams are a picture or map of the sequence and detail of each step in the process (Pearlson & Saunders, 2004). Having documented procedures will help to train new employees, create standardized work environments, and create efficiency in current processes that are done at the user's discretion.

Recommendation Concerns

The hospital has already made a large investment in MEDITECH and training required to effectively use it. The recommendations that have been made will require additional investments in time, materials, training, and human resource requirements. The investments made will be hard to justify under traditional financial tools such as net present value, internal rate of return, and return on investment since future cash flows are not easily determined (Brigham & Ehrhardt, 2005). What should be considered are the elements of quality, efficiency, and staff training. The above recommendations will result in a higher quality service of the MM department to the OR. This will be accomplished through greater control of the inventory, along with more efficient processes. When future staffing needs arise, the new staff's learning curve will be shortened which will allow them to participate in value added activities in a shorter time frame than before.

MEDITECH

All of the above recommendations are intended to create a more efficient process for both the OR and MM. The recommendations would hold true whether or not an automated system was being implemented. Automation simply provides more efficient ways of doing the wrong things (Champy & Hammer, 1993). By creating a more efficient supply process, installation of MEDITECH's OR Module should be made easier. Through the four recommendations made: inventory levels should be reduced, procedures will be standardized, and inventory will be easier to monitor.

Culture

The biggest barrier to implementing MEDITECH appears to be the culture. In this scenario culture can be defined as, “the way we do things around here” (De Wit & Meyer, 2004). When the employees were asked why they did things a certain way, the common answer was that is how it has always been done. When asked why certain things couldn’t be done, a common answer was that we couldn’t get people to do that. In order for MEDITECH to be used, top down support will have to be acquired (Pearlson & Saunders, 2004). As mentioned earlier, BPR initiatives create radical change in an organization, and almost always contribute to an organizations culture changing. To help accommodate employees during this time of change, training will be very important. Training of both MEDITECH and the new MM procedures will be equally important (Giunipero, 1997).

Delay implementation

It is worth considering the delay of the MEDITECH implementation until the above recommendations can be implemented. By continuing with the MEDITECH implementation, the hospital may be creating additional work. The above recommendations will have an impact on inventory levels, inventory location, and par levels which are all part of the OR Module in MEDITECH. By implementing MEDITECH now, they may have to revise many of the MEDITECH parameters once the recommendations are complete. Additional training time will also be incurred since staff members will have to be trained on MEDITECH and MM procedures. If MEDITECH is implemented now, staff members will have to be trained on current MM procedures, and again on the new MM procedures once they are created.

Inventory Model

The hospital has the ability to use either a fixed-period or perpetual inventory model while using MEDITECH in the OR. Either of the two systems will fulfill their needs. A perpetual system may take more time to implement, but the benefits realized can be greater in the future. Benefits to a perpetual system include accurately and “real time” tracked expense activity, identified opportunities for additional savings based on usage patterns, and the elimination of manual counts, just to name a few (Graham, Brewer & Byrd, 1999).

Conclusion

This organization is in a great position to make operational changes in its MM processes. Procedural changes will be required to fully realize the benefits of using MEDITECH in the OR supply process. MM has an opportunity to create efficiency within the process by implementing the above recommendations.

The implementation of a bin system should be the first priority. This step is necessary for completing the second step of establishing a location system. These two recommendations should be considered simultaneously. There may be potential for rearranging the supplies to make pulling case carts more efficient. Generating par levels for all of the inventory items should be the next concern. With a bin system, location system, and par levels in place a similar procedure to that of every other supply area could be explored. This could be used to operate a fixed period inventory model, with the period probably being three or seven days. Unless there is a strong push from the staff, a perpetual inventory model is not needed.

With implementation of the three recommendations above, procedures can be created to build consistency into the MM processes in the OR. By having processes completed in a consistent manner, no longer will the OR feel the effects of having certain people unavailable. The procedures must also be documented in a way in which a person unfamiliar with the process could complete the task with little guidance. Written procedures work, but workflow diagrams may be more suitable for the MM processes.

Using kits and CPT's will be a way to reduce turnover time, reduce par levels, decrease inventory levels, reduce setup time, and increase the capture of patient charges. Current surgical procedures will have to be carefully studied to determine what surgeries are suitable for kits and/or CPT's. If possible, standardization among doctors would help to increase the number of kits or CPT's used.

Additional human resources may be needed during the implementation and training time of the above recommendations. As mentioned earlier, training will be a very important step of implementing both MEDITECH and the newly created MM processes. The MM department has a great opportunity to instill its practices on the OR staff during this time. The MM department should be responsible for training the OR staff on the new procedures. To accomplish this, the additional resources mentioned above will be needed in the MM department during the implementation and training phases. Once these phases are complete, the current workforce will be sufficient in both the OR and MM to manage and monitor the inventory.

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Appendix A

Name: _____

Position: _____ Years: _____

Previous Positions: _____

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1. Describe the daily functions of your position as they apply to the OR Supply Room?
 2. In your opinion, who has overall responsibility for the OR Supply Room?
 3. How often are you in the OR Supply Room?(for inventory purposes)
 4. What are your tasks in the OR Supply Room?(for inventory purposes)
 5. What percentage of your time is spent in the OR Supply Room?
 6. Do you perform these tasks the same way all of the time?
 - Are the procedures to complete these tasks documented?
 - Do you have a copy of the documented procedure that I can review?
 - Is this procedure up-to-date and current? (Check to see the revision date on the procedure).
 - Could someone else complete these tasks?
 - If yes, who else completes these tasks besides you?
 7. How are new employees trained to complete these tasks?
 - Who is responsible for training?
 8. Do you assist in placing orders for the OR Supply Room?
 - Who do you notify if something runs out?
 9. Have you been trained in MEDITECH software?
 - What modules have you received training on?
 10. Does the current inventory labeling system work in your opinion? (You might want to ask them to describe labeling/location system.
 - How could it be improved?
 11. Do you ever experience difficulty in finding things?
 12. How often have you needed something that wasn't there?
 - How did you solve the problem?
 13. Do you think that the OR Supply Room could be moved to one of the "open" rooms in the OR area, if the carts that needed to be available for surgery were still kept in their present location?
 14. Would there be a way for you not to have to use the OR Supply Room?
 15. What changes during emergency surgeries/situations?
 16. What would you think of having an employee that was solely responsible for the OR Supply Room?
 17. What problems/concerns do you have with the current system and procedures?
 18. What works well or do you like about the current system and procedures?
 19. How could your job be made easier as it pertains to the OR Supply Room?