Compounding In Hospitals

Definition:

- Compounding in hospitals refers to the preparation, mixing, assembling, altering, packaging, and labeling of a drug or device in accordance with a licensed practitioner's prescription, medication order, or initiative.
- It ensures that customized medication is available when commercial preparations are unsuitable or unavailable.

Bulk Compounding

Definition:

- Bulk compounding is the preparation of large quantities of pharmaceutical formulations (solid, liquid, or semisolid) from raw ingredients for multiple doses or future use.
- These preparations are typically for:
  - Commonly used medications in standard doses.
  - Frequently administered IV fluids or mixtures.
  - Medications used in protocols (e.g., chemotherapy, pain management).

Examples:

- Oral rehydration salts (ORS) powder
- Creams, ointments, or gels
- Cough syrups or elixirs
- Pediatric dilutions from adult-strength medications

Applications:

- Often used in pediatric wards, dermatology, or for customized formulations
- Cost-effective for high-demand drugs

Steps Involved:

1. **Formulation Design** – Based on a standard formula or hospital-approved master formulation record
2. **Weighing and Measuring** – Accurate measurement of all ingredients
3. **Mixing** – Using mortar-pestle or industrial mixers for uniformity
4. **Filling and Packaging** – In appropriate containers with labels
5. **Labeling** – Drug name, strength, batch number, expiry, storage

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6. **Documentation** – Compounding log, batch preparation records, and quality checks

Quality Control Measures:

- Physical checks (color, clarity, pH)
- Sterility (for injectables)
- Potency testing (when applicable)

IV Admixture Services

Definition:

- IV admixture service is the preparation of sterile intravenous (IV) products by combining one or more sterile drugs with a suitable diluent in a controlled aseptic environment.
- This is done in laminar airflow hoods in sterile environments to minimize contamination

Objectives of IV Admixture Services:

- Ensure sterility and safety of IV preparations.
- Prevent errors in dosing and administration.
- Reduce microbial contamination risks.
- Ensure compatibility and stability of drug mixtures.

Common Preparations:

- Antibiotics (e.g., vancomycin in NS)
- Chemotherapy admixtures
- Electrolyte solutions
- Infusion fluids for critical care

Components:

- **Drug**: Active pharmaceutical ingredients
- **Diluent/Base**: Normal saline (NS), Dextrose 5%, Ringer's lactate, etc.
- **Additives**: Electrolytes, vitamins, etc.

Facilities Required:

- Laminar airflow hood or biological safety cabinet (Class 100)
- ISO Class 5 cleanroom environment
- Sterile compounding tools and aseptic techniques

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Personnel:

- Trained pharmacists and pharmacy technicians
- Aseptic certification is required

Incompatibilities in IV Admixtures

Definition:

- Incompatibility refers to the undesirable reaction that occurs between two or more components in a solution which may lead to reduced potency, precipitation, or toxicity.

Types of Incompatibilities:

1. **Physical incompatibility:**
   - Visible changes such as precipitation, color change, turbidity.
   - Caused by pH changes, insolubility, or reaction between ions.
   - Example: Mixing calcium and phosphate in parenteral nutrition can cause precipitates.
2. **Chemical incompatibility:**
   - Degradation of the drug due to chemical reactions.
   - May not be visible.
   - Example: Beta-lactam antibiotics degrade quickly in certain solutions.
3. **Therapeutic incompatibility:**
   - When the combined drugs produce undesirable effects or cancel each other’s therapeutic benefits.
   - Example: Mixing two vasopressors that antagonize each other.

Prevention Strategies:

- Use compatibility charts (e.g., Trissel’s Handbook on Injectable Drugs).
- Minimize the number of drugs in a single IV line.
- Use Y-site administration carefully.
- Separate incompatible drugs with a flush in between.

Total Parenteral Nutrition (TPN)

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Definition:

- Total Parenteral Nutrition is a specialized form of intravenous therapy that provides all essential nutrients directly into the bloodstream, bypassing the gastrointestinal tract.

Used in:

- Patients with GI disorders, post-surgery recovery, malabsorption, severe burns, or critically ill in ICU

Components of TPN:

A. Macronutrients:

- Carbohydrates (typically dextrose solutions).
- Proteins (amino acid solutions).
- Fats (lipid emulsions, often administered separately or as a 3-in-1 mixture).

B. Micronutrients:

- Electrolytes (e.g., sodium, potassium, calcium, magnesium, phosphate).
- Vitamins.
- Trace elements.

Compounding Process:

- Customized based on the patient’s metabolic needs, fluid restrictions, and organ function.
- Must be compounded under strict aseptic conditions in clean rooms or isolators.
- Stability and compatibility are critical—especially between calcium and phosphate, which can precipitate.

Types of TPN:

1. Peripheral Parenteral Nutrition (PPN):

- Lower concentration.
- Short-term use.
- Administered through peripheral veins.

2. Central Parenteral Nutrition:

- Higher concentration.
- Long-term use.
- Administered via a central venous catheter (e.g., PICC line).

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