



Inventory Management

A BEST PRACTICE GUIDE

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Inventory management is the process of administering the hospital's expendable assets. For the healthcare supply chain, those assets are the supplies necessary to run healthcare operations and deliver patient care. Hospital stakeholders often view inventory management as the main—if not sole—function of the supply chain department, as clinicians rely on supply chain staff to make sure that patient care products are in the right place at the right time. There are myriad challenges involved in achieving best practice inventory management. The manner in which every supply and its associated value are managed can significantly impact a hospital's operational efficiency, financial performance, and care quality. In the past, inventory management addressed individual aspects as opposed to taking a holistic approach to problem-solving. Today's supply chain professionals must go beyond resolving issues on a day-to-day basis and focus on how to make their facility a high reliability organization (HRO).

The HRO approach focuses on 1) preoccupation with failure, 2) resisting the temptation to simplify observations, 3) sensitivity to operations, 4) commitment to resilience, and 5) regard for expertise.¹ Applying HRO values to managing hospital inventory can help prevent obstacles from arising in an environment where undesirable situations are likely to occur, due to the high number of risk factors.

In inventory management, numerous factors involve other supply chain areas, which can have a ripple effect on downstream operations. For one, inventory management controls and processes must be applied from the moment products arrive on the receiving dock in

order to ensure that there is an accurate record of products on hand. Then there are the risks associated with product demand, seasonality, item backorders and allocations, technology, and so on that directly impact requisitioning. Specific to inventory management are anticipating demand and the calculations associated with inventory replenishment—as well as handling specialty items, especially those for the perioperative and procedural hospital units.

The key components of inventory management include locations (the main storeroom or unit-specific locations), cycle counting (a count of every product found in all locations, accomplished by

HRO 101

Even small mistakes can lead to great harm in the complex world of healthcare. Relative to inventory management, patient care can suffer if a surgeon or clinician doesn't have the right product at the right time or an intensive care nurse can't find a needed supply quickly. The high reliability concept must be adapted to an organization's culture, operations, and technology infrastructure in order to be most effective. The tenets of a culture focused on continuing process improvement are particularly applicable here.

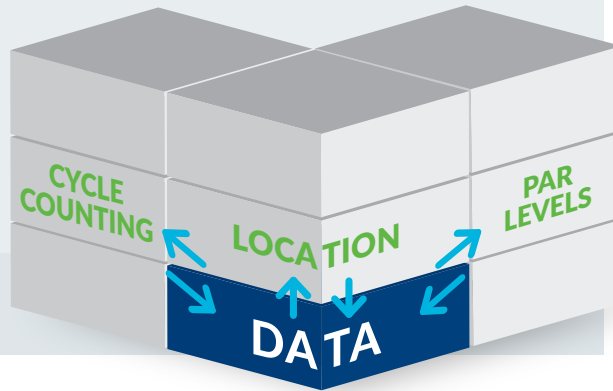
Traits of HROs:

- 1. Preoccupation with failure:** They have a relentless commitment to preventing mistakes. HRO staff remains alert to the smallest sign that a new threat may be developing.
- 2. Resisting the temptation to simplify observations:** They understand that threats to safety can be complex and may present themselves in myriad forms. HROs have an ability to identify subtle differences and encourage early recognition of problems (problem can be easily fixed) versus late recognition (problem is already out of control).
- 3. Sensitivity to operations:** HROs recognize that the earliest indicators of threats typically appear in small changes. They take great pains to ensure that all staff report any deviation from expected performance. HROs engender an environment where everyone not only feels free to speak up, they feel an obligation to speak up.
- 4. Commitment to resilience:** HROs recognize that despite best efforts and past successes, errors will occur. They identify errors quickly and contain or solve them, preventing further harm and bigger problems.
- 5. Regard for expertise:** When confronted with a new threat, HROs have mechanisms in place to identify who has the greatest expertise relevant to managing the new situation and gives decision-making authority to that person or group. HROs don't rely on organizational hierarchy.

continuously selecting smaller portions of inventory to count throughout a select time period for the purpose of validation and replenishment), and periodic automatic replenishment (PAR) levels (the maximum and minimum quantities of a specific product that should be kept in a certain location). These components are influenced by internal and external stakeholders, institutional culture, and technology. For example, clinicians are the largest internal stakeholders, as they determine the need for patient supplies, while vendors are external stakeholders, as they provide supplies. A hospital culture that supports multidisciplinary collaboration and educates clinicians about the methodology behind inventory management fosters a more efficient environment, reduces costs, improves morale, and enhances the quality of care throughout the facility. This is particularly important in the OR—frequently the hospital's highest revenue-generating department. All supply chain executives should strive to use technology and be able to automate the main components of inventory management. Supply chain leaders would do well to consider technology solutions to enhance their enterprise resource planning (ERP) software or materials management information system (MMIS) and provide insight into how products are being used in other areas of the hospital. Technology offers the controls, data, and reporting needed to improve performance and better control costs in an area that has a direct impact on care delivery and the hospital's bottom line.

The Cornerstone of Inventory Management

The item master is the main source of inventory management data. That's why item master data must be clean in order to achieve best practice inventory management. Data management is the cornerstone of inventory management. It feeds information inward and outward from each of its components to drive decision-making.



Even with limited resources, inventory management professionals can lower costs and improve organization-wide quality and operations by implementing best practices. There is a great deal to consider. This guide focuses on the basic best practices for achieving a well-functioning inventory management system.

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Have an inventory control strategy

The way in which a hospital's supplies are maintained largely depends on the facility size, the patients served, the number of units or floors, and the technology in place. It also depends on the hospital's distribution model (whether it is LUM, JIT, or bulk).

Besides the main storeroom, there are unit-specific storerooms, which are often referred to as PAR locations. Inventory strategies that can be applied to these locations include the following:

- **Simple storage:** The use of item locations and bins as well as bar code technology, if available.
- **Two bin:** A method that uses two bins; an empty bin signals the need for replenishment. The first is taken away to be refilled and the second is pulled forward.
- **Exchange carts:** A full cart of items is delivered to each location and exchanged for the empty one that is currently there.
- **Technology** can be used to enable inventory replenishment, such as weight scales and radio frequency identification (RFID).

Varying factors determine the best strategy for hospital PAR locations. The most important thing is to ensure that only one inventory strategy is used for all PAR locations across the organization. Measures can also be taken to arrange unit-specific storerooms so that they provide a better workflow.

Group items by type, frequency of use

The following should be applied as general best practice, but environmental requirements should be considered depending on the type of storage (clean, sterile, etc.).

The items that are used constantly should be stored in a primary reach area (i.e., within arm's length) so that staff don't have to bend down or use a step stool to get them. Limiting the need to bend down or get a step stool saves time and reduces the risk of worker injury. Keep items that are used for similar tasks near each other.

For example, group bins that contain personal hygiene items for patients in one area and items that are needed to dress wounds in another area. It will make it easier to pull related items without having to go around the storeroom to find them all. It is best practice to design each unit-specific storeroom in the same way to support floating nurses and physicians. Make sure clinicians, including new hires, are familiar with the layout.

Use labeled bins to hold items in unit-specific storerooms

Only store one type of item per bin (e.g., do not put 5% dextrose solution and 10% dextrose solution in a single bin). When a bin contains more than one type of item, especially if the items are similar in shape, there is a greater risk of slowing down the process because the staff member must double-check that the correct item has been pulled. Mixing items also increases the risk of distributing the wrong item when staff is in a hurry or, in the unit-specific storeroom, the risk of clinical staff picking the wrong item.

The front of each bin should have a label for the product it contains that includes the following information:

- **Item location:** This is the bin number or nomenclature so that staff can find it more quickly. If an electronic system is used, the item location should be included.
- **Item part number:** Both the manufacturer and distributor/vendor item numbers should be listed, as sometimes orders must be placed through the manufacturer.
- **Item description:** This helps ensure that the correct item is pulled. Instead of just pulling an item from bin 19, for example, staff can confirm that the item pulled from bin 19 is exactly the item that has been requested.

- **Item master file number:** This is an important internal tracking number that the hospital can use to measure the amount of spend in a particular area and optimally link the product to patient outcomes, such as readmissions.
- **Minimum and maximum amounts:** These should be based on the purchase UOM: does the item get purchased in a box or individually (i.e., each)? The associated UOM ensures accuracy and provides context.
- **Bar codes:** If the hospital has the technological resources, they can include bar codes on bins to provide a scan that matches the information above to the item that has been requested, which improves workflow.

Mark all bins with a number or other nomenclature. Keep on hand a map of the bin locations, their identifying numbers, and their contents so that inventory management and other staff can locate them quickly. For example, if a unit has requested alcohol pads, instead of an employee having to look in each bin, the inventory management system shows the exact bin it is in.

Follow The Joint Commission and departments of health requirements for organizational environment and layout

The Joint Commission has specific requirements about where shelving should be placed: 18 inches below the ceiling fire sprinklers and six inches off the floor to protect items from flooding. Bottom shelves should also have splash guards to protect the supplies from flooding or dirt kicked up from the floor. Check and enforce all government requirements and those of any accrediting body.

Keep hard-copy backups

Make sure that there are hard copies of PAR sheets, bin labels, and policies and procedures for easy reference in the event of a power outage or technology system failure. When training inventory management staff, make sure everyone knows where to find these hard copies.

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Examine inventory cycle for constraints

Inventory management can identify and improve workflow problems by applying the Theory of Constraints, which was developed by Eliyahu Goldratt to help managers make changes to business systems. Goldratt's theory envisions that a system (such as inventory management) is made up of linked activities that create a chain and, much like the adage, the weakest link in that chain limits the rest of the system. Finding that system constraint (as he calls it), and focusing on improving that bottleneck improves the overall system.

The methodology is made up of the following steps:

- Identify the constraint.
- Exploit the constraint with existing resources.
- Subordinate and synchronize the constraint by reviewing all other activities in that system chain to ensure that they are in alignment with and support the needs of the constraint.
- Improve performance of the constraint. If it has not improved, consider what else needs to be done to fix it. Capital investment may be required.
- Repeat the process.

Goldratt also describes the types of constraints an organization may face when trying to improve a system:

- Physical constraints, which can include material shortages, a lack of space, or a lack of staff.
- Policy constraints, which may involve current facility policies and procedures or regulatory requirements being at odds with industry best practices. Such constraints can also take the form of new employees being informally trained in procedures that are not best practice.
- Paradigm constraints, which are deeply engrained beliefs and habits that are difficult to change (the mentality of “We have always done it this way—why do we have to change?”).
- Market constraints, which is when production capacity exceeds sales or the external marketplace is constraining throughput. In inventory management, product shortages are a market constraint.

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Use cycle counts to track inventory in unit-specific locations

Cycle counts involve reviewing the contents of a bin to 1) verify the information in the electronic system and 2) know when a product needs to be replenished. Set aside time to count one section of the storeroom each week. If discrepancies are discovered, perform a root cause analysis to identify the issue. Even if inventory management can demonstrate that a cycle count has been conducted each week for a year and those amounts have consistently matched, an annual physical inventory count may still be required.

Use a perpetual inventory model for main storeroom and high-value areas

Perpetual inventory is an electronic method that tracks all receipts and issues (disbursements) and maintains an active dollar value and count of product on hand in real time. This model is useful within procedural areas (such as the OR) to track items that move quickly through a particular department/area (e.g., endomechanicals). This creates a more efficient replenishment process.

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Rotate stock to avoid expiration and waste

Inventory management analytics let staff see where products are being used and how frequently. This can help reduce the likelihood that an item will expire, lose sterility, or be damaged before it can be used.

While analytics can help identify places or times when more or fewer items are needed, the inventory management department must also be flexible, due to the ever-changing conditions in hospitals. For example, during the avian influenza outbreak, a greater demand for personal protection devices (N-95 masks, barrier protection) significantly changed stock patterns and quantities. Similarly, an unusually dangerous virus such as Ebola can dramatically change the quality and level of personal protective equipment requirements for patient care, including the use of powered air purifying respirators (PAPRs).

Establish PAR levels

To ensure that products are available when they are needed, hospitals need to establish PAR levels so that supplies are reordered

in a timely manner and the hospital doesn't run out of essential patient care items. The following factors must be considered when determining PAR levels to help keep inventory flowing smoothly throughout the hospital:

- Use
 - Unit of measure/quantity of each
- Lead time
 - When calculating PAR levels for each item, make sure a reorder point is established that incorporates the lead time required for ordering that product. It will help guarantee that enough of the item is always available.
- Operating inventory
 - How many days' worth of inventory is it necessary to have on hand?
- Safety stock
 - It is important to plan ahead so that stock is always available when needed. For example, holidays or bad weather (both near the hospital itself and elsewhere) can delay or disrupt shipping and deliveries. It might be prudent to order more than usual the week before holidays or in advance of anticipated bad weather events.

PAR levels should not be static. They should be reviewed consistently to avoid the effects of seasonality, patient mix, item changes, backorders, etc. A hospital isn't a static environment and PAR levels must reflect that. When determining reorder points, never allow any item to drop to the point where there is only one in the building.

Following HRO principles, the inventory management team should be preoccupied with failure—which, in this case, means running out of product. There should be a process to determine how much of an item should always be kept in stock.



KEY PERFORMANCE INDICATORS

The following can be used to measure supply chain performance in inventory management:

- Storeroom average days on hand (number)
 - Storeroom inventory value
÷ annual distribution spend
- OR average days on hand (number)
 - OR inventory value ÷ annual OR spend
- Annual stock-outs (number)
- OR inventory value (\$)
 - OR inventory value ÷ number of rooms

1. M.R. Chassin and Loeb, J.M., “High-Reliability Health Care: Getting There from Here,” *The Milbank Quarterly* vol. 91, no. 3 (2013); 459-490.
2. Gamble, M., “5 Traits of High Reliability Organizations: How to Hardwire Each in Your Organization,” *Becker's Hospital Review*, (April 2013). Available at <https://www.beckershospitalreview.com/hospital-management-administration/5-traits-of-high-reliability-organizations-how-to-hardwire-each-in-your-organization.html>. Accessed August 30, 2017.

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