

INVENTORY CONTROL SYSTEM

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Inventory control system

- Informs the storekeeper
 - When to order or issue and
 - How to maintain an appropriate stock level of all products
 - To avoid shortage and oversupply

Key inventory terms

- **Max-min ICS**; Designed to ensure that the quantity in stock fall within established range
- **Max stock level/max quantity**; level of stock which inventory level should not rise, under normal condition and expressed as number of months of stock
- **Minimum stock level/ min quantity**; level of stock action to replenish inventory should occur under normal condition and expressed as number of months of stock

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- **Review period/ review period stock/order interval/resupply interval/;** is the routine interval of time between assessment of stock level to determine if additional stock is needed
- **Safety stock level;** the additional buffer or reserve stock kept on hand to protect against stock out caused by delayed deliveries markedly increased demand or other unexpected event
- **Emergency order point;** the level of the stock that triggers an emergency order

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- **Reorder level** is the quantity of remaining stock that should trigger a reorder of the item. In the minimum-maximum ordering system, this level is called the minimum stock level.
- **Stock position** the sum of stock on hand (working and safety stock) and stock on order, minus any stock back-ordered to clients.
- Overstocks may occur if several months' worth of stock are on hand or on order when a new order is placed.
- Stock outs may result if significant quantities from an upcoming order are on back-order to lower-level facilities and this amount is not factored into the reorder quantity

Types of max-min ICS

1. **Forced order system**; the trigger for order is the end of the review period
2. **Continuous review system**; the trigger for order is when inventory reaches at minimum level
3. **Standard system**; the trigger for order is the end of the review period for the commodities that are at minimum level

Determination of order/issue quantity

- Order/issue quantity= max stock quantity-SOH

Where

max stock =AMC X 2

AMC = average quantity of product dispensed to user or patient in most recent 3 month

Factors in the reorder formula...

- ❑ **Reorder quantity**: the number of units specified when an order is placed
- Calculated when the stock level is found to be at or below the minimum level. The formula is

$$Q_o = (S_{\max} + S_B) - (S_I + S_o)$$

$$Q_o = (S_{\min} + PP \times CA + S_B) - (S_I + S_o)$$

- S_B - quantity of stock back ordered to lower levels (intra system back orders)

Determine when to place order/issue

- Forced order system;
 - At the end of each and every review period
 - Can be push or pull
- Continuous review system;
 - Minimum stock level
- Standard system;
 - End of the review period for the commodities that are at minimum level

Reading assignment

- Read on the advantage and disadvantage of
 - Forced order system
 - Continuous review system
 - Standard system

Setting Max –min level

- Step 1. determine lead time
- Step 2. set the review period
- Step 3. set the safety stock
 - Safety stock $\geq \frac{1}{2}$ review period
 - $SS = C_A \times L_T$
- Step 4. set the minimum
 - Forced order system and Continuous review system
= lead time stock + SS
 - Standard system = lead time stock + SS + review period stock
 - No data = $\frac{1}{2}$ review period stock
 - Or $S_{min} = (L_t \times C_A) + SS$
 - where S_{min} = minimum stock L_t = lead time C_A = Average consumption SS = safety stock

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- Step 5. set the maximum
 - Min stock level + review period stock
 - **$S_{max} = S_{min} + PP \times CA$**
 - PP= procurement period
- Step 6. set EOP
 - Longest emergency lead time

Records

- Stock records are
 - the core records in the inventory management system.
 - the primary source of information used in the various reordering formulas and reports
 - Stock records can be either manual or computerized.
- Bin cards:
 - File cards are physically kept with the stock
 - What difference can you mention?

Stock counts

- Stock counts are important, both for reordering purposes and for determining the inventory value.
- Annual stock count counting done annually
- In cyclic counting (sometimes known as continuous counting or perpetual inventory), the entire inventory is divided into counting groups, and one group is counted each week (or each month), with reconciliation of discrepancies; another group is counted the next week (or next month), and so forth.

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- A cyclic counting program provides for every item in the inventory to be counted at least once a year and for a reconciliation to be carried out between physical and recorded stock.
- A regular, cyclic stock-counting procedure is generally accepted as superior to an annual stock count

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- Two main reasons account for the change to cyclic counting
 1. With an annual stock count, a whole warehousing and distribution operation is **shut down** for a day or two to a week or more.
 - This procedure disrupts the supply system and causes frustration for warehouse and financial staff, who must rush to **get the whole process completed as quickly as possible.**

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2. When discrepancies are found in an annual count, tracing exactly where the problem arose during the year is difficult

Cyclic counting, in contrast, can take place without interrupting normal operations. With more frequent counting, tracking down the source of discrepancies may be possible.

Stock must be held for several reasons

- To ensure availability:
- To maintain confidence in the system:
- To reduce the unit cost of medicines:
- To avoid shortage costs:
- To minimize ordering costs:
- To minimize transport costs:
- To allow for fluctuations in demand:

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- Most pharmaceutical supply systems try to regularly stock all items that are on the formulary or essential medicines list
 - no differentiation is made between vital and nonessential items, between high-cost and low-cost items, or between items that move quickly and those that are rarely used.
- This lack of discrimination often leads to an accumulation of slow-moving stock and excess capital tied up in inventory.
- Ways to reduce it?

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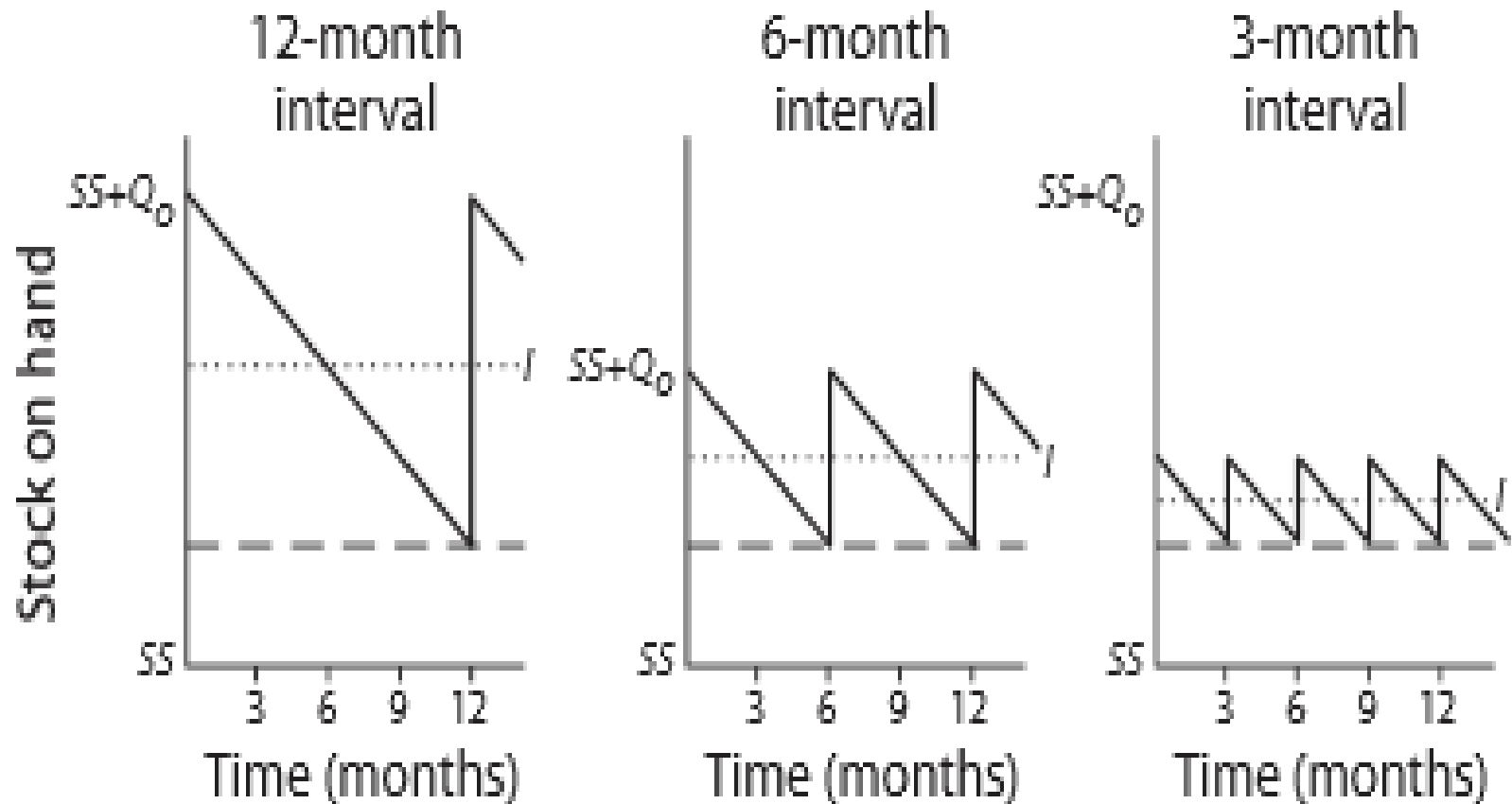
- Two inventory models

1.Periodic review model:

In periodic review models, orders can be placed only at specified intervals, and the item is ordered at every interval.

2.Perpetual review model:

In perpetual review models, orders can be placed at any time; the user (or a minimum stock level) determines when to order and how much to order



Key: I = average inventory Q_0 = order quantity SS = safety stock

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- In pharmaceutical supply systems, the most common inventory control models are—
 - ❖ **Annual purchasing**—a periodic review model with the interval set at once a year
 - ❖ **Scheduled purchasing**—a periodic review model in which orders are placed at prescribed intervals (such as weekly, monthly, quarterly, biannually)
 - ❖ **Perpetual purchasing**—a model in which stock levels are reviewed each time stock is issued (or at least weekly) and orders are placed whenever stock falls below a minimum level
 - ❖ **Draw-downs from framework contracts**

Annual purchasing

- ❖ Form of scheduled purchasing
- ❖ Procurement is carried out once each year for all items.
- ❖ Mandatory in countries where local sources of supply are limited and lead times from foreign suppliers average several months.
- ❖ Preferred when donors support pharmaceutical purchases.

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- Countries use annual purchasing for the following main reasons—
 - ✓ Financial regulations and realities may dictate the choice.
 - ✓ A single procurement can be easier to manage than more frequent purchasing, depending on staff capacities and availability of information.
 - ✓ Tradition and inertia may promote continuance of annual purchasing just because it has always been done that way.

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- ✓ Greater purchase volumes result in lower prices and can be accompanied by staggered deliveries to facilitate storage and distribution management, as well as a more even cash flow arrangement
- ✓ Pharmaceutical purchase prices per unit are usually lower when large-volume purchases are made. This consideration can be important when inflation or local currency devaluation is significant and progressive

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- Disadvantages stem from using annual purchasing
 - Actual consumption is often different from the annual forecast or the actual demand, leading to shortages and surpluses;
 - Expensive emergency orders are required to cope with shortages, and surplus stock may spoil or expire.
 - Average stock levels and inventory-holding costs are higher with this model
 - Local suppliers that win annual tender contracts may find coping with huge, single deliveries difficult
 - More storage space is required, unless deliveries from suppliers can be spaced throughout the year.

Scheduled purchasing

- Specific ordering windows are determined, and regular orders can be placed only at the scheduled intervals—for example, once each month, each quarter, or every six months.
- Orders are placed at the scheduled order date for quantities large enough to cover average needs until the next order is scheduled plus stock needed during the lead time for that order (plus replenishment of safety stock, if needed).
- Scheduled purchasing works most effectively when consumption patterns are relatively stable

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- Scheduled purchasing has several benefits—
 - An estimated-quantity rather than fixed-quantity contract can be supported.
 - A scheduled system may be preferable to local suppliers because it allows them to spread their demand over the year.
 - Inventory-holding costs are less than with annual purchasing (Less space is needed in warehouses than with annual purchasing).

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- Items with variable demand can be purchased more frequently in smaller lots, reducing overstocking and costly emergency orders.
- The procurement unit can respond more rapidly to program needs and make better use of a limited pharmaceutical budget.
- In many countries, funds and foreign exchange are easier to obtain for making smaller, more frequent purchases.

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- The procurement and port-clearing workload is fairly evenly spread over the year.
- Because many products need reordering at scheduled points, procurement costs are better controlled, especially in instances where the procurement process is lengthy and cumbersome.
- It supports pooled procurement systems, where orders from all partners are joined and placed as a single order.

Perpetual purchasing

- The inventory position (stock on hand and on order) is reviewed on a regular basis (usually with every transaction, but at least weekly);
- whenever the stock position falls below a designated reorder point, an order is initiated.
- The order quantity may be predetermined or variable.
- Safety stocks and average inventories are much lower with this model than with either scheduled or annual purchasing, but some safety stock is still needed

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- Advantage:- the ability to rapidly respond to sudden changes in consumption,
 - because the inventory position is reviewed continuously and orders are placed frequently.
- Disadvantage:- It is not suitable for all public-sector pharmaceutical supply systems.
 - If lead times are not relatively short (one month or less), perpetual purchasing will be difficult to use without maintaining large safety stocks

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- The main requirements for perpetual purchasing are
 - Stock records that are current and accurate
 - A computer with suitable software to manage an inventory of more than a few items
 - Good access to and communication with suppliers and user units, with lead times of one month or less
 - Ready access to funds, unless suppliers are prepared to wait for payment
 - An estimated-quantity contract that allows ad-hoc orders, or a purchasing environment where formal contracts are not used

Drawing down from framework contracts

- A framework contract establishes the essential terms and conditions of the procurement agreement, such as time frame, product specifications, prices, quantities, and conditions of supplier performance.
- During the framework contract term, the supplier holds the stock until it receives orders for specific purchases.
- Each order is itself a separate contract that follows the broad framework terms with specific terms added, such as delivery date.

Projecting consumption

- Ordering rationally requires forecasting future needs, the least predictable variable in a reordering formula
- Three different methods can be used for forecasting consumption

1. Projective

- Forecasts using past consumption (e.g. Average monthly consumption)

Projecting consumption...

2. Causal

- Forecasts based on external factors such as market conditions, epidemics, changes in health system size and structure

3. Judgmental:

- Forecasts based on subjective estimates of purchasing staff and advice from other staff
- The ***least demanding method***, and often the least accurate, if used alone

Methods of tracking average consumption to forecast demand

1. Simple average consumption:

- The average monthly consumption over the past 12 months or less, if there are no seasonal changes in consumption

2. Seasonal average consumption:

- The average consumption in the last comparable season or epidemic cycle for specific drugs

3. Moving average consumption:

- The average monthly consumption in the most recent months- for example, the past two or three months

Monitoring and evaluation of inventory management

Sample indicators

- **Performance indicators**
 - Percentage of stock records that correspond with physical count
 - Average lead time from suppliers and from warehouses to facilities
- **Safety stocks and service level indicators**
 - How are safety stock levels calculated at each level of the system
 - What adjustments in safety are made for variations in consumption and lead time pattern?

THANK YOU