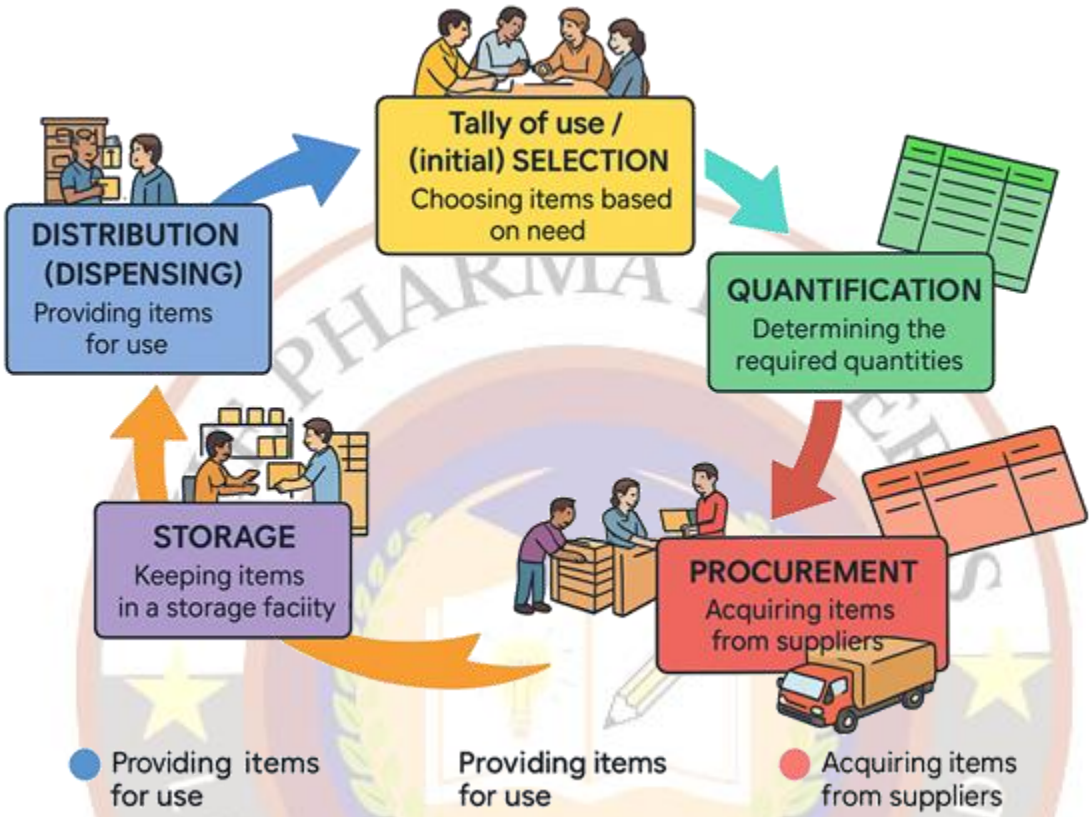
INVENTORY CONTROL IN COMMUNITY PHARMACY



Inventory is an essential part of an organization. There are many definitions of inventory in a system explaining various aspects of inventory analysis. Some of these are:

1. Inventories are the piles of raw materials and finished goods in the warehouse.
2. All the materials, parts and in-processor finished products recorded on the books by an organization and kept in its stores, warehouses and plants are known as inventories.
3. Inventory is a list of names, quantities and/or monetary values of all or any group of items.
4. Inventory is a detailed list of those movable items which are necessary to manufacture a product and to maintain the equipment and machinery in good working order. The quantity and value of every item is also mentioned in the list.

Inventory control is the systematic process of **planning, organizing, directing, and controlling the procurement, storage, and distribution of materials** so that the **right quantity of items is available at the right time**, in the **right condition**, and at the **minimum possible cost**, without interruption of operations.

Inventory control or stock control can be broadly defined as ***the activity of checking a shop's stock***. However, a more focused definition takes into account the more science-based and methodical practice of not only **verifying a business's inventory** but also focusing on the many related aspects of inventory management (such as forecasting future demand) within an organization **to meet the demand** placed upon that business economically.

OBJECTIVES OF INVENTORY CONTROL:

The following are the main objectives of inventory control:

1. **Protection Against Fluctuations in Demand:** The demand forecast of any product can never be exact or accurate. There is likely to be some difference, that too of varying magnitude, in predicted demand and actual demand of the product. If sufficient items are available in the inventory, the fluctuations in demand can be easily adjusted and the organization can protect itself from unforeseen economic losses.

2. **Better Use of Men, Machines and Materials:** In manufacturing system the production planning can be done with an objective to have optimum use of resources namely, men, machines and materials. Here the resources can remain engaged during lack period of demand and there will be no need of generating

additional resources in the boom periods as the Inventory enlarged in lack period can be utilised. This will lead to uniform and proper utilization of resources available with the enterprise.

3. **Protection Against Fluctuations in Output:** Another important function of inventory is to reduce the gap between actual and scheduled production. In practice, production schedule cannot be adhered due to a number of reasons eg. sudden breakdown in supply of raw materials, machines, labour strikes, etc.In such case the difference in actual production and the planned output can be bridged by inventories.

4. **For production Economies:**The production runs can be planned in economic lot sizes when there is a policy to produce for stocks.

5. **Control of Stock Volume:** Inventory control is concerned with the size and the value of goods present in stock.
It is responsible to forecast the value of the stocks at regular intervals, so that

(a) capital invested in inventories doesnot exceed the funds available for the purpose.

(b) the amount invested in inventory is correctly recorded in accounts book.

(c) (c)production against theft is ensured.

6. Control of stock Distribution: Stock analysisis done to be sure that it is in balance and that obsolescence and depreciation are kept at the minimum possible level. Thus Inventory managers try to determine the appropriate size of the inventory keeping in view the interest of the production department as well as of the outside customer and side by side holding down the costs.

Role of Inventory Management Software

Inventory **management software** often plays an important role in the **modern inventory control** system. It provides timely and **accurate analytical, optimization**, and **forecasting** techniques for **solving complex** inventory management problems.

Typical features of this type of software include:

- **Inventory tracking and forecasting tools** that use selectable algorithms and review cycles to identify anomalies and other areas of concern.
- **Inventory optimization.**
- **Purchase and replenishment tools** that include automated and manual replenishment components, inventory calculations, and lot size optimization.
- **Lead time variability management.**
- **Safety stock calculation and forecasting.**
- **Inventory cost management.**
- **Shelf-life and slow-mover logic.**
- **Multiple location support.**
- **Mobile/Moving inventory support.**

Advantages and Disadvantages of Inventory Control Systems

Inventory control systems have advantages and disadvantages depending on what style of system is being used.

1. **Periodic (Physical) Inventory Control System**
    - In this method, an actual physical count and valuation of all inventory on hand is taken at the close of an accounting period.
    - **Advantages**: Periodic inventory is technically more accurate since it considers both counted and valued inventory.
    - **Disadvantages**: It is more time-consuming compared to perpetual.
2. **Perpetual Inventory Control System**
    - In this system, an initial count of the entire inventory is taken, and then all additions and deletions are closely monitored as they occur.
    - **Advantages**: Perpetual systems can lower the cost of carrying inventory compared to periodic systems.

- **Disadvantages**: Perpetual systems are typically more costly to run than periodic systems and need to be verified from time to time against an actual physical count due to factors like scrap, human error, theft, and other variables.

Inventory Control in Pharmacy

- Inventory control is the process of managing inventory in order to meet customer demand at the lowest possible cost and with a minimum of investment.
- Unlike many factors in pharmacy, inventory is controllable. The pharmacy decides how much to stock.

Inventory Management in Business

- Managing inventory for a small business is a balancing act between supply and demand.
- Several methods of inventory control are used by businesses to gauge the needs of consumers and the company, including:
  - Minimum stock levels.
  - Just-in-Time (JIT).
  - Economic Order Quantity (EOQ).
- Inventory control methods vary across companies and commodities.
- The method that works best for slow-moving items might not work as well for fast-moving items.
- There is no single perfect method for managing inventory.
- A “holy grail” or magic formula for perfect inventory levels does not exist.

ABC ANALYSIS (Always Better Control)

- The **ABC analysis** provides a mechanism for identifying items that have a significant impact on overall inventory cost, while also providing a mechanism for classifying stock into different categories that require different levels of management and control.
- ABC analysis suggests that inventories of an organization are not of equal value.
- Therefore, inventory is grouped into three categories (A, B, and C) in order of their estimated importance.

ABC -ALWAYS BETTER CONTROL ANALYSIS: It is based on the concept of : " Thick on the Best , Thin on the Rest"

Annual on usage value = Annual Requirement x Per unit cost

Classifying items of inventory in ABC Analysis basing upon selective control, where large no. of items to be analyzed then sampling may be done for ABC Analysis

This method helps to maintain peroper stock of categories of drugs based an their money value & based on its value, the Drugs are divided into Group A,B,C

A- Drugs (Costlier & Valuable Items):

They are expensive drugs so; they should be properly stored of handled

1. overstocking should be avoided.
2. They should be purchased on exact requirement basis
3. Wastage of such drugs should be reduced
4. Care full Control of drugs
5. More investment but with less no of items are placed in Class –A Has high consumption value.About 10 % of items of inventory account for 75% of total capital invested in inventory
   Example : Anti Anginal Drugs , Immuno suppressant Drugs

B- Drugs (Average Usage Value items)

1. B-Drug are Neither costly nor cheaply items
2. They require moderate control
3. Less important then class -A & have less control
4. Average consumption value ..
5. About 15 % of items account for 15 % of totalinvestment Example: I.V Fluids , vitamin Preparation .

C-Drugs (Low Usage Value Items)

1. C- drugs are cheap items
2. Low Consumption value
3. Stored in an operative place where people help themselves without formalities About 75% of inventory items account for 10 % of invested capital.
   Example: Anti Pyretics, Antacids etc.,

Steps for classification of Items as A B or C

The following are the steps for the classification of then as A,B or C

1. Take a representative sample of stock items

2. The Annual usage value is calculated for each item to be classified by multiplying hte quantity used with the unit price of the item

3. The usage values in step ii. are arranged in descending order

4. calculated the cumulative total of the no of items & the usage value obtainedin step.

5. Find the percentage of the values obtained in step iv write the grand total of the corresponding columns .

6. Percentage of items are taken on X-axis the corresponding usage value percentage on y-axis arised to plot various points on graph paper 1 to draw a smooth curve

7. Mark the points X & Y where the slope of the curve changes sharply (pointsof infixion)

The usage value & the percentage of items corresponding to these points will determine the items to be classified as A,B or C

Category of drugs	% of items	% of Annual Expenditure
A- Drugs B-Drugs C-Drugs	10-15 % 20-25 % 60-70 %	70 -80 % 15-20 % 5-15 %

APPLICATIONS OF ABC ANALYSIS

1. ABC Analysis can be effectively used in material management at various stages applied.
2. The main work in this analysis is the classification and identification of different types of inventories to determine the degree of control required for each.
3. In many firms, stocks are used at very different rates, so items are classified under categories A, B, and C, on the basis of usage, bulk, value, size, durability, utility, availability, and criticality.
4. Items should be controlled with due weightage to these differential characteristics.

COMPARISIONS OF CLASS A, B & C ITEMS :

	CLASS-A DRUGS	CLASS-B DRUGS	CLASS-C DRUGS
1.	Maintains close Control	Maintains Moderate control	Maintains Loose Control
2.	Size of order based on Calculated requirement	Size of order Based on usage	Size of order Based on level of inventory
3.	Procured from many sources	Procured from From two (or)three sources	Procured from From two sources
4.	Keeps records of receipt & use	Keeps records of receipt & use	No records are kept
5.	More effort to reduce lead time	Moderate effort	Minimum effort
6.	Close checks on schedule revision	Some checks on changes in need	No Checks against need
7.	Frequent Ordering	Less frequent ordering	Bulk ordering
8.	Continual Expediting	Expediting for prospective shortages	No expediting
9.	Accurate forecasts	less accurate forecasts	Appropriate fore casts
10	Low safety stock for less than 2 weeks	Large safety stock upto 2 to 3 months	Large Safety Stock for more than 3 months.
11	High Consumption value	Average consumption value.	Low consumption value

VED ANALYSIS (Vital Essential Desirable)

- **VED analysis** is an inventory management technique that classifies inventory based on its functional importance.
- It categorizes stock under three heads: **Vital, Essential, and Desirable.**

Definitions:

- **V – Vital items:**
  vital drugs are such drugs which are categorized as vital whose absence cannot be tolerated even for a single day. Items whose non-availability renders the equipment or the whole production line completely inoperative or unsafe. If these items are not readily available, there is total loss of production.
- **E – Essential items:**
  Essential drugs are those drugs without which a hospital/drug store can function but may affect the quality of service. Items whose non-availability reduces equipment performance but does not render it totally inoperative or unsafe. Non-availability may cause temporary loss of production or disruption of work. Replacement can often be delayed without serious impact, and temporary repairs are sometimes possible.

- **D – Desirable items:**
  Desirable drugs are those whose absence will not affect the functioning of the hospital/ward/department/patient care and it can be managed at lower level managers.I tems that are mostly non-functional and do not significantly affect performance. The number of vital spares in a plant is generally very few, while most spares fall under essential or desirable categories.

COMBINING ABC AND VED

- The decision regarding the stock of spares depends not only on how critical the spares are from a functional point of view (VED analysis) but also on their annual consumption cost (ABC analysis).
- Therefore, both ABC and VED analyses should be combined for effective spare parts control.

EOQ (ECONOMIC ORDER QUANTITY)

- It refers to the size of the order which gives maximum economy in purchasing any material. It is also referred as optimum (or) standard ordering quantity.

- The basic decision in EOQ is to determine the amount of stock to be ordered at a particular time so that the total of ordering and carrying costs is minimized.
- A firm should place optimum orders that are neither too large nor too small.
- EOQ is the level of inventory order that minimizes the total cost associated with inventory.

Assumptions of EOQ Model:

1. A firm has a steady and known demand of **D units** each period for a particular input.
2. The firm consumes the input at a uniform rate.
3. The cost of carrying stocks is a constant amount **C per unit per period.**
4. The cost of ordering inputs is a fixed amount **O per order.** Orders are delivered instantly.

Formula:

$$EOQ = \sqrt{\frac{2DO}{C}}$$

SAFETY STOCK

- To avoid stock-outs, firms maintain safety stock.
- Safety stock is the minimum level of inventory desired for an item, based on expected usage rate and lead time for receiving an order.

- **Benefits:** Reduces chances of stock-outs and associated costs.
- **Drawback:** Increases overall inventory investment.
- The optimum level of safety stock is determined by balancing stock-out costs with carrying costs.
- Factors include:
    - Stock-out costs.
    - Variability of usage rates.
    - Variability of delivery times.

LEAD TIME

Lead time is the **total time interval between placing an order for medicines and receiving them in usable condition**.

In simpler terms, it's the **waiting period** — from when a purchase order is raised until the stock is ready for use in the pharmacy.

Components of Lead Time:

Lead time can be divided into several stages:

Component	Description
1. Order Preparation Time	Time taken to prepare and approve the purchase order.
2. Supplier Processing Time	Time taken by supplier to process the order and dispatch goods.
3. Transportation Time	Time taken for shipment from supplier to pharmacy.
4. Inspection & Receiving Time	Time taken to verify the delivered goods and add them to inventory records.

Example:
If a hospital pharmacy orders drugs on 1st June and receives them on 10th June, the total **lead time = 9 days**.

Importance of Lead Time:

1. **Inventory Planning:** Helps determine *when to place the next order*.
2. **Prevents Stockouts:** Ensures medicines are available even during delivery delays.
3. **Affects Reorder Point:** The reorder level depends directly on the lead time.
4. **Reduces Emergency Purchases:** Predictable lead time allows better cost control.

Formula:

Reorder Level (ROL)=Average Daily Usage×Lead Time

If lead time increases, the reorder level should also increase to avoid stockouts.

Factors Affecting Lead Time:

- Supplier reliability and location.
- Mode of transportation (air, road, etc.).
- Availability of stock at supplier's end.
- Administrative delays in order approval.
- Seasonal demand or holidays.

Example in Hospital Pharmacy:

If a hospital uses **100 tablets of metformin per day**, and the average lead time is **10 days**, then reorder level = 100 × 10 = **1000 tablets**. So, the pharmacist should reorder when stock falls to **1000 tablets**.

SAFETY OR BUFFER STOCK

The demand and supply rates can never be assessed exactly. There is bound to be discrepancy between actual and estimated demand and supply quantities with fair degree of uncertainty. The organisation with a policy of safeguarding their against these uncertainties maintain level of inventory at some desired minimum level.

Safety stock is the **extra inventory kept on hand as a cushion** against uncertainties in:

- Drug demand (usage rate)
- Delivery time (lead time)

This minimum level of inventory to cover some unforeseen and uncalled for situations is known as the safety or Buffer Stock. Alternately when the fresh supply arrives.

It acts as **insurance** to ensure continuity of patient care when there are fluctuations in demand or supply delays.

Importance of Safety Stock:

1. **Prevents Stockouts:** Protects against unexpected surges in medicine use or supplier delays.
2. **Ensures Patient Safety:** Continuous drug availability is critical in hospitals.
3. **Stabilizes Operations:** Prevents interruptions in dispensing and treatment.
4. **Supports Emergency Situations:** Provides backup for urgent needs (e.g., epidemics or sudden admissions).

Formula (Basic):

$$\text{Safety Stock} = (\text{Maximum Daily Usage} \times \text{Maximum Lead Time}) - (\text{Average Daily Usage} \times \text{Average Lead Time})$$

Example:

- Maximum daily usage = 150 units
- Average daily usage = 100 units
- Maximum lead time = 12 days
- Average lead time = 8 days

Then,
Safety Stock = (150×12) − (100×8) = **1800 − 800 = 1000 units**

So, 1000 units should be kept as **safety stock**.

Factors Affecting Safety Stock:

Factor	Effect
Variation in demand	High fluctuation in drug usage increases safety stock.
Lead time variability	Longer or unpredictable delivery time requires more safety stock.
Criticality of the drug	Life-saving drugs (e.g., insulin, adrenaline) need higher safety stock.
Supplier performance	Reliable suppliers allow lower safety stock levels.

Balancing Safety Stock:

Too much safety stock → increases **carrying cost** (storage, expiry, wastage).
Too little safety stock → increases **risk of stockout** (treatment delay, emergency purchase).

Thus, pharmacies aim for an **optimal safety stock** that balances cost and service level.

There are **two approaches to determine the safety stock** to be left in order to cover demand rate variations,

(1) Explicit Consideration Of Shortage Of Shortage Costs

(2) Implicit Consideration Of Shortage Costs

1. Since inventory control basically involves the trade-off between different costs, we may consider

(a) The Cost Of Not Having The Materials In The Quantity That May Be Required And

(b) The Cost Of Keeping Excess Material In Stock For Fear Of Demand Rate Variations.
The former cost per unit of the material is called as the “under stocking cost” or the “ shortage

cost", the later cost for limit of the material is called as the "over-stocking cost". These two categories of cost are the opportunity costs and a mathematical analysis can be carried out to find the optimal trade-off between these two opposing costs, the stock level at which the total of these two costs is minimum.

2. Instead terms of explicit values of the under-stocking and over-stocking costs, one may gauge the uncertain demand and rates in terms of " risk factor" or " risk-level". The safety stock is then determined based on the 'risk' which the organisation is willing to undertake.

Once maximum demand rate is fixed, the calculations of safety stock is easy.

Since the safety stock is required for the lead time only, the amount of safety stock will be :(Dmaximum – D average) over the lead time.