Supply Chain and Inventory Control

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Supply Chain Management

- Refers to the entire process of procurement, storage, and distribution of pharmaceuticals in a healthcare setting (hospital, clinic, etc.)

Key Components:

- **Supplier selection** – based on quality, reliability, pricing, and regulatory compliance.
- **Drug procurement** – involves demand forecasting, budgeting, and timely ordering.
- **Logistics and transportation** – ensuring drugs are transported under required conditions (e.g., cold chain).
- **Receiving and inspection** – verifying batch numbers, expiry dates, quantity, and quality.
- **Distribution to departments** – dispensing as per requirement, usually with software support.

Inventory Control

- Aims to maintain optimal stock levels—neither too high (which ties up capital) nor too low (which leads to stockouts).

Key Techniques:

- **ABC Analysis** – categorizes drugs based on cost:
  - A: High-cost, tight control
  - B: Moderate cost, moderate control
  - C: Low cost, minimal control
- **VED Analysis** – based on criticality:
  - V: Vital
  - E: Essential
  - D: Desirable
- **FSN Analysis** – based on consumption pattern:
  - F: Fast-moving
  - S: Slow-moving
  - N: Non-moving
- **EOQ (Economic Order Quantity)** – optimizes the amount ordered each time.

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- **Safety Stock** – a buffer to handle demand fluctuations.
- **Reorder Level** – stock level at which new orders are placed.

Preparation of Drug Lists

- To ensure rational drug use, availability of life-saving and essential medicines, regulatory compliance, and patient safety by categorizing drugs according to their clinical importance, regulatory status, and risk potential.

High-Risk Drugs

- Drugs with a high potential to cause significant harm if used improperly.
- Examples: Insulin, Heparin, Chemotherapy agents, Potassium chloride.
- **Control Measures:**
  - Special labeling (e.g., red labels)
  - Double-check systems
  - Storage in separate, clearly marked areas

Emergency Drugs

- Drugs required for life-saving situations (e.g., code blue or crash cart medications).
- Examples: Adrenaline, Atropine, Lidocaine, Amiodarone.
- **Stored in:** Emergency trolleys (Crash Carts) accessible 24/7
- **Monitored for:** Expiry, replenishment after each use

Schedule H1 Drugs

- As per Drugs and Cosmetics Rules, 1945 (India)
- Prescription-only drugs with high potential for misuse
- Examples: Antibiotics like Cefixime, Levofloxacin; anti-TB drugs.
- **Regulations:**
  - Must be sold only on prescription
  - Pharmacists must maintain a separate register/logbook
  - Retain prescription copy for at least 3 years

NDPS Drugs (Narcotic Drugs and Psychotropic Substances)

- Regulated under the NDPS Act, 1985 (India)
- Includes opioids, sedatives, etc.

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- Examples: Morphine, Fentanyl, Methadone
- **Regulations:**
    - Special licenses needed for procurement and storage
    - Mandatory stock registers (daily record)
    - Security (locked cupboards, restricted access)
    - Periodic audits by authorities

Reserved Antibiotics (Antimicrobial Stewardship Program)

- Reserved for multidrug-resistant infections or critical use to prevent resistance
- Examples: Colistin, Linezolid, Carbapenems (Imipenem, Meropenem)
- **Protocols:**
    - Prescription by specialists only
    - Justification and documentation required
    - Monitored under Antibiotic Policy/Stewardship Programs

Procedures of Drug Purchases

- Drug procurement is a systematic process to ensure the continuous availability of quality-assured medicines in hospitals.
- It involves multiple steps to select, source, evaluate, and purchase drugs through short-term, long-term, and tender-based systems.

Drug Selection

- Based on Essential Drug List (EDL) or hospital formulary
- Selection by Pharmacy and Therapeutics Committee (PTC) based on:
    - Safety
    - Efficacy
    - Cost-effectiveness
    - Clinical need

Purchase Methods

1. Short-Term Purchase

- For immediate or urgent requirements (e.g., emergency drugs)
- Often through local purchase or quick procurement

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- Quotation-based (3 or more quotations obtained for best price)

2. Long-Term Purchase

- For drugs used regularly (routine demand)
- Annual/bi-annual contracts or rate contracts
- Fixed rates and quantities negotiated in advance
- Lower procurement cost per unit

3. Tender / e-Tender Process

- For bulk purchases and government/private hospitals
- Transparent and competitive bidding process
- Can be:
  - **Open Tender** – open to all vendors
  - **Limited Tender** – invited to specific pre-qualified vendors
  - **Single Tender** – used for proprietary drugs or specific brands

Quotations

- Used when purchasing from the open market for non-contracted items
- Minimum 3 quotations from authorized suppliers
- Selection based on price, quality, delivery time

Inventory Control Techniques

- Inventory control techniques are methods used to ensure that the right quantity of drugs is available at the right time without overstocking or understocking. Key techniques include:

Economic Order Quantity (EOQ)

- **Definition**: EOQ is the optimal quantity of stock to order that minimizes the total cost of inventory—comprising ordering cost and holding cost.
- **Formula**:

$$EOQ = \sqrt{\frac{2DS}{H}}$$

Where:

- **D** = Annual demand (units)
- **S** = Ordering cost per order

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- **H** = Holding or carrying cost per unit per year

- **Importance**:
  - Balances ordering and storage costs
  - Avoids overstocking and stockouts
  - Increases efficiency in drug procurement

Reorder Level (Reorder Point)

- **Definition**: The inventory level at which a new order should be placed to replenish stock before it runs out.
- **Formula**:

$$\text{Reorder Level} = \text{Average Daily Usage} \times \text{Lead Time (in days)}$$

- **Purpose**:
  - Ensures continuous supply of drugs
  - Avoids interruptions due to lead time delays

Minimum and Maximum Stock Level

- **Minimum Stock Level**: The lowest quantity of inventory that should be maintained to avoid stockout.
- **Maximum Stock Level**: The highest quantity of inventory that should be held to avoid overstocking and wastage.
- **Helps in**:
  - Setting safety stock levels
  - Planning purchase frequency and storage capacity

Inventory Turnover Ratio

- **Definition**: Measures how often inventory is sold and replaced during a period.
- **Formula**:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Drugs Consumed}}{\text{Average Inventory}}$$

- **Interpretation**:
  - High ratio → efficient use of inventory
  - Low ratio → overstocking or slow-moving items

ABC Analysis (Always Better Control)

- Categorizes drugs based on annual consumption value:

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