

Medical Supplies, Equipments and Reagents



By:

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Introduction

- The traditional role of pharmacists is to manufacture and supply medicines.
- More recently, pharmacists have been faced with increasing health demands which change their direction and focus to Patients instead of the Product.
- The practice of pharmacy is a vital part of a complete health care system.
- The number of people requiring health care services has steadily increased, and this trend will likely continue.

Introduction...

- Pharmacy will face new challenges, expanded responsibilities, and an ever-increasing growth in opportunities:
 - The increased incidence of chronic diseases;
 - The increased complexity, number, and sophistication of medications and related products and devices;
 - Increased emphasis on primary and preventive health services.
 - Home health care, and long term care;
 - Concerns about improving patients' access to health care, controlling its cost, and assuring its quality.
 - Because of the large role that medications and their proper use play throughout these issues, pharmacists will play an important part in the future of health care.

Medical supplies

- ➡ Are items that need replacing on a routine basis
- ➡ **Disposables** (single use items); *E.g.*, disposable syringes and needles, sutures, surgical gloves, wound dressings...
- ➡ **Expendables** (consumables): items that are used within a short time, essential for an item to perform its basic function.

E.g., cotton wool and laboratory stains, slides

Medical Equipments

- ➡ Durable items that last for several years; ***E.g.***, beds, examination tables, sterilizers, microscopes...
- ➡ Any device, material or other article, whether used alone or in combination to be used for human being for the purpose of:
 - Diagnosis, monitoring, compensation for injury
 - Replacement or modification of anatomy or physiological process

Medical Equipments...

Medical classification of equipment

A- Sensing/Monitoring:

- A device that **measures physiological parameter(s)** such as pressure, pulse, analyte concentration, or temperature

Examples: Thermometer, sphygmomanometer, stethoscope, Glucose Monitor



B- Diagnostics:

- A device that **gathers information leading to the identification of a disease or disorder**

Examples: Imaging (X-Ray, CT), Optical Diagnostics (otoscope, ophthalmoscope)



Medical Equipments...

C- Therapeutics/Surgery:

- A device that is **used to treat a disease or disorder.**

Examples include:

- Surgical Tools (scarpel, scissors), Orthopedic equipments,
- Radiation therapy machines, infusion pumps

D- Supplementary (support) equipments :

Examples include

- Aid for blind
- Hearing aid
- Pacemaker
- Wheel chairs

Reagents

- ➡ A substance or material used in a reaction to detect or measure substances of interest
- ➡ Examples:- reagents for hematologic tests, immunological tests, clinical chemistry tests, parasitological test, microbiological test

Surgical Dressings



Surgical Dressings...

- ▶ A term applied to a wide range of materials used for dressing wounds or injured or diseased tissues

Functions:

- ▶ Provide an environment for **moist wound healing**
- ▶ **Prevent maceration** by permitting evaporation or absorption
- ▶ Reduce heat loss, odor, pain (increase patient comfort)
- ▶ Control microbial growth

Surgical Dressings...

- ▶ Provide compression, promoting haemostasis, and reducing edema;
- ▶ Provide mechanical support
- ▶ Improve appearance of the wound site
- ▶ Protect the wound from further damage
- ▶ Reduce overall costs associated with wound treatment

Surgical Dressings...

Selection of a wound Dressing

Should be based on:

- ▶ The degree of exudation
- ▶ Presence of likelihood of infection
- ▶ Anatomical site
- ▶ The state of wound repair

Ideal Wound Dressings

- Provide mechanical and bacterial protection
- Maintain a moist environment at the wound/dressing interface
- Remain nonadherent to the wound
- Nontoxic and nonallergic
- Well acceptable to the patient (e.g., providing pain relief and not influencing movement)
- **Cost effective**

Ideal Wound Dressings...

- Highly absorbable (for exuding wounds)
- Absorb wound odor
- Sterile
- Easy to use (can be applied by medical personnel or the patient)
- Require infrequent changing
- Available in a suitable range of forms and sizes

Classification of Dressings

Functionally classified as:

1. Primary dressings

- directly in contact with the wound
- it may provide **absorptive** capacity of secondary dressings
- it may prevent **desiccation, infection**
- prevent adhesion of secondary dressing to the wound

E.g., Plain Gauze, Impregnated Gauze, & Film Dressing

Classification of Dressings...

2. Secondary dressings

- placed over a primary dressing
- provide further protection, absorptive capacity, compressions (firmness), or occlusion

E.g., surgical cotton (absorbent), surgical gauze, bandages, adhesive tapes

Classification of Dressings...

Dressings may also be classified as:

1. Fibers e.g. cotton
2. Fabrics e.g. Absorbent Gauze
3. Bandages e.g. Elastic Bandages
4. Self adhesive plasters e.g. ZnO plasters
5. Compound dressings

Primary Wound Dressings

1. Plain Gauze

- Stick to all but clean, incised wounds



- Although this property has been used to debride exudative, infected, and necrotic wounds, this practice may be *painful* and is often counter productive, causing the removal of *granulation tissue* and *new epithelium*

Primary Wound Dressings...

2. Impregnated Gauze

- impregnation used to reduce its adherence to wounds
- cotton, rayon, or cellulose acetate gauze has been impregnated with a variety of substances such as paraffin, Zinc saline, or Sodium chloride solutions



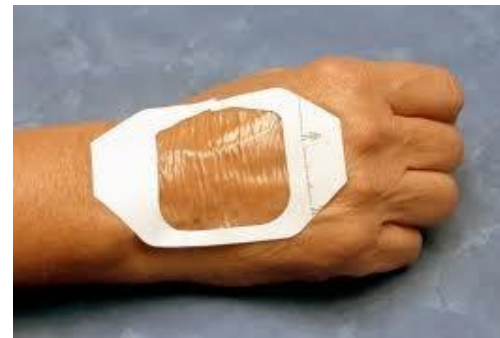
Primary Wound Dressings...

- Coatings may wear off, necessitating a dressing change
- A secondary dressing should be used with primary dressings to prevent desiccation, provide absorbency, and prevent the entrance of pathogens
- When used with an appropriate secondary dressing, these dressings may be used in heavily exudating wounds

Primary Wound Dressings...

3. Film Dressings

- transparent film, occlusive or semi occlusive
- films of *polyurethane* with *acrylic or polyether* adhesives
- semipermeable membrane to water vapor & oxygen, and yet are *water proof*
- in lightly exuding wounds, they permit enough evaporation to promote moist wound healing & prevent maceration
- exclude bacteria from wounds



Primary Wound Dressings...

- permit observation of the wound
- adhere well to intact skin & have low adherence to wound tissue
- shouldn't be used in infected or heavily exuding wounds

Secondary Wound Dressings

- include: absorbents, bandages and adhesive tapes

I. Absorbents

- Required to absorb and retain a wide range of fluids from the blood and serous exudate of damaged tissue
- Surgical cotton, surgical gauzes, etc
- They are available in a number of forms: 1) Fibrous (staple) absorbents, 2) Fabric absorbents, 3) Fiber plus fabric absorbents, and 4) Wound dressing pads

Secondary Wound Dressings...

a. Surgical cotton

- cotton is the basic surgical **absorbent**, purified cotton of USP grade
- raw cotton fiber, mechanically cleaned of dirt and carded into layers but not otherwise treated, has a limited use for padding & covering of unbroken surfaces and supplied under the name "*non absorbent cotton*"

Secondary Wound Dressings...

- absorbent cotton is prepared from the raw by processes that remove natural *waxes* and all impurities (making *hydrophilic*)

➡ rendered absorbent

- absorbent cotton is a practically pure, white cellulose fiber
- absorbent cotton is available in the form of rolls and balls



Secondary Wound Dressings...

b. Surgical Gauzes

- ✓ is known as '*Absorbent Gauze USP*'
- ✓ to provide an absorbent material of sufficient tensile strength for surgical dressings

Classification of surgical gauze

- Classified according to its **mesh**, or number of threads per inch
- The close-meshed gauze is required for extra strength and greater protection



Secondary Wound Dressings...

II. Bandages

► *Function –*

- ❖ To prevent contamination of wound by holding dressings in position.
 - ❖ To provide support to the part that is injured, dislocated joint.
 - ❖ To prevent & control hemorrhage.
 - ❖ To restrict movement / immobilize a fracture or a dislocation.
 - ❖ To maintain pressure e.g. elastic bandages applied to the improve venous return.
- They may be inelastic, elastic, or rigid to be applied after shaping for immobilization

Secondary Wound Dressings...

1. Common Gauze Roller Bandages

- ✓ each bandage is in one continuous piece, tightly rolled and substantially free from loose threads
- ✓ Made from absorbent gauze



Secondary Wound Dressings...

2. Muslin Bandage Rolls

- ✓ are made of heavier unbleached material
- ✓ very strong and are used wherever gauze bandages do not provide sufficient strength or support
- ✓ Frequently used to hold **splints** or **bulky** compression dressings in place



Secondary Wound Dressings...

3. Elastic Bandages

- ✓ are made in several types

a. Woven Elastic Bandage

- is made of heavy elastic webbing containing rubber threads
- good support & pressure are provided by this type

b. Crepe Bandage

- is elastic but contains no rubber
- its elasticity is due to a special weave that allows it to stretch to particularly twice its length



Secondary Wound Dressings...

Crepe Bandage...

- ✓ its elasticity makes it especially serviceable in bandaging varicose veins, sprains, etc
- ✓ Because it **conforms** closely to the skin or joint surfaces, lies flat and secure, yet allows **limited motion** and stretches in case of swelling so that circulation is not impaired

Secondary Wound Dressings...

c. High-Bulk Bandage

- is made of multiple layers (typically six) of crimped cotton gauze
- the high bulk is designed to provide padding protection in wound dressing applications
- also provides the absorbent capacity of a cotton dressing component



Secondary Wound Dressings...

d. Compression Bandage

- is composed of cotton knitted or woven with either viscose, polyurethane, nylon, or elasthane threads
- Comfortable and easy to apply
- Used primarily to maintain controlled levels of pressure when compression therapy is required
- they should be utilized with caution on patients with marked peripheral ischemia or impaired arterial blood supply



Example; Tensopress, Yeinopress, Setopress

Secondary Wound Dressings...

4. Triangular Bandages (Cravat bandage)

- ✓ are made by cutting a square of bleached muslin diagonally from corner to corner, forming two right triangles of equal size & shape
- ✓ are used in first aid work for head dressings and arm *slings* and as temporary *splints* for broken bones
- ✓ Triangular bandages are used for maintaining compressions on a head wound

Secondary Wound Dressings...

- ✓ for keeping body parts, such as shoulders, stationary during the healing process



Secondary Wound Dressings...

5. Tube Bandages

- is applied using an applicator, & is woven in a continuous circle
- used to hold dressings or splints onto limbs, or to provide support to sprains, and it stops the bleeding



Secondary Wound Dressings...

6. Orthopedic Bandages

- ✓ used to provide **immobilization** and **support** in the treatment of broken bones and in certain conditions of bones & joints
- ✓ ***Plaster of Paris*** - impregnated gauze, has been the standard material for this purpose
- ✓ more recently introduced are synthetic cast materials made of polyester, cotton or fiberglass



Secondary Wound Dressings...

III. Adhesive Tapes

- have two components: backing & adhesive mass
- adhesive tapes available today may be divided into two broad categories:
 - those with a ***rubber*** based adhesive &
 - those with an ***acrylate*** adhesive



Secondary Wound Dressings...

- Rubber adhesives are commonly used when **strength** of **backing**, superior adhesion and economy are required; e.g., athletic strapping
- Acrylate adhesives are used widely in surgical dressing applications, when reduced skin trauma is required, as in operative & postoperative procedures

Secondary Wound Dressings...

1. Acrylate Adhesives

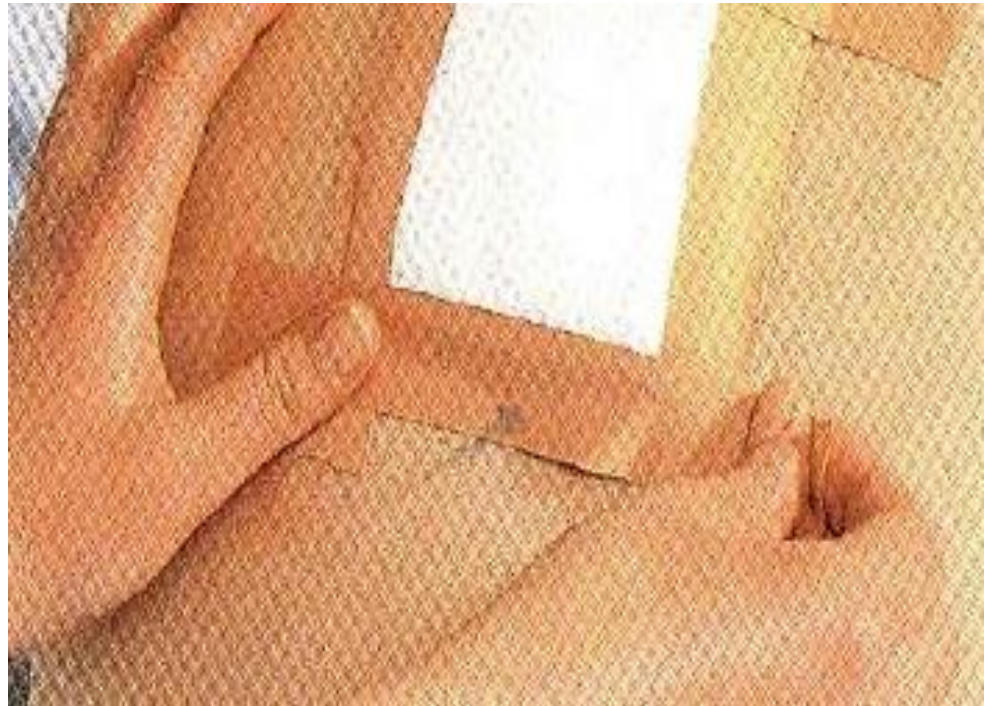
- ✓ have been accepted widely for use as surgical tapes, owing largely to what may be termed their ***hypoallergenic nature***
- ✓ have a non woven or fabric backing
- ✓ the acrylics have an ***excellent shelf-life*** because they are not affected by heat, light, or air; factors that tend to degrade rubber-base adhesives

Secondary Wound Dressings...

- ✓ acrylate adhesives combine the proper balance of tack and long-term adhesion
- ✓ their molecular structure permits the passage of water vapor, so they are non-occlusive and thus when coated on a porous backing material do not cause over-hydration in the stratum corneum
- ✓ skin moisture passes normally through adhesive & backing material

Secondary Wound Dressings...

- ✓ are used to affix dressings
- ✓ their backing can be made of:
 - Rayon
 - Paper
 - Cloth
 - Foam



Secondary Wound Dressings...

2. Rubber-Based Adhesives

- ✓ they are backed with cloth & plastic
- ✓ used principally where **heavy support** & a **high** level of **adhesion** are required
- ✓ the adhesive tape masses consist:
 - i. Elastomer
 - ii. Rosin or modified rosin
 - iii. Antioxidants
 - iv. Plasticizers
 - v. Fillers & Coloring agents