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# Institutional Pharmacy

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# ***Course Outline***

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- **Hospital Pharmacy**
  - **Technician Roles**
  - **Hospital Pharmacy Areas**
  - **Organization of Medications**
  - **Hospital Formulary**
  - **Unit Dose System**
  - **Communication**
  - **Computer Systems**
  - **Medical Records**
  - **Medication Orders**
  - **Order Processing**
  - **Inventory Control**
  - **Sterile Products**
  - **General Hospital Issues**
  - **Calculations**
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# Hospital Pharmacy Services

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- Inpatient Drug Distribution Systems
  - Hospital pharmacies carry out a number of unique activities such as:
    - Unit dose drug distribution system
    - Repackaging
    - Floor stock
    - IV admixture/TPN service.
  - Unit dose drug distribution system saves money and reduces the chance of medication errors.
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# Hospital Pharmacy Services

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- Pharmacy Administration
    - The director of pharmacy is the pharmacist-in-charge, with overall responsibility for the hospital's pharmacy services.
    - Depending on the hospital size, additional assistant or associate directors may work under the director. In small rural hospitals, only one or two pharmacists may make up the pharmacy staff.
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# The Nurses' Station

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- Hospitals generally contain the same elements.
  - Patient rooms are divided into groups called nursing units or patient care units.
  - Patients with similar problems are usually located on the same unit.
    - For example, a patient being treated for a heart attack would be treated in the Cardiac Care Unit (CCU) and a woman about to give birth would be admitted to the obstetrics (OB) ward.
  - The work station for medical personnel on a nursing unit is called the nurses' station.
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# Physicians

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- **M.D., Medical Doctor**
    - An M.D. examines patients, orders and interprets lab tests, diagnoses illnesses, and prescribes and administers treatments.
    - MD's write the majority of all medication orders.
  - **D.O., Doctor of Osteopathy**
    - A osteopathic physician has the same responsibilities as an M.D. but practices a “whole person” approach to medicine.
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# Other Staff

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- **P.A., Physician's Assistant**
    - A PA coordinates care for patients under the close supervision of a M.D. or D.O.
    - They are allowed to prescribe certain medications.
  - **R.T., Respiratory Therapist**
    - A respiratory therapist assists in the evaluation, treatment, and care of patients with breathing problems or illnesses. They may also administer respiratory drug treatments to patients.
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# Other Staff

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- **P.C.T., Patient Care Technician**
    - A person who works as a unit clerk or assists nursing in patient care activities. PCTs are often sent to the pharmacy to pick up medications that are needed for a patient.
  - **M.S.W., Master's of Social Work**
    - A social worker is concerned with patient social factors such as child protection, coping capacities of patients and their families, and ability to pay for medications.
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# Nursing

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- **N.P., Nurse Practitioner**
    - A nurse practitioner provides basic primary health care or can do further training to specialize in a specific area.
    - The N.P. works closely with doctors and can prescribe various medications in most states.
  - **R.N., Registered Nurse**
    - A nurse who provides bedside care, assists physicians in various procedures, and administers medication regimens to patients.
  - **L.P.N., Licensed Practical Nurse**
    - A nurse who provides basic bedside care under the supervision of an RN. An LPN may administer medication to patients.
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# *Pharmacy*

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- **R.Ph., Registered**

- A pharmacist who is licensed to work by the state..
- Duties include reviewing patient drug regimens for appropriateness, dispensing medications, and advising the medical staff on the selection of drugs.
- An R.Ph. may have a bachelor of science in pharmacy (B.S. Pharm.) or a Doctor of Pharmacy (Pharm.D.) degree.

- **Pharm.D., Doctor of Pharmacy**

- This is the only degree available to pharmacy school graduates. Pharm.D. requirements include more clinical sciences and experiential training than a B.S. Pharm.
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# Organization of Hospital Pharmacy

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- **In-patient pharmacy**

- A pharmacy located in a hospital which services only those patients in the hospital and its ancillary areas.

- **Pharmacy satellite**

- A branch of the in-patient pharmacy responsible for preparing, dispensing, and monitoring medication for specific patient areas.

- Pediatric satellite, OR Pharmacy, Oncology Pharmacy.

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# Organization of Hospital Pharmacy

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- **Central pharmacy**

- The main in-patient pharmacy in a hospital that has pharmacy satellites. It is the place where most of the hospital's medications are prepared and stored.



# Other Hospital Pharmacy Services

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- *Clinical Services*
    - Many hospitals offer clinical and consultative services such as nutrition support, pharmacokinetics, critical care, and other specialties.
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# Other Hospital Pharmacy Services

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- Drug Information Services
    - Most hospitals have a drug information service that is primarily responsible for making recommendations on a drug formulary. A hospital pharmacy may maintain a drug information center, containing reference works, including books, periodicals, microfilm, CDs, DVDs, and access to computerized or Internet databases.
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# Organization Of The ~~Hospital~~

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- Pharmacy and Therapeutics Committee
    - The P&T committee is primarily responsible for making the final decision on drug formulary decisions.
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# Organization Of The

## ~~Hospital~~

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- Infection Control Committee
    - The major role of the infection control committee (ICC) is the prevention of nosocomial infections in the hospital. Universal precautions are used to prevent infection when a hospital worker comes into contact with blood or other bodily fluids.
  - Institutional Review Board
    - The IRB is responsible for protecting the patient in investigational studies undertaken in the hospital.
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# Pharmacy Technician Role

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1. Front Counter
  2. Cart Fill
  3. Order Processing
  4. Monitoring Drug Therapy
  5. Help coordinate narcotic drug distribution
  6. Delivery (hospital and clinics)
  7. Serve as an automation technician
  8. Participate in Quality Assurance (QA)
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# Pharmacy Technician Role

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- 9. Investigational Drug Service
  - 10. Compounding/Unit Dosing
  - 11. Staff Development
  - 12. IV/Clean Room (IV admixtures)
  - 13. Inventory Control
  - 14. Pharmacy Technician Supervisor
  - 15. Satellite Pharmacies
  - 16. Outpatient Pharmacy
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# Hospital Pharmacy

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- **Batching**

- Preparation of large quantities of unit-dose oral solutions/suspensions or small volume parenterals for future use.

- **Clean room**

- Area designed for the preparation of sterile products.

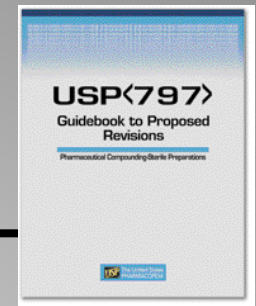
- **Outpatient pharmacy**

- A pharmacy attached to a hospital which services patients who have left the hospital or who are visiting doctors in a hospital outpatient clinic.

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# USP 797

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- A set of regulations issued by the US Pharmacopoeia.
  - Must be followed by any pharmacy that prepares compounded sterile products.
  - Includes a strict set of policies and practices for hospitals to use in sterile product preparation.
  - Intended to decrease infections transmitted to patients through drug preparation and better protect staff in their exposure to pharmaceuticals.
  - All hospitals that are accredited by the Joint Commission of Health Care Organizations (JCAHO) must be compliant with USP 797 standards.
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# Organization of Medications

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- Specific **route of administration** such as intravenous, oral, ophthalmic, topical, etc.
  - Intravenous medications may be further separated by **vials, small volume parenterals** and **large volume parenterals**.
  - Oral drugs may be further divided into **solid dosage forms** (capsules, tablets) and **liquids** (suspensions, solutions) and placed in separate areas.
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# Organization of Medications

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- Alphabetical order using the generic name of each drug .
    - It is important for the hospital pharmacy technician to have a good knowledge of brand vs. generic names.
  - Some medications require refrigeration or freezing.
    - It is imperative that the technician identify put them in the correct place.
      - For example, most vaccines require refrigeration. If left at room temperature for too long, they may lose some of their effectiveness.
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# Organization of Medications

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- Narcotics and other controlled substances are often stored in a secure area of the pharmacy.
    - They may be stored in a locked cabinet or automated dispensing cabinet which requires a personal code and password.
    - Some pharmacies will have video surveillance of this area to decrease risk of diversion or mishandling of these medications.
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# Organization of Medications

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- It is mandatory for hospital pharmacies to **lock CII medications in a secure area.**
  - CIII-CV medications are stored according to each institution's policy.
  - Other pharmacies may choose to keep them in a secure area.
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# Examples of Refrigerated Medications

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Refrigerator: 2° to 8°C (36°–46°F)

- Alteplase (Activase®)
  - Caspofungin (Cancidas®)
  - Epoetin alfa (Epogen®, Procrit®)
  - Filgrastim (Neupogen®)
  - Fosphenytoin (Cerebyx®)
  - Tobramycin for oral inhalation (Tobi®)
  - Most vaccines
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# Examples of Frozen Medications

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Freezer: -10° to -20°C (Av -15°C, 5°F)

- Measles, Mumps, Rubella and Varicella combination vaccine (Proquad®)
  - Varicella (chickenpox) vaccine (Varivax®)
  - Zoster (shingles) vaccine (Zostavax®)
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# Compounding

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- **Bulk compounding log**
    - A record of medications that are compounded in the pharmacy for non-specific patients.
    - Include information on the list of all the ingredients, amounts used, manufacturer, lot numbers and expiration dates of each specific ingredient.
  - **Reconstitute**
    - Addition of water or other diluent to commercially made drug bottles or vials in order to make a solution or suspension from a pre-made powder form of the drug.
  - **Extemporaneous compounds**
    - Medications which must be prepared following a specific recipe or formula, usually because they are not available commercially.
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# Hospital Formulary

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- **Formulary**

- A list of drugs stocked at the hospital which have been selected based on therapeutic factors as well as cost.

- **Closed-formulary**

- A type of formulary that requires physicians to order only those medications on the formulary list.

- **Non-formulary drugs**

- These are not on the formulary list which a physician can order.
  - A physician may have to fill out a form stating why that specific medication is required.
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# Unit Dose

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- **Unit dose**

- A package containing the amount of a drug required for one dose.
- Oral medications contain **24 hour dosages**.
- By preparing medication in this way, nurses are not required to select medication from large bulk bottles, decreasing the chance of making an error.



# Unit Dose

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- Medication carts
    - Contain an individual drawer or tray for each patient
    - Each individual drawer in a medication cart is filled daily to meet patient medication needs.
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# Cart Filling

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- Several machines referred to as robots developed to assist in the cart filling process.
    - While this reduces the manual filling responsibilities of technicians, there is still a requirement for some medications, such as those stored in the refrigerator, to be hand filled.
  - There is a large amount of special packaging required to stock robots, and technicians who would traditionally be hand filling trays often perform these duties.
  - Cart-filling robots are very expensive and require a large amount of space within the pharmacy area.
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# Communication

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- Pneumatic tube

- A system which shuttles objects through a tube using compressed air as the force.



- Limitations

- It may not be used with unstable medications (e.g. albumin, insulin, IVIG).
    - Medications too large for the tubes.
    - Medications restricted by hospital policy (e.g. narcotics).





# Medical Records

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- Health records
    - Records that are detailed, chronological accounts of a patient's medical history and care.
  - Electronic medical record (EMR) or electronic health record (EHR)
    - A computerized patient medical record.
    - Integrates patient medical records with billing, patient appointments and allows authorized health care providers to access a patient's medical information from any secure location.
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# Components of Medical Record

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- **Demographics**
    - Personal identification information (phone numbers, addresses and emergency contact information, etc.).
  - **Allergies**
    - List of drug and/or food allergies and the allergic response experienced (e.g., rash, anaphylaxis).
    - **NKA or NKDA:** “no known allergy” or “no known drug allergy.”
  - **Medical history**
    - List of disease states (previous illnesses, surgeries, prescription, OTC and herbal medications).
  - **Medication orders**
    - Medication orders written by a physician to the patient.
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# Components of Medical Record

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- Medication administration record

A computerized or handwritten form that tracks the medications given to a patient, what time they were given, and who administered them.

- Lab/test results

Results for blood tests, X-rays, microbiology, etc.

- Documentation flow sheet

Vitals on an hourly or scheduled basis, hourly rates of large volume IV and medication drips, etc.

- Progress notes

Notes that detail the current progress of a patient.

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# Medication Orders

- **Standing order**
  - A standard medication order for patients to receive medication at scheduled intervals (e.g., 1 tablet every 8 hours).
- **PRN order**
  - An order for medication to be administered only on an as needed basis (e.g., 1 tablet every 4 to 6 hours as needed for pain).
- **STAT order:**
  - An order for medication to be administered immediately.

		PATIENT IDENTIFICATION			
<b>DOCTOR'S ORDERS</b>		099999999	675-01		
		SMITH JOHN			
		12/06/1950			
		DR P JOHNSON			
DATE	TIME	DOCTOR'S ORDERS 1		DATE/TIME INITIALS	DATE/TIME INITIALS
12/10	2100	Admit patient to 6* Floor Pneumonia, Dehydration All: PCN Rash			
		Order CBC, chem-7, blood culture stat NS @ 125ml/hr IV			
		Dr Johnson x2222			
DATE	TIME	DOCTOR'S ORDERS 2		DATE/TIME INITIALS	DATE/TIME INITIALS
12/10	2100	Tylenol 650mg po q4-6 hrs PRN for Temp > 38°C			

# Manual Order Processing (Seven Step Process)

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1. Medication order is written in patient chart.
  2. Copy of medication order is removed from chart.
  3. Order is picked up at nursing station or faxed or tubed to the pharmacy.
  4. Medication order is entered into the pharmacy computer system.
  5. Pharmacist reviews and verifies medication order.
  6. Medication order is filled by a pharmacy technician and checked by pharmacist.
  7. Patient-specific medication is manually delivered or tubed to nursing unit.
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## Automated Order Processing (4 Step Process)

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1. Physician or agent of the physician enters medication order directly into hospital computer system which automatically communicates order to the pharmacy.
  2. Pharmacist reviews and verifies medication order.
  3. RN retrieves medication from point-of use automated medication station.
  4. Pharmacy technician fills inventory as medication supplies fall below par.
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# Inventory Management

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An important part of the technician's position is the receipt, storage, and ordering of pharmaceuticals; discrepancies in the order from the wholesaler or pharmaceutical manufacturer should be resolved. Automation from the pharmacy wholesalers is making inventory management more accurate and less costly.

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# Inventory Management

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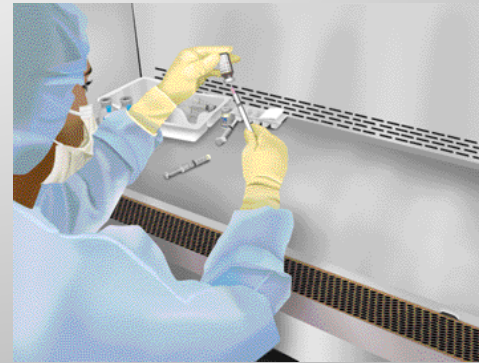
- Par
    - Amount of drug product that should be kept on the pharmacy shelf.
  - Restricted distribution
    - Medications having limited availability due to cost, manufacturing problems, or safety concerns.
  - Drug recall
    - The voluntary or involuntary removal of a drug product by the manufacturer.
    - It usually only pertains to a particular shipment or lot number.
  - Emergency drug procurement
    - Quickly obtains a medication not currently in stock in the pharmacy in situations where the drug is urgently needed.
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# Sterile Products Steps in Preparing Parenterals

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1. Calculate the amount of drug needed.
2. Use aseptic technique to ensure sterility.
  - Wash hands, put on gloves and gown worn (if required), and clean laminar flow hood.
3. Double check for correct drug, concentration, volume, base solution and all calculations.



# Steps in Preparing Parenterals

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4. Label and initials.
  5. Place the vial and syringes used in preparation next to the IVPB for the pharmacist to check.
  6. Dispose all supplies used for product preparation in the proper bins as required by hospital pharmacy.
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# Parenterals

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- **Total parenteral nutrition (TPN)**

- A type of LVP solution that contains protein, carbohydrates and essential nutrients to be given to the patient through an IV line..
- May contain fat-emulsion (3 in 1).

- **Epidural**

- A sterile, preservative-free medication administered into a patient's epidural space (located near the spinal cord and backbone).

- **Short stability**

- Medication that will expire soon after preparation (i.e., within 1–6 hours after preparation).
    - E.g. Trimethoprim and phenytoin.
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# Regulatory Agencies

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- **The Joint Commission on Accreditation of Healthcare Organizations (JCAHO)**
    - Surveys and accredits healthcare organizations every 18 months to three years.
    - Medicare and several insurance providers require JCAHO accreditation for reimbursement.
  - **Centers for Medicare and Medicaid Services (CMS)**
    - Inspects and approves hospitals to provide care for Medicaid patients.
    - Approval by this organization is required to receive reimbursement for these patients.
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# Regulatory Agencies

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- **The Department of Public Health (DPH)**
    - A state run organization that oversees hospitals, including the pharmacy department, in order to assure compliance with hospital practice.
  - **The State Board of Pharmacy (BOP)**
    - The BOP registers pharmacists and technicians.
    - Regulate the registration of the pharmacists and technicians.
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# Regulatory Agencies

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- **United States Pharmacopoeia (USP)**
    - Creates standards to assure the quality of medicines, dietary supplements and related products made available to the public.
  - **Drug Enforcement Administration (DEA)**
    - A regulatory agency for controlled substances (CI–CV).
    - Ensures that hospitals follow controlled substances laws.
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# Safety

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## Code Cart

A cart that contains different medications and equipment commonly used in emergency situations.



# Safety

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## **Universal precaution**

Practices and guidelines that reduce the probability of exposure to bloodborne pathogens.

- These precautions include the use of protective barriers (gloves, gowns, masks, and protective eyewear).
  - Employees who may not have direct contact with blood products must be trained in universal precautions.
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# Safety

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## "Sharps" container

A **RED** container designated for disposal of used needles or other items that may cut or puncture the skin.



# Terms to Remember

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1. Automated dispensing system
  2. Batching
  3. Bulk compounding log
  4. Central pharmacy
  5. Clean room
  6. Closed formulary
  7. Code cart
  8. Drip rounds
  9. Drug recall
  10. Electronic medical record (EMR)
  11. Emergency drug procurement
  12. Epidural
  13. Extemporaneous compounds
  14. Final filter
  15. Formulary
  16. In-patient pharmacy
  17. Intravenous piggyback (IVPB)
  18. Medication
  19. Administration record
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# Terms to Remember

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20. Non-formulary drugs

21. Outpatient pharmacy

22. Par

23. Pharmacy satellite

24. Pneumatic tube

25. PRN order

26. Reconstitute

27. Restricted distribution

28. Short stability

29. Standing order

30. STAT order

31. Total parenteral nutrition  
(TPN)

32. Unit dose

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