ELEMENT 6.5;

Prepare, apply and attach dressings, wound supports and drains to patients.

1. Describe the principles of wound healing and any complications that may arise.

Wound healing comes in two processes which are;
Primary (healing by first intention)
Secondary (healing by second intention)

In both these processes there are 3 stages;
- inflammation
- Proliferation
- Maturation

Primary healing follows minimal destruction of tissue, where the wound edges are close together.

Inflammation -Blood clot and cell debris fill the gap in the first few hours. Phagocytes and Fibroblasts migrate into the blood clot.

- Phagocytes start to remove the clots and cell debris, which stimulates fibroblast activity.
- Fibroblasts secrete collagen fibres, binding the surface together.

Proliferation - Epithelial cells proliferate across the wound through the clot. The Epidermis joins and grows upwards till full thickness is restored.
The clot above the new tissue turns to scab, which seperates after 3-10 days.
New capillary buds, Phagocytes and Fibroblasts (Granulation tissue) develops, invading the clot and returning the blood supply to the wound.
As the Phagocytes remove the clot and any bacteria, the Fibroblasts carry on secreting collagen fibres.

Maturation - The fibrous scar tissue replaces the Granulation tissue. The Collagen fibres re-arrange, so the strength of the wound increases.
Eventually, the scar becomes less vascular until it appears as a fine line, after
a few months.

Secondary healing follows destruction of a large amount of tissue, or when the sides of the wound cannot be brought into appostion. E.G. Pressure sores (Decubitus Ulcers)

Inflammation - This develops at the surface of healthy tissue and Phagocytes migrate to the necrotic tissue (Slough) and seperate it from the healthy skin.

Proliferation - Granulation tissue develops at the base of the cavity, growing up towards the surface, which is probably stimulated by macrophages.
Phagocytes which are in the blood supply, prevent infection of the wound by ingesting the bacteria after the seperation of the Slough.
Some Fibroblasts in the wound develop a limited ability to contract so the wound and the healing time is reduced.

As the granulation tissue arrives at the level of the dermis, Epithelial cells at
the edge proliferate and grow towards the centre.

Maturation - Scar tissue replaces the granulation tissue over several months, until the full thickness of the skin is restored.

Complications of wound healing;

Systemic infection - The wound has to compete with the infection for white cells and nutrients. Healing may not be able to continue, until the body has dealt with the infection.

Hypertrophic Scars - These occur because of extreme fibrous tissue response during the healing process, which results in a large deposition of Collagen, leaving a thick wound scar.
More common in large burns and traumatic injury. Will usually flatten out in time.

Keloids - Similar to Hypertrophic Scars exept that they take some time to form and may occur years after the initial injury. They do not flatten out in time.

Contractures - Contraction is part of the normal healing process, but occasionally contraction will continue, resulting in scar contraction. This can go
on to joint contracture and subsequent loss of mobility and poor cosmetic result.

The age of the patient may effect the healing process. Elderly patients skin may be more fragile, with less efficient collagen tissue, making the wound healing slower.

Circulatory disease can result in poor blood supply, which can lead to the development of pressure sores. It will effect the amount of oxygen available for normal tissue activity, so the healing process will again be slower and less efficient.

Diabetic patients have a delayed cellular response to injury, and will cause a defect in collagen production and wound strength. This can lead to amputation, as the wound will rot before it has a chance to repair.

If the immune function is compromised due to for example Leukaemia or Cancer, the body's ability to fight infection will be effected.

Obesity can deter healing because adipose tissue is poorly vascularized, increasing the risk of wound breakdown.
Underweight patients could have vitimin and mineral deficiencies needed to fight any infection.

2. Why is it so important to observe a patient's fingers and toes after the application of a plaster cast and a bandage?

To monitor for possible impairment of circulation. Undue swelling could impede the arterial flow to distal parts of the limb, which could result in tissue necrosis. The swelling would create pressure to the nerves and could cause permanent nerve damage.

It is also to monitor for cyanosis, and extreme pallor which would indicate improper positioning or surgical damage.

3. Describe the types of dressings used in your department, include functions, techniques of preparing, applying, securing them and hazards.

Mefix
A non-woven polyester fabric, coated with acrylic adhesive and protected in a roll of release paper backing.
The tape is permeable to water vapour, so unlikely to be effected by sweating.
Used in Orthopaedics to hold dressings in place over joints. Stays in position for long periods of time, as it is very wear resistant. Good for fixing absorbant pads,
To apply, cut to length required, and pull gently on each edge to split the perforated line in the middle. Carefully pull paper back one side at a time. Immediately place over dressing.
Hazards - Should not be applied to patients who are known to be sensitive to acrylic adhesives.

Opsite flexigrid
This is a waterproof dressing coated with an acrylic adhesive. Allows air in, but keeps micro-organisms out. Mainly used in Orthopaedics to protect wounds from infection. To apply, peel off paper backing and press on carefully, ensuring there are no ripples.

Opsite
Similar to flexigrid, but has an absorbant dressing attached. Designed to absorb any leakage from the wound and keep micro-organisms out, and offers a waterproof protection.
In Orthopaedic surgery the Ioban drape is peeled back at the end of surgery, just enough to make room for the dressing. A betadine soaked swab is used to clean the wound and dressing is applied. Once in place, the rest of the Ioban drape can be removed, as the wound is then protected from infection.
Hazards - Can cause blistering or tear delicate skin if not carefully removed.

Inadine
This is a topical wound dressing, which is impregnated with 10% povidine iodine ointment. The dressing also contains polyethylene glycol and purified water.
Prevents infection from bacterial, protozoal and fungal organisms.
To apply, the wound is cleaned and dried.
The Inadine is removed from the package with sterile forceps. Then the backing paper is removed and the dressing peeled off from the remaining backing paper and applied directly to wound.
When the dressing turns white, it means there is a loss of antiseptic efficiency, so should be changed at this stage. With highly infected wounds, this may need to be up to two times daily.
Hazards - Must not be used on new borns to 6 month old infants, as providine may be absorbed through unbroken skin.

Dressing pad
Made of absorbant cotton or viscose fibre gauze and mainly used as a secondary dressing to put pressure on the wound. It also acts as a barrier to bacteria.
Hazards - If liquid seeps through the surface of the dressing, the barrier has been compromised, so must be changed regularly.

Algosteril

Made of Alginate which is known for its healing properties. It is made of natural mixed salts of alginic acid which comes from certain species of seaweed. Used in open wounds, where it heals from the bottom of the wound upwards.
Hazards - If applied to a relatively dry wound, the patient may experience a burning sensation, so moistening the dressing will avoid this occurance.

Velband and Crepe
Used in conjunction with each other. The Velband is used to absorb any blood or fluids secreted from the wound, and to distribute the pressure from the bandaging, while the Crepe bandage offers support to joints.
For example with knee replacements, two layers of each are applied alternatively.
Crepe is made from lightweight cotton fabric and possesses elastic properties to ensure the dressing is held in close proximity to the wound.
The support it offers prevents any change in shape of the tissue due to swelling or sagging. Also compresses to reduce any swelling.
Hazards - If applied to tightly it could cause restriction of circulation and impede the arterial flow, so hindering repair or causing nerve damage.

4. Describe in detail passive, active, naso-gastric and chest drains, include: functions, techniques of preparing, attaching and securing them and hazards.

Chest drains (underwater seal)
This drain is used for the pleural cavity. It is used to ensure air, blood, pus and any other fluid can drain away, but at the same time, stops air or fluid returning to the pleural space. This could detroy the negative pressure which the lung needs to inflate.
Two chest drainage tubes are used. One at the top of the lung to drain air and one at its base to drain fluid.
The drainage bottle which must be placed at a level lower than the chest, has an inlet for the drain, which ends below the saline seal in the bottle, and an outlet or vent portal in its cap.
A one-way valve mechanism provided by the water seal, stops air and fluid escaping from the pleural cavity, and with gravity, and the postive pressure that breathing produces, means it can not return.
If a patient needs to be moved, the drain can be held above chest height and the tube can be clamped, but only for short periods of time. If left too long, the patient can suffer from tension pneumothorax.
This is because gas can enter the pleural cavity, but because it cant escape the intrapleural pressure increases.
This means the lungs can not function correctly, which in turn effects the respiration and cardiac systems, so could be life threatening.

Active
A vacuum within a sealed container is attached to the drain. Its the subatmospheric pressure which draws the fluids away, via the tubing. They are inserted by a sharp metal probe, which is attached to the drainage tubing. Once in place this is cut off and discarded. The drain is sometimes stitched in place on the patients skin, but not in orthopaedic surgery. Examples of this would be the Exu-drain or the Redivac drains.
Hazards - May become dislodged or displaced. Surrounding tissue can grow into the drains, making removal difficult.

Passive
This is similar to the active drain but the fluids flow freely into the drainage container, and instead of a vacuum, gravity or capillary action is used. For

example the Soft drain and the Portex corragated wound drain.
Other passive drains allow free drainage into the dressing.
Hazards - If container is not kept lower than the patient at all times, fluids could return into the wound.

Naso-gastric
This is a tube which is placed in the Intestinal tract, via the patients nose, to
remove fluid and gas, obtain a specimin of gastric contents, or occasionally used for administration of medications or feedings.
The Naso-gastric (NG) tube is kept in the fridge to make it more pliable and easy to handle. It is lubricated with KY jelly.
The tip of the patients nose is tilted back and the tube aligned to enter the nostril. The mouth is opened to view the tube at the back, and magill forceps used to feed the tube down the oesophagus and stomach, until it reaches the Intestinal tract.
A bile bag is attached, and when the gastric fluid enters the bag, this confirms the tube is in the correct place.
The NG tube is then secured to the nose to make sure it does not become dislodged.
Hazards - Fluid volume deficit, including dry skin, mucous membranes, and decreased urinary output.
Pulmonary complications, because coughing and clearing the pharynx can be impaire.
Irritation of the mucous membrane, sore throats.