Text Book of

Operation Theater Nursing

(Perioperative Nursing)

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[For: B.Sc. Nursing, M.Sc. Nursing, MN, BNS & CN Students of TU, PU, KU, CTEVT & BPKIHS]

About the Author

Prof. Dr. Ram Sharan Mehta, is currently working in the post of Professor in Medical Surgical Nursing Department in College of Nursing, BP Koirala Institute of Health Sciences, and involved in Nursing Profession for more than 30 years. He has vast experiences of teaching Medical-Surgical Nursing to the Undergraduate and Post Graduate Nursing Students. He has great experiences of teaching Basic Nursing Concepts, Leadership and Management, Nursing Research, Nursing Education to both Under-graduate and post-graduate nursing students. He had experiences of teaching Oncology Nursing to M. Sc. Nursing, B.Sc. Nursing students, Post Basic BN and Certificate Nursing students. He has conducted many research related to medical-surgical nursing contents and Presented Papers on various scientific sessions of national as well as international conferences. He has completed his B.N. from Nursing Campus Maharajganj with distinction and M.Sc. nursing from Punjab University (PGIMER, Chandigarh) India. He has completed his PhD from Tribhuvan University Kathmandu Nepal.

He has worked in Bir-hospital, Rukum hospital, Eastern Regional Hospital, Koshi Zonal Hospital, BPKIHS and visited various nursing colleges of Nepal and India. He has presented papers in scientific forms and participated in national as well as international conferences at Australia, Singapore, Hong Kong, Australia, Switzerland, Belgium, France, Belgrade, USA, South Korea, Sri-Lanka and most of the city of India. He has been awarded with "**Vice-Chancellor Gold Medal**– 1997, **Mahendra Bidya Bhushan** GA & KA, **Mera devi Rana Gold Medal**– 1997" due to his outstanding performance in nursing education. He has also written the books: Basic Nursing Concepts, Handbook of Diagnostic Procedures, Leadership and Management, Nursing Research, Entrance Guide for nurses, Nursing Education, Oncology Nursing. This book Medical- Nursing covers almost all topics of Medical Surgical Nursing and provides useful tips for nursing students as well as nurses. This book will be very useful for graduate and undergraduate students of TU, PU, KU, BPKIHS and other health professionals involved in the care of medical-surgical nursing patients. This book covers all the course contents of B. Sc. Nursing and BNS students of all the universities of Nepal. This books also covers all the contents of M.Sc. Nursing/MN and the book will be also beneficial for certificate nursing students. The constructive feedback from the students and teachers will be highly appreciated.

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Operation Theater Nursing (Perioperative Nursing)

1. Perioperative Nursing: Definitions, Phases, Terminologies, Concepts

Overview: Perioperative nursing describes the wide variety of nursing functions associated with the patient's surgical management. It has three phases of the surgical experience namely;

1. **Pre-operative phase:** This phase begins when the decision for surgical intervention is made and ends when the patient is transferred from the operating room.
2. **Intra-operative phase:** This phase begins when the patient is admitted or transferred to the surgery department and ends when he or she is admitted to the recovery area.
3. **Post-operative phase**: This phase begins with the admission of the patient to the recovery area and ends with a follow-up evaluation in the clinical setting or at home.

Surgery is a technology consisting of a physical intervention on tissues, and muscle. As a general rule, a procedure is considered surgical when it involves cutting of a patient's tissues or closure of a previously sustained wound They involve settings, such as use of a sterile environment, anesthesia, antiseptic conditions, typical surgical instruments, and suturing or stapling. All forms of surgery are considered invasive procedures. Numerous surgical procedures are performed by various departments and group of surgeons every day in the hospital setting. The types of surgery may be:

- **Elective:** Performed on the basis of client's choice; not essential and may not necessary for health.
- **Urgent:** Necessary for client' health, may prevent additional problem from developing (e.g. tissue destruction); not necessarily emergency.
- **Emergent:** Must be done immediately to save life or preserve function of body part.
- **Required:** Has to perform at some point; can be pre-scheduled.

Types of Surgery:

Surgical procedures are commonly categorized by:

A. Urgency: Based on Timing

B. Type of procedure
C. Body system involved
D. Degree of invasiveness and
E. Special instrumentation.

A. Based on timing: Urgency

1. **Elective surgery:** done to correct a non-life-threatening condition, and is carried out at the patient's request, subject to the surgeon's and the surgical facility's availability.
2. **Emergency surgery:** which must be done promptly to save life, limb, or functional capacity?
3. **A semi-elective surgery:** is one that must be done to avoid permanent disability or death, but can be postponed for a short time.

B. Based on purpose:

1. **Exploratory surgery:** performed to aid or confirm a diagnosis.
2. **Therapeutic surgery:** treats a previously diagnosed condition.
3. **Cosmetic surgery**: to improve the appearance of an otherwise normal structure.

C. Based on procedure:

1. **Amputation:** cutting off a body part, usually a limb or digit.
2. **Resection:** removal of all or part of an internal organ or part of the body.
3. **Reconstructive surgery:** reconstruction of an injured, mutilated, or deformed part of the body.
4. **Transplant surgery:** is the replacement of an organ or body part by insertion of another from different human (or animal) into the patient.

D. By body part: When surgery is performed on one organ system or structure, it may be classed by the organ, organ system or tissue involved. Examples include cardiac surgery (performed on the heart), Gastrointestinal surgery (performed within the digestive tract and its accessory organs), orthopedic surgery (performed on bones and/or muscles).

E. By degree of invasiveness:

1. Minimally-invasive: involves smaller outer incision(s) to insert miniaturized instruments within a body cavity or structure, as in laparoscopic surgery or angioplasty.

2. Open: with a large incision to access the area of interest.

F. By equipment used:

1. **Laser surgery:** involves use of a laser for cutting tissue instead of a scalpel or similar surgical instruments.

2. **Microsurgery:** involves the use of an operating microscope for the surgeon to see small structures.

3. **Robotic surgery:** makes use of a surgical robot, to control the instrumentation under the direction of the surgeon.

Purpose of Surgery:

- **Diagnostic:** Determine or confirm a diagnosis (breast biopsy, bronchoscopy)
- **Cure/Curative:** Removal of diseased tissue, organ, or extremity (appendectomy, amputation)
- **Constructive:** Build tissues or organs that are absent; congenital anomalies **(cleft lip repair)**
- **Prevention/Preventive: e.g. removal of mole**
- **Reconstructive:** Rebuild tissue or organ that has been damaged (skin graft after a burn, total joint replacement
- **Exploration**: Surgical examination to determine the nature or extent of a disease (Laparotomy)
- **Cosmetic Improvement:** repairing a burn scar, or changing breast shape
- **Palliative:** Alleviate symptoms of a disease (not curative), bowel resection in client with terminal cancer.
- **Transplant:** Replace organ or tissue to restore function (Heart lung liver kidney transplant)

Important Suffixes RT Surgery:

- Ectomy - Excision or removal of **(Appendectomy)**
- Lysis – Destruction of **(Electrolysis)**
- Orrhaphy – Repair or suture of **(Herniorrhapy)**
- Oscopy Looking into **(Endoscopy)**
- Ostomy Creating of opening into **(Colostomy)**
- Otomy – Cutting into or incision of **(Tracheotomy)**
- Plasty – Repair or reconstruction of **(Mammoplasty)**

Common Prefix:

- *angio-* : related to blood vessels
- *arthr-* : related to a joint
- *colono-* : related to large intestine colon
- *colpo-* : related to the vagina
- *cysto-* : related to the bladder
- *encephal-* : related to the brain
- *gastr-* : related to stomach
- *hepat-* : related to the liver
- *hyster-* : related to the uterus
- *lamino-* : related to the lamina (posterior aspect of vertebra)

- *lapar-* : related to the abdominal cavity
- *lobo-* : related to a lobe (of the brain or lungs)
- *mammo-* and *masto-*: related to the breast
- *myo-* : related to muscle tissue
- *nephro-* : related to the kidney
- *oophor-* : related to the ovary
- *orchid-* : related to the testicle
- *rhino-* : related to the nose
- *thoraco-* : related to the chest

Common Suffix:

- centesis : surgical puncture
- clasia : crushing or breaking up
- desis : fusion of two parts into one, stabilization
- ectomy : surgical removal
- opsy : looking at
- oscopy : viewing of, normally with a scope
- ostomy or -stomy : surgically creating a hole
- otomy or -tomy : surgical incision
- -pexy : to fix or secure
- -plasty : to modify or reshape (sometimes entails replacement with a prosthesis)
- -rrhaphy : to strengthen, usually with suture

Surgical Setting:

– Hospital
– Ambulatory surgery
– Emergency departments
– Doctors offices? (clnic)
– Freestanding surgical clinics (camps)
– Outpatient surgeries in hospitals

Types of Surgeries Performed in an Inpatient Setting:

– Amputations
– Transplants
– Total Joint Replacement
– Colostomy
– Nephrectomy
– Heart Bypass Surgery
– C-sections
– Ruptured Aneurysm
– Life-threatening Trauma

- Breast Biopsy
- Bronchoscopy
- Appendectomy
- Removal of Skin Lesion
- Cataract Extraction
- Cosmetic Surgery
- Hernia Repair
- Tubal Ligation
- Vasectomy
- Dilation and Curettage
- Hemorrhoidectomies

Inpatient Surgery-Advantages:

- More time for rapport
- More time to assess for risks and needs
- More time to teach
- Increased availability of:
- Professional care and assistance
- Treatment and diagnostic facilities
- Medications and blood

Inpatient Setting: Disadvantages:

- Higher cost
- Higher risk of hospital acquired infection
- Interruption of family routine
- Interruption of work and responsibilities
- More stressful for the patient and family

Outpatient Setting: Advantages

- Lower cost
- Less risk for hospital acquired infection
- Less interruption of family routine
- Possible reduction in time lost from work and other responsibilities
- Less physiologic stress to the patient and family

Outpatient Setting: Disadvantages

- Less time for rapport
- Less time to assess risks and needs
- Less time to teach

Common Pre-Admission Directions:

– Time and date of arrival
– NPO
– Bowel preparation
– Valuables, jewelry
– Clothing
– Medicines

Key elements to efficient use of operating theatres are:

– Effective management
– Good communication
– Well trained staff
– Appropriate facilities and equipment
– Operational layout that allows flow of patients

It is a place. . .

– To correlate theory and practice
– To develop skills in assisting the surgeon in the operation
– To create a suitable sterile field for surgical procedures to prevent complications

Objectives of Planning:

– Promote high standards of asepsis
– Ensure maximum standard of safety
– Optimum utilization of OT and staff time
– Optimize working conditions
– Patient and staff comfort in terms of thermal, acoustic and lighting requirements
– Allow flexibility
– Facilities coordinated services
– Minimize maintenance
– Ensures functional separation of spaces
– Provide a smoothing environment
– Regulate the flow of traffic

Design Parameters:

– Avoidance of unrelated hospital traffic flow
– Convenient functional flow between related departments like ICU CCU etc.
– Avoidance of outdoor noise

- Provision for future expansion
- Sliding doors
- Desirable floors to be smooth and non-slippery
- Ceilings to be painted with washable paints
- Taps in scrub room should be knee/elbow operated /infrared operated.
- Provisions of high speed autoclaves
- Essential pharmaceutical storage
- X-ray films illuminators
- Emergency communicators that can be activated without the use of hand
- Toilets

Design considerations:

•Location
•Workflow
•Basic work areas and Division of space
•Zoning concept
•Air filters
•Machinery and equipment
•Organization
•Policies and procedures
•problems

The following are the physiologic assessments necessary during the preoperative phase:

- **Age**
- **Nutritional status and needs**: determined by measuring the patient's height and weight, triceps skin fold, upper arm circumference, serum protein levels and nitrogen balance. Obesity greatly increases the risk and severity of complications associated with surgery.
- **Fluid and Electrolyte Imbalance**: Dehydration, hypovolemia and electrolyte imbalances should be carefully assessed and documented.
- **Infection**
- **Drug and alcohol use**: the acutely intoxicated person is susceptible to injury.
- **Respiratory status**: patients with pre-existing pulmonary problems are evaluated by means pulmonary function studies and blood gas analysis to note the extent of respiratory insufficiency. The goal for potential surgical patient us to have an optimum respiratory function. Surgery is usually contraindicated for a patient who has a respiratory infection.

- **Cardiovascular status**: cardiovascular diseases increases the risk of complications. Depending on the severity of symptoms, surgery may be deferred until medical treatment can be instituted to improve the patient's condition.
- **Hepatic and renal function**: surgery is contraindicated in patients with acute nephritis, acute renal insufficiency with oliguria or anuria, or other acute renal problems. Any disorder of the liver on the other hand, can have an effect on how an anesthetic is metabolized.
- **Endocrine function**: diabetes, corticosteroid intake, amount of insulin administered
- **Immunologic function**: existence of allergies, previous allergic reactions, sensitivities to certain medications, past adverse reactions to certain drugs, immunosuppression
- **Previous medication therapy**: It is essential that the patient's medication history be assessed by the nurse and anesthesiologist.

The following are the medications that cause particular concern during the upcoming surgery:

1. **Adrenal corticosteroids:** not to be discontinued abruptly before the surgery. Once discontinued suddenly, cardiovascular collapse may result for patients who are taking steroids for a long time. A bolus of steroid is then administered IV immediately before and after surgery.
2. **Diuretics:** thiazide diuretics may cause excessive respiratory depression during the anesthesia administration.
3. **Phenothiazines:** these medications may increase the hypotensive action of anesthetics.
4. **Antidepressants:** MAOIs increase the hypotensive effects of anesthetics.
5. **Tranquilizers**: medications such as barbiturates, diazepam and chlordiaxepoxide may cause an increase anxiety, tension and even seizures if withdrawn suddenly.
6. **Insulin:** when a diabetic person is undergoing surgery, interaction between anesthetics and insulin must be considered.
7. **Antibiotics**: "Mycin" drugs such as neomycin, kanamycin, and less frequently streptomycin may present problems when combined with curariform muscle relaxant. As a result, nerve transmission is interrupted and apnea due to respiratory paralysis develops.

Psychological Nursing Assessment during the Preoperative Period:

- Fear of the unknown
- Fear of death
- Fear of anesthesia
- Concerns about loss of work, time, job and support from the family
- Concerns on threat of permanent incapacity

- Spiritual beliefs
- Cultural values and beliefs
- Fear of pain

Psychological Nursing Interventions:

1. Explore the client's fears, worries and concerns.
2. Encourage patient verbalization of feelings.
3. Provide information that helps to allay fears and concerns of the patient.
4. Give empathetic support.

Informed consent: An informed consent is necessary to be signed by the patient before the surgery. The following are the purposes of an informed consent:

- Protects the patient against unsanctioned surgery.
- Protects the surgeon and hospital against legal action by a client who claims that an unauthorized procedure was performed.
- To ensure that the client understands the nature of his or her treatment including the possible complications and disfigurement.
- To indicate that the client's decision was made without force or pressure.

Criteria for a Valid Informed Consent:

- Consent voluntarily given. Valid consent must be freely given without coercion.
- For incompetent subjects, those who are NOT autonomous and cannot give or withhold consent, permission is required from a responsible family member who could either be apparent or a legal guardian. Minors (below 18 years of age), unconscious, mentally retarded, psychologically incapacitated fall under the incompetent subjects.
- The consent should be in writing and should contain the following:
    1. Procedure explanation and the risks involved
    2. Description of benefits and alternatives
    3. An offer to answer questions about the procedure
    4. Statement that emphasizes that the client may withdraw the consent
    5. The information in the consent must be written and be delivered in language that a client can comprehend.
    6. Should be obtained before sedation.

2. Pre-operative Nursing

a. Pre-Operative Assessments

Introduction: All patients scheduled to undergo surgery should be assessed in advance with the view to planning optimal preparation and perioperative management. Failure to undertake this activity places the patient at increased risk for morbidity and mortality. Preoperative preparations include all the activities needed to be carried out before a patient is sent to an OR for operative procedure. It is a multi-disciplinary action, which involves health personnel of various levels, starting from assessment till the patient transfer.

Aims:

– To enable the most appropriate treatment considering current health status, nature of surgery and anesthesia proposed
– To anticipate potential problems and provide satisfactory perioperative care
– To ensure patient is prepared correctly
– To provide appropriate information to the patient
– To prescribe pre-medications or specific prophylactic measures

Process:

– The decision regarding surgery is made by the surgeon based on patient's presenting pathology.
– **PAC** (Pre Anesthetic Check-up):
    - History: items specific relevant to anesthesia
    - Presenting Condition and concurrent medical history
    - Anesthetic history
    - Family history
    - Drug/allergy history
    - Smoking/Alcohol
– **Physical examination**
    - General
    - Cardiovascular
    - Respiratory
    - Airway
    - Nervous

– **Special Investigations**
    - Full blood count
    - Blood chemistry
    - Coagulation test
    - Chest-XRAY
    - ECG

Guidelines for Pre-Operative Investigations:

Predication of Perioperative Morbidity and Mortality: After patient's history and relevant investigations, following 2 questions must be answered:

– Is the patient in optimum physical condition for anesthesia and surgery?
– Are the anticipated benefits of surgery greater than the combined risks?

Blood Transfusion Requests:

– The amount of blood ordered depends upon the patient's preoperative hemoglobin level and anticipated extent of the surgery.
– Generally, blood arrange and cross matching procedure is done before sending the patient to OR.
– Blood may be transfused during the surgery or post operatively depending upon the amount of blood loss and response of the patient.

Preoperative Nursing Interventions:

Managing Nutrition and Fluids:

– The time of last oral intake of solid and fluid must be established.
– In general, anesthesia for elective surgery should not be undertaken within 6hours of ingestion of food, although clear fluids may be taken up to 2 hours before surgery.
– NPO after midnight
– One of the commonest causes of anesthetic related mortality is aspiration of gastric contents.

Preparing the Bowel for Surgery:

Enemas are not commonly ordered preoperatively unless the patient is undergoing abdominal or pelvic surgery. In this case, a cleansing enema or laxative may be prescribed the evening before surgery and may be repeated the morning of surgery.

Preparing the Skin:

– The goal of preoperative skin preparation is to decrease bacteria without injuring the skin.
– Patient may be instructed to use a soap containing a detergent-germicide to cleanse the skin

area before surgery to reduce the number of skin organisms

– Generally, hair is not removed preoperatively unless the hair at or around the incision site is likely to interfere with the operation.
– If hair must be removed, electric clippers are used for safe removal.

Administering Pre-Anesthetic Medication:

— **Benzodiazepines:** For anxiolysis, sedation and amnesia.
Tab. Diazepam (10-30 mg), Lorazepam (1-5 mg) PO 1-2 hours before surgery.
— Anticholinergic agents
— B-blockers

After administering the medicines, patient is kept in bed with the side rails raised because the medication can cause lightheadedness or drowsiness. During this time, the nurse observes the patient for any untoward reaction to the medications. The immediate surroundings are kept quiet to promote relaxation.

Maintaining the Pre-Operative Record:

A preoperative checklist contains critical elements that need to be checked preoperatively. The completed chart accompanies the patient to the operating room with the surgical consent form attached, along with all laboratory reports and nurses' records. Any unusual last-minute observations that may have a bearing on anesthesia or surgery are noted at the front of the chart in a prominent place.

Legal Preparation for surgery:

– It consists of checking that all required forms have been correctly signed and are present on the chart.
– Patient and the family have clearly understood what is going to happen.
– The most important of these- signed consent for the surgical procedure.

Informed Consent for Surgery:

– Patient must sign a voluntary and informed consent in the presence of a witness.
– It is an active, shared-decision making process between the provider and recipient of care.
– This protects the patient, the surgeon and all the hospital staffs, employees.

Following 3 conditions must be met for the consent to be valid:

1. Adequate disclosure of the diagnosis, nature and purpose of proposed treatment, risks and consequences, alternative and prognosis
2. Clear understanding and comprehension of information provided.

3. Consent must be given voluntarily.

Although the surgeon is ultimately responsible for obtaining the consent, nurses should be familiar with the process and be a patient advocate, verifying that consent has been signed voluntarily after clear understanding. In case of emergencies, unconscious patients, mentally incompetent or minors, the next of kin or responsible family members may give the consent.

Respecting Cultural, Spiritual, and Religious Beliefs: Psychosocial interventions include identifying and showing respect for cultural, spiritual, and religious beliefs

Transporting the Patient to the Pre-surgical Area:

– The patient is transferred to the holding area in a bed or on a stretcher about 30 to 60 min before the anesthetic is to be given.
– The stretcher should be comfortable, with a sufficient number of blankets to prevent chilling from air-conditioner.
– Patient safety in the preoperative area is a priority.
– Patient identification, the surgical procedure, and the surgical site is verified.

Attending to Family Needs: The family and significant others should be given proper information about what is being done to the patient and a conducive environment to communicate with them.

Preoperative teaching: Multiple teaching strategies (verbal, written, return demonstration), depending on the patient's needs and abilities including:

– Sensory, Process, Procedural
– Deep-Breathing, Coughing, and Incentive Spirometers
– Mobility and Active Body Movement
– Pain Management
– Cognitive Coping Strategies

Goals of Pre-operative Care: Although the physician is responsible for explaining the surgical procedure to the patient, the patient may ask the nurse questions about the surgery. There may be specific learning needs about the surgery that the patient and support persons should know. A nursing care plan and a teaching plan should be carried out. During this phase, emphasis is placed on:

- Assessing and correcting physiological and psychological problems that may increase surgical risk.
- Giving the patient and significant others complete learning and teaching guidelines regarding the surgery.
- Instructing and demonstrating exercises that will benefit the patient postoperatively.
- Planning for discharge and any projected changes in lifestyle due to the surgery.

Physiologic Assessment: Before any treatment is initiated, a health history is obtained and a physical examination is performed during which vital signs are noted and a data base is establishing for future comparisons. The following are the physiologic assessments necessary during the preoperative phase:

- Age
- Obtain a health history and perform a physical examination to establish vital signs and a database for future comparisons.
- Assess patient's usual level of functioning and typical daily activities to assist in patient's care and recovery or rehabilitation plans.
- Assess mouth for dental caries, dentures, and partial plates. Decayed teeth or dental prostheses may become dislodged during intubation for anesthetic delivery and occlude the airway.
- Nutritional status and needs: determined by measuring the patient's height and weight, triceps skinfold, upper arm circumference, serum protein levels and nitrogen balance. Obesity greatly increases the risk and severity of complications associated with surgery.
- Fluid and Electrolyte Imbalance: Dehydration, hypovolemia and electrolyte imbalances should be carefully assessed and documented.
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- Presence of trauma
- Endocrine function: diabetes, corticosteroid intake, amount of insulin administered
- Immunologic function: existence of allergies, previous allergic reactions, sensitivities to certain medications, past adverse reactions to certain drugs, immunosuppression
- Previous medication therapy: It is essential that the patient's medication history be assessed by the nurse and anesthesiologist.

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Gerontologic Considerations: Monitor older patients undergoing surgery for subtle clues that indicate underlying problems since elder patients have less physiologic reserve than younger patients. Monitor also elderly patients for dehydration, hypovolemia, and electrolyte imbalances.

Nursing Diagnosis: The following are possible nursing diagnosis during the preoperative phase;

- Anxiety related to the surgical experience (anesthesia, pain) and the outcome of surgery
- Risk for Ineffective Therapeutic Management Regiment related to deficient knowledge of preoperative procedures and protocols and postoperative expectations
- Fear related to perceived threat of the surgical procedure and separation from support system
- Deficient Knowledge related to the surgical process

Diagnostic Tests: These diagnostic tests may be carried out during the perioperative phase;

- Blood analyses such as complete blood count, sedimentation rate, c-reactive protein, serum protein electrophoresis with immunofixation, calcium, alkaline phosphatase, and chemistry profile
- X-ray studies
- MRI and CT scans (with or without myelography)
- Electrodiagnostic studies
- Bone scan
- Endoscopies
- Tissue biopsies
- Stool studies
- Urine studies

Significant physical findings are also noted to further describe the patient's overall health condition. When the patient has been determined to be an appropriate candidate for surgery, and has elected to proceed with surgical intervention, the pre-operative assessment phase begins.

The purpose of pre-operative evaluation is to reduce the morbidity of surgery, increase quality of intraoperative care, reduce costs associated with surgery, and return the patient to optimal functioning as soon as possible.

Psychological Assessment:

Psychological nursing assessment during the preoperative period:

- Fear of the unknown
- Fear of death
- Fear of anesthesia
- Concerns about loss of work, time, job and support from the family
- Concerns on threat of permanent incapacity
- Spiritual beliefs
- Cultural values and beliefs
- Fear of pain

Psychological Nursing Interventions:

1. Explore the client's fears, worries and concerns.
2. Encourage patient verbalization of feelings.
3. Provide information that helps to allay fears and concerns of the patient.
4. Give empathetic support.

Informed consent:

- Reinforce information provided by surgeon.
- Notify physician if patient needs additional information to make his or her decision.
- Ascertain that the consent form has been signed before administering psychoactive premedication. Informed consent is required for invasive procedures, such as incisional, biopsy, cystoscopy, or paracentesis; procedures requiring sedation and/or anesthesia; nonsurgical procedures that pose more than slight risk to the patient (arteriography); and procedures involving radiation.
- Arrange for a responsible family member or legal guardian to be available to give consent when the patient is a minor or is unconscious or incompetent (an emancipated minor [married or independently earning own living] may sign his or her own surgical consent form).
- Place the signed consent form in a prominent place on the patient's chart.

An informed consent is necessary to be signed by the patient before the surgery. **The following are the purposes of an informed consent:**

- Protects the patient against unsanctioned surgery.
- Protects the surgeon and hospital against legal action by a client who claims that an unauthorized procedure was performed.
- To ensure that the client understands the nature of his or her treatment including the possible complications and disfigurement.
- To indicate that the client's decision was made without force or pressure.

Criteria for a Valid Informed Consent:

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- The consent should be in writing and should contain the following:
    - — Procedure explanation and the risks involved
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    - — An offer to answer questions about the procedure
    - — Statement that emphasizes that the client may withdraw the consent
    - — The information in the consent must be written and be delivered in language that a client can comprehend.
    - — Should be obtained before sedation.

Nursing Interventions:

Reducing Anxiety and Fear:

- Provide psychosocial support.
- Be a good listener, be empathetic, and provide information that helps alleviate concerns.
- During preliminary contacts, give the patient opportunities to ask questions and to become acquainted with those who might be providing care during and after surgery.
- Acknowledge patient concerns or worries about impending surgery by listening and communicating therapeutically.

- Explore any fears with patient, and arrange for the assistance of other health professionals if required.
- Teach patient cognitive strategies that may be useful for relieving tension, overcoming anxiety, and achieving relaxation, including imagery, distraction, or optimistic affirmations.

Managing Nutrition and Fluids:

- Provide nutritional support as ordered to correct any nutrient deficiency before surgery to provide enough protein for tissue repair.
- Instruct patient that oral intake of food or water should be withheld 8 to 10 hours before the operation (most common), unless physician allows clear fluids up to 3 to 4 hours before surgery.
- Inform patient that a light meal may be permitted on the preceding evening when surgery is scheduled in the morning, or provide a soft breakfast, if prescribed, when surgery is scheduled to take place after noon and does not involve any part of the GI tract.
- In dehydrated patients, and especially in older patients, encourage fluids by mouth, as ordered, before surgery, and administer fluids intravenously as ordered.
- Monitor the patient with a history of chronic alcoholism for malnutrition and other systemic problems that increase the surgical risk as well as for alcohol withdrawal (delirium tremens up to 72 hours after alcohol withdrawal).

Promoting Optimal Respiratory and Cardiovascular Status:

- Urge patient to stop smoking 2 months before surgery (or at least 24 hours before).
- Teach patient breathing exercises and how to use an incentive spirometer if indicated.
- Assess patient with underlying respiratory disease (eg, asthma, chronic obstructive pulmonary disease [COPD]) carefully for current threats to pulmonary status; assess patient's use of medications that may affect postoperative recovery.
- In the patient with cardiovascular disease, avoid sudden changes of position, prolonged immobilization, hypotension or hypoxia, and overloading of the circulatory system with fluids or blood.

Supporting Hepatic and Renal Function:

- If patient has a disorder of the liver, carefully assess various liver function tests and acid–base status.
- Frequently monitor blood glucose levels of the patient with diabetes before, during, and after surgery.
- Report the use of steroid medications for any purpose by the patient during the preceding year to the anesthesiologist and surgeon.

Monitor patient for signs of adrenal insufficiency: Assess patients with uncontrolled thyroid disorders for a history of thyrotoxicosis (with hyperthyroid disorders) or respiratory failure (with hypothyroid disorders).

Promoting Mobility and Active Body Movement:

- Explain the rationale for frequent position changes after surgery (to improve circulation, prevent venous stasis, and promote optimal respiratory function) and show patient how to turn from side to side and assume the lateral position without causing pain or disrupting IV lines, drainage tubes, or other apparatus.
- Discuss any special position patient will need to maintain after surgery (eg, adduction or elevation of an extremity) and the importance of maintaining as much mobility as possible despite restrictions.
- Instruct patient in exercises of the extremities, including extension and flexion of the knee and hip joints (similar to bicycle riding while lying on the side); foot rotation (tracing the largest possible circle with the great toe); and range of motion of the elbow and shoulder.
- Use proper body mechanics, and instruct patient to do the same. Maintain patient's body in proper alignment when patient is placed in any position.

Respecting Spiritual and Cultural Beliefs:

- Help patient obtain spiritual help if he or she requests it; respect and support the beliefs of each patient.
- Ask if the patient's spiritual adviser knows about the impending surgery.

- When assessing pain, remember that some cultural groups are unaccustomed to expressing feelings openly. Individuals from some cultural groups may not make direct eye contact with others; this lack of eye contact is not avoidance or a lack of interest but a sign of respect.
- Listen carefully to patient, especially when obtaining the history. Correct use of communication and interviewing skills can help the nurse acquire invaluable information and insight. Remain unhurried, understanding, and caring.

Providing Preoperative Patient Education:

- Teach each patient as an individual, with consideration for any unique concerns or learning needs.
- Begin teaching as soon as possible, starting in the physician's office and continuing during the pre admission visit, when diagnostic tests are being performed, through arrival in the operating room.
- Space instruction over a period of time to allow patient to assimilate information and ask questions.
- Combine teaching sessions with various preparation proce-dures to allow for an easy flow of information. Include descriptions of the procedures and explanations of the sensations the patient will experience.
- During the preadmission visit, arrange for the patient to meet and ask questions of the perianesthesia nurse, view audiovisuals, and review written materials. Provide a telephone number for patient to call if questions arise closer to the date of surgery.
- Reinforce information about the possible need for a ventilator and the presence of drainage tubes or other types of equipment to help the patient adjust during the postoperative period.
- Inform the patient when family and friends will be able to visit after surgery and that a spiritual advisor will be available if desired.

Teaching the Ambulatory Surgical Patient:

- For the same day or ambulatory surgical patient, teach about discharge and follow-up home care. Education can be provided by a videotape, over the telephone, or during a group meeting, night classes, preadmission testing, or the preoperative interview.
- Answer questions and describe what to expect.
- Tell the patient when and where to report, what to bring (insurance card, list of medications and allergies), what to leave at home (jewelry, watch, medications, contact lenses), and what to wear (loose-fitting, comfortable clothes; flat shoes).
- During the last preoperative phone call, remind the patient not to eat or drink as directed; brushing teeth is permitted, but no fluids should be swallowed.

Teaching Deep Breathing and Coughing Exercises:

- Teach the patient how to promote optimal lung expansion and consequent blood oxygenation after anesthesia by assuming a sitting position, taking deep and slow breaths (maximal sustained inspiration), and exhaling slowly.
- Demonstrate how patient can splint the incision line to minimize pressure and control pain (if there will be a thoracic or abdominal incision).
- Inform patient that medications are available to relieve pain and that they should be taken regularly for pain relief to enable effective deepbreathing and coughing exercises.

Explaining Pain Management:

- Instruct patient to take medications as frequently as prescribed during the initial postoperative period for pain relief.
- Discuss the use of oral analgesic agents with patient before surgery, and assess patient's interest and willingness to participate in pain relief methods.
- Instruct patient in the use of a pain rating scale to promote postoperative pain management.

Preparing the Bowel for Surgery:

- If ordered preoperatively, administer or instruct the patient to take the antibiotic and a cleansing enema or laxative the evening before surgery and repeat it the morning of surgery.
- Have the patient use the toilet or bedside commode rather than the bedpan for evacuation of the enema, unless the patient's condition presents some contraindication.

Preparing Patient for Surgery:

- Instruct patient to use detergent–germicide for several days at home (if the surgery is not an emergency).
- If hair is to be removed, remove it immediately before the operation using electric clippers.
- Dress patient in a hospital gown that is left untied and open in the back.
- Cover patient's hair completely with a disposable paper cap; if patient has long hair, it may be braided; hairpins are removed.
- Inspect patient's mouth and remove dentures or plates.

Remove jewelry, including wedding rings:

- If patient objects, securely fasten the ring with tape.
- Give all articles of value, including dentures and prosthetic devices, to family members, or if needed label articles clearly with patient's name and store in a safe place according to agency policy.
- Assist patients (except those with urologic disorders) to void immediately before going to the operating room.
- Administer preanesthetic medication as ordered, and keep the patient in bed with the side rails raised. Observe patient for any untoward reaction to the medications. Keep the immediate surroundings quiet to promote relaxation.

Transporting Patient to Operating Room

- Send the completed chart with patient to operating room; attach surgical consent form and all laboratory reports and nurses' records, noting any unusual last minute

observations that may have a bearing on the anesthesia or surgery at the front of the chart in a prominent place.

- Take the patient to the preoperative holding area, and keep the area quiet, avoiding unpleasant sounds or conversation.

Attending to Special Needs of Older Patients:

- Assess the older patient for dehydration, constipation, and malnutrition; report if present.
- Maintain a safe environment for the older patient with sensory limitations such as impaired vision or hearing and reduced tactile sensitivity.
- Initiate protective measures for the older patient with arthritis, which may affect mobility and comfort. Use adequate padding for tender areas. Move patient slowly and protect bony prominences from prolonged pressure. Provide gentle massage to promote circulation.
- Take added precautions when moving an elderly patient because decreased perspiration leads to dry, itchy, fragile skin that is easily abraded.
- Apply a lightweight cotton blanket as a cover when the elderly patient is moved to and from the operating room, because decreased subcutaneous fat makes older people more susceptible to temperature changes.
- Provide the elderly patient with an opportunity to express fears; this enables patient to gain some peace of mind and a sense of being understood

Attending to the Family's Needs:

- Assist the family to the surgical waiting room, where the surgeon may meet the family after surgery.
- Reassure the family they should not judge the seriousness of an operation by the length of time the patient is in the operating room.
- Inform those waiting to see the patient after surgery that the patient may have certain equipment or devices in place (i.e., IV lines, indwelling urinary catheter, nasogastric tube, suction bottles, oxygen lines, monitoring equipment, and blood transfusion lines).
- When the patient returns to the room, provide explanations regarding the frequent postoperative observations.

Spiritual Considerations:

- Help patient obtain spiritual help if he or she requests it; respect and support the beliefs of each patient.
- Ask if the patient's spiritual adviser knows about the impending surgery.
- When assessing pain, remember that some cultural groups are unaccustomed to expressing feelings openly. Individuals from some cultural groups may not make direct eye contact with others; this lack of eye contact is not avoidance or a lack of interest but a sign of respect.
- Listen carefully to patient, especially when obtaining the history. Correct use of communication and interviewing skills can help the nurse acquire invaluable information and insight. Remain unhurried, understanding, and caring.

3. Intra-operative Nursing:

3.a. Intra-Operative Nursing: Definition, OT Design, Zones in OT

Background: Until the middle of 19th century, surgery was carried out in any convenient room, frequently which was used for other purposes as well. Although the concept of asepsis resulted in washing of instruments and operating table, the operating room itself was ignored as a source of infection. Gradually, separate operating rooms were designed with tiers of wooden benches around the operating room for spectators, thus the term operating theatre was introduced. The design of OT changed with advancement in every fields, well facilitated smaller theatres were introduced after 20th century to facilitate in frequent cleaning.

OT is that specialized facility of the hospital where life saving or life improving procedures are carried out on the human body by invasive methods under strict aseptic conditions in a controlled environment by specially trained personnel to promote healing and cure with maximum safety, comfort and economy.

A modern Operating Theatre incorporates the following design features:

- Environmental controls of varying degrees of complexity
- Services for surgical and anesthetic equipments
- Operating table to position the patient as per the nature of surgery
- Artificial lighting appropriate for the requirements of both surgeon and anesthetist
- Measures to promote safety of both patients and staffs

Designing an Ideal OT:

- A scientific and detailed planning is required while designing an OT in order to ensure its smooth functioning, efficiency and effective utilization
- Known for its stark appearance and cool temperature
- Access is limited to authorized personnel
- Must have a specific air filtration devices to screen out contaminating particles, dust, and pollutants

Objectives of Planning OT Design:

- Promote high standard of asepsis.
- Ensure maximum standard of safety.
- Optimize utilization of OT and staff time.
- Optimize working conditions.
- Patient & staff comfort in terms of thermal, acoustic and lighting requirements.
- Allow flexibility and facilitate coordinated services.
- Minimizes maintenance

– Ensure functional separation of spaces
– Provide soothing environment
– Regulates flow of traffic

Location:

– The OR must be situated in a location that is central to all supporting services
– Close to the surgical wards, and adjacent to emergency department, ICU, X-Ray department, sterile supplies.
– It is logical for the anesthetic department to be immediately adjacent to or an integral part of the Operating Theatre.

Zones of Cleanliness:

Zones are area of varying degrees of cleanliness in which the bacteriological count progressively diminishes from the outer to the inner zones (operating area) and is maintained by a differential decreasing positive pressure ventilation gradient from the inner zone to the outer zone.

1. **Protective /Outer Zone** / **Unrestricted Zone:** Hospital areas up to, where street clothes are allowed:
   - Reception
   - Waiting area
   - Trolley bay
   - Changing room

2. **Clean Zone/ The Semi-Restricted Zone:** The circulating area used by staffs after they have changed, where attire consists of scrub clothes and caps. Recovery room, Staff room, Stores

3. **Aseptic Zone/ The Restricted Zone:** Gowning and scrub up areas, anesthetic area, theatre preparation room, exit bay.

4. **Disposal Zone:** Disposal areas for waste products and soiled or used equipment/supplies.

Operating Room Standards:

– The operating room is designed around its centrally situated operating table with over-head lighting and ventillation systems.
– The ideal shape for the operating room is circular, but most are square or nearly square.
– The floor of an operating room should be 625 ft^2 (approx 58m^2) in area, not smaller than 45m^2, smooth, non-slippery.
– Corridors should not be less than 2.85 m. in width to facilitate movement of trolleys and stretchers.
– Ceiling should be painted with washable paint and corners of the rooms should be rounded off to prevent collection of dirt and dust.
– Taps in the scrub room should be knee/elbow operated or preferably electronically controlled

taps activated by infrared sensor.
- Essential pharmaceutical storage including refrigeration facilities should be available.
- There should be a waiting room with toilet facilities for patient attendants.
- Power back up with provision of stand-by generating sets.
- Outlets for piped gases and electrical sockets must be positioned close to the head of the operating table.
- Electrical cables should not lie across the floor.

Temperature, Humidity and Ventilation:
- Temperature should be sufficiently high to minimize the risk of inducing hypothermia in the patient, but must be comfortable for the theatre staffs.
- Temperature of 22-24°C is acceptable with the relative humidity of 50 -60 %.
- Controls for temperature and humidity should be located within the theatre, so that the adjustments can be made by staffs.
- Heating and humidity are controlled usually by an air-conditioning and ventilation system.
- In general, air is introduced directly over the operating table, and leaves at the periphery through ducts positioned near floor levels.
- In the area of the table, 400 air changes per hour are required to minimize the risk of airborne transmission of infection.
- More effective system of ventilation, involving radial exponential air flow away from operating table, or laminar flow is used.

Light:
- Daylight is not necessary in the operating theatre, although it is more pleasant for staffs if there are windows in the theatre suite.
- A high level of illumination is required over the operating table, and ceiling mounted lamps are standard.
- The spectrum provided by the lighting tubes should be similar to that of daylight, with the emission temperature of 4000-5000K.
- The color of decor should be neutral and uniform.
- The intensity of general illumination should be up to 325 lm/m2 inside the theatre and diffused to avoid glare.
- In the anesthetic room and recovery area, a light of approximately 220 lm/m2 is acceptable, but a spotlight should be available if increased illumination is required for specific procedures.

Auditory Effects: Sound level in OT should be limited to 25-35 db. The reverberation time in OR should be reduced to below one second.

Fire Safety:

- Both ionization and optical fire detectors should be provided in the operation theatres
- Hydrants and fire extinguishers should be provided.
- Fire exit route should be clearly identified, earmarked and well illuminated.

Water Supply: Besides normal supply of available water at the rate of 400 liters per bed per day separate reserve emergency over head tank should be provided for operation theatre.

Other Accommodations:

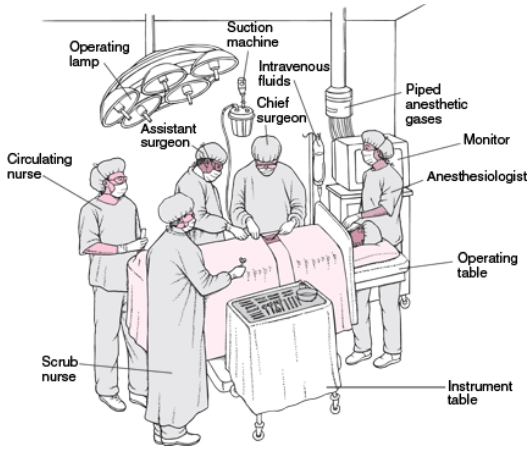
- Storage space is required for large items of equipment.
- In most modern OT, instruments are sterilized in a separate department, which is not always on site.
- Staff Amenities: Separate areas should be provided for male and female personnel containing lockers showers, toilets, lavatories and space for donning surgical attire should allow one way traffic i.e. personnel entering from outside the surgical suite to change and move inside.
- There should be facilities for staffs to take breaks.
- Ideally, there should be a tutorial or seminar room for staff training.

3.b. Operating Room Team, Duties and Responsibilities of: Circulating, Scrub, Anesthetic and Recovery Nurse

Patients undergoing surgery will be taken care of the operating room team. Safety and privacy of patients in the OR is safeguarded by the operating room team members. Personnel inside the OR consist of the operating surgeon, assistants to the surgeon, a scrub person, an anesthesiologist and a circulating nurse. Each member of the OR team performs specific function in coordination with one another to create an atmosphere that best benefit the patient.

Classification of Operating Room (OR) team: There are two types of OR team according to the functions of its members;

- **Sterile team members:**
  1. Surgeon
  2. Assistants to the surgeon
  3. Scrub person (either a registered nurse or surgical technologist)
- **Unsterile team members:**
  1. Anesthesiologist
  2. Circulator
  3. Biomedical technicians, radiology technicians or other staff that might be needed to set up and operate specialized equipment or devices essential in monitoring the patient during a surgical operation



Operating Room Team Members

Sterile Operating Room Team:

The members of the OR sterile team will do the following things:

1. Perform surgical hand washing (arms are included).
2. Don sterile gowns and gloves.
3. Enter the sterile field.
4. Handles sterile items only.
5. Functions only within a limited area (sterile field).
6. Wear mask.

Operating Surgeon:

The surgeon is a licensed physician (MD), osteopath (DO), oral surgeon (DDS or DMD), or podiatrist (DPM). This professional is especially trained and is qualified by knowledge and experience for the performance of a surgical operation.

Responsibilities of a surgeon:

1. Preoperative diagnosis and care of the patient
2. Performance of the surgical procedure
3. Postoperative management of care

Assistants to surgeon:

During a surgical procedure, the operating surgeon can have one or two assistants to perform specific tasks under his/her (operating surgeon) direction. The responsibilities of a surgeon's assistant:

1. Help maintain the visibility of the surgical site
2. Control bleeding
3. Close wounds
4. Apply dressings
5. Handles tissues
6. Uses instruments

Types of Assistants to Surgeon:

- First Assistants could either be:

1. A qualified surgeon or resident in an accredited surgical education program. The first assistant should be capable of assuming the operating surgeon's responsibility in cases of incapacitation or accidents.
2. Registered Nurse and surgical technologists that have a written hospital policy permitting the action.

- Second Assistant could be a registered nurse or surgical technologist. These staff should be trained and they mar retract tissues and suction body fluids to help provide exposure of the surgical site.

Scrub Person:

A scrub person could be the following:

- Registered Nurse
- Surgical technologist
- Licensed practical/vocational nurse

The responsibility of a scrub person is to maintain the integrity, safety and efficiency of the sterile field throughout the surgical procedure.

Unsterile Operating Room Team:

The unsterile operating room members are not allowed to enter the sterile field to prevent contamination. The responsibilities of the members of this team are the following:

- Handle supplies and equipments that are considered unsterile.
- Touches unsterile surfaces only.
- Keep the sterile team supplied with supplies handled aseptically.
- Give direct patient care.
- Assist the sterile team member's need with strict observation of avoiding contact to the sterile field.
- Handles other requirements arising during the surgical procedure.

Anesthesiologist or Anesthetist:

An anesthesiologist is a medical practitioner who is certified by a certain institution while an anesthetist could either be a qualified and licensed nurse, dentist or a physician who administers anesthetics. The anesthetist works under the supervision of an anesthesiologist or a surgeon when administering a drug or gas.

Responsibilities of an anesthesiologist or anesthetist

1. Choice and application of appropriate agents.
2. Choice and application of suitable techniques of administration.
3. Monitoring of physiologic function.
4. Maintenance of fluid and electrolyte balance.
5. Blood replacement.
6. Helps in minimizing the hazards of shock, fire and electrocution.
7. Use and interpret correctly a wide variety of monitoring devices.

8. Overseeing the positioning and movement of patients.
9. Oversee the post-anesthesia care unit (PACU) to provide resuscitative care until the patient has regained vital functions.

Circulator:

A circulator is preferably a registered nurse. However, in some cases a surgical technologist can perform the role of a circulator with the direct supervision from a registered nurse.

Responsibilities of a circulator:

1. Monitor and coordinate all activities within the room.
2. Manage the care required for each patient.
3. Provides assistance to any member of the OR team with strict observation to avoid a break in sterility.
4. Creates and maintains a safe and comfortable environment for the patient through the implementation of aseptic technique.

Operating Room Nursing Personnel:

➢ Advanced Nurse Practitioner

Advance Nurse Practitioners are nurses who hold the title of team leader, resource clinical nurse, nurse clinician, clinical nurse specialist or nurse practitioner. These personnel are capable of organizing and providing complex care while using their initiative and independent judgment.

Requirements of an Advanced Nurse Practitioner:

1. Has acquired a degree in nursing (BSN)
2. Must pass the licensure examination (RN)
3. Graduate of master's program in nursing (MN or MAN)
4. Expert in a clinical specialty

Functions of an advanced nurse practitioner:

1. Coordinates plan of care for each patient surgical patient with the surgeon, other professional nurses and other allied health care staff who will assist in the performance of the functions that are related to the plan of care.
2. Decides what needs to be done in an operating room set-up with the coordination of the surgeon and other OR personnel. The decision is related to the direct and indirect nursing care of the patient in the operating room set-up by utilizing his or her specialized judgments and skill acquired.
3. Coordinates nursing and supportive services.
4. Directs and determines the nursing implementations that will be done by others.

5. They may fulfill the circulating nurse duties in one operating room or serve as a consultant coordinator for several rooms in which patients are being operated by a surgeon within a given surgical specialty.
6. Evaluates the quality of nursing care postoperatively through direct [patient interaction.

➢ Registered Nurse or Staff Nurse:

The entry into the operating room personnel is as a staff nurse with license or registered nurse. Before exposed and allowed to work in an actual operation, a structured orientation program is done to develop basic competencies in both scrub and circulating duties of a nurse.

Functions of a registered nurse or staff nurse:

1. Should have the ability to perform either the scrub or circulating nurse duties. In most cases, the more experienced nurse (RN) functions as the circulator and oversees the activities in the OR and the OR team. The nurse functions as patient's advocate.
2. Works in collaboration with the surgeon and the anesthesiologist in identifying the needs of the patient during the operation or surgical procedure.
3. Assumes responsible for patient care during surgical operation.
4. Document and evaluate the effectiveness of nursing interventions performed.
5. Visits patients before the operation to assess their individualized needs and plan nursing care that will be carried out during the surgical procedure.
6. Conducts postoperative follow-up directly with patients. The rationale for doing this is to provide opportunities to evaluate the outcomes of the nursing care planned and implemented.

Standards of Professional Performance of Registered Nurses in Operating Room:

The entry into the professional operating room (OR) nursing as the clinical practice setting of choice is as a staff nurse. A staff nurse should have a degree in Nursing (Nursing) who has successfully passed the nursing licensure examination (registered nurse or RN). A registered nurse should be competent to provide nursing care for all surgical patients and to ensure a safe environment to achieve desired outcomes of surgical interventions.

Eight standards of perioperative practice have been identified that may be used to measure professional performance of registered nurses (RNs) in the operating room (OR).

1. **Quality of Care**: The perioperative nurses are expected to systematically evaluate the quality and appropriateness of nursing practice. It is anticipated that RN's in the OR should participate the quality assessment and improvement programs to promote a quality care.

2. **Performance Appraisal**: The practice of a perioperative nurse evaluates his or her own performance in context with the professional practice standards and relevant statutes and regulations. Defining and evaluating professional practice behaviors is an ongoing process. To provide a framework for future growth and development self-assessment and feedback from the health care team members should be gathered.
3. **Education:** The perioperative nurse acquires and maintains current knowledge in the nursing practice.
4. **Collegiality:** It is expected that a perioperative nurse contributes to the professional growth of his or her peers, colleagues and others by sharing knowledge and expertise through preceptor program, role modeling and mentorships. This assists the colleagues to attain a broader base knowledge.
5. **Ethics:** The decisions and the actions of a perioperative nurse on behalf of the patients are determined by the governing ethical principles. Delivery of care and services should be within the practice parameter of not violating the basic rights of the clients.
6. **Collaboration:** It is a standard obligation of a perioperaive nurse to collaborate not only with the patient but also with the significant others and health care providers in providing care. To attain the expected outcomes patient care should be a unified effort that is supported by internal and external forces that follows the same goal.
7. **Research:** The perioperative nurse uses research findings in carrying out his or her practice.
8. **Resource Use:** In the planning and the implementation of the patient care the perioperative nurse should consider factors relating to safety, effectiveness, efficiency, environmental concerns and cost.

Role and Responsibilities of Different Types of nursing personnel in OT:

➢ Circulating Nurse:

A circulating nurse is an important part of the surgical team in an operating room. In addition to preparing the operating room, he checks the stock of supplies and instruments. Problem-solving is a regular duty of a circulating nurse. Equipment must be checked and double-checked. If something is missing or not in working order, the circulating nurse finds a solution. As a patient advocate, the circulating nurse interacts with the patient before surgery and serves as a patient protector during surgery. Assessing the patient right before surgery is critical to making sure that all required prep was completed. Serving as a patient advocate and safety monitor, the circulating nurse observes the surgery and ensures that no aspect of patient care is missed. She also studies data and responds quickly if anything goes wrong. For outpatient surgery, the circulating nurse confirms who will drive the patient home and who should receive updates about the patient's progress.

Role and Responsibilities Circulating:

Before an operation

- Checks all equipment for proper functioning such as cautery machine, suction machine, OR light and OR table
- Make sure theater is clean
- Arrange furniture according to use
- Place a clean sheet, arm board (arm strap) and a pillow on the OR table
- Provide a clean kick bucket and pail
- Collect necessary stock and equipment
- Turn on aircon unit
- Help scrub nurse with setting up the theater
- Assist with counts and records

During the Induction of Anesthesia

- Turn on OR light
- Assist the anesthesiologist in positioning the patient
- Assist the patient in assuming the position for anesthesia
- Anticipate the anesthesiologist's needs
- If spinal anesthesia is contemplated:

Place the patient in quasi fetal position and provide pillow, Perform lumbar preparation aseptically, Anticipate anesthesiologist's needs

After the patient is anesthetized:

- Reposition the patient per anesthesiologist's instruction
- Attached anesthesia screen and place the patient's arm on the arm boards
- Apply restraints on the patient
- Expose the area for skin preparation
- Catheterize the patient as indicated by the anesthesiologist
- Perform skin preparation

During Operation:

- Remain in theater throughout operation
- Focus the OR light every now and then
- Connect diatherapy, suction, etc.
- Position kick buckets on the operating side
- Replenishes and records sponge/ sutures
- Ensure the theater door remain closed and patient' s dignity is upheld
- Watch out for any break in aseptic technique

End of Operation:

- Assist with final sponge and instruments count
- Signs the theater register
- Ensures specimen are properly labeled and signed

After an Operation:

- Hands dressing to the scrub nurse
- Helps remove and dispose of drapes
- Helps to prepare the patient for the recovery room
- Assist the scrub nurse, taking the instrumentations to the service (washroom)
- Ensures that the theater is ready for the next case.

➢ Scrub Nurse:

A **scrub nurse** is a **nursing** professional who works alongside surgeons and other surgical staff. They are also called perioperative or operating room (OR) **nurses**. **Scrub nurses** use their expertise and calm demeanor to help surgeons perform surgery and sometimes lifesaving operations on patients.

Scrub nurses assist the surgical team by donning sterile masks, gloves and gowns as well as aid the physician by passing instruments during surgery. Following the operation, the job involves clearing away the tools and preparing the patient for transport to the recovery room.
Scrub nurses have a variety of responsibilities to ensure the welfare of their patients.

Here are some common job duties scrub nurses perform daily:

- Reports to the circulator nurse to prepare the operating room and keep it sterile
- Communicates with surgeons throughout the procedure to ensure a successful operation
- Considers potential complications and creates a plan of action should if the team has to take lifesaving measures
- Wash hands and arms with surgical soap before and after surgical procedures
- Remain on-call to take part in emergency surgery
- Properly disinfect oneself, scrub in, and dress and gown by sterile procedure
- Assist the rest of the surgical team in scrubbing in for surgery.
- Prepare the operating room by maintaining sterile procedure to set out instruments and set up other surgical equipment.
- Be able to move quickly and remain organized during complicated procedures.
- Understand the importance of time-outs and other safety checks.

- Use critical thinking skills to determine potential surgical complications and the appropriate next steps to take.
- Be familiar with all surgical instruments and be comfortable assisting with a variety of surgical procedures.
- Understand medication dosage, complications, contraindications, and interactions
- Know how to properly label medication on the surgical field
- Know when and how to perform proper surgical instrument and sponge counts to ensure patient safety.
- Collaborate with the surgical team and promote teamwork to ensure patient safety
- Recognize respiratory and cardiovascular decline and know initial steps to obtain help and to stabilize your patient.

➢ Anesthetist Nurse:

Nurse Anesthetist Responsibilities:

— Examining patients' histories for allergies or illnesses that would affect anesthesia.
— Evaluating and preparing patients, providing education about surgery and recovery, and discussing the side effects of anesthesia with them.
— Determining the amount and type of anesthesia needed for the patient and the best way to administer it.
— Preparing and administering the proper dose of anesthesia.
— Monitoring patients' vital signs and their dose of anesthesia during medical procedures.
— Overseeing patients' safety during anesthesia recovery.
— Evaluating patients' progress before, during, and after medical procedures.
— Performing some administrative duties, such as ordering anesthesia, training new staff, and overseeing department finances.

Job Duties and Responsibility of Anesthetic Nurse:

1. Select and prescribe post-anesthesia medications or treatments to patients.
2. Administer post-anesthesia medications or fluids to support patients' cardiovascular systems.
3. Evaluate patients' post-surgical or post-anesthesia responses, taking appropriate corrective actions or requesting consultation if complications occur.
4. Perform pre-anesthetic screenings, including physical evaluations and patient interviews, and document results.
5. Select, order, or administer pre-anesthetic medications.
6. Discharge patients from post-anesthesia care.
7. Perform or evaluate the results of diagnostic tests such as radiographs (x-rays) and electrocardiograms (EKGs).

8. Manage patients' airway or pulmonary status using techniques such as endotracheal intubation, mechanical ventilation, pharmacological support, respiratory therapy, and extubation.
9. Monitor patients' responses, including skin color, pupil dilation, pulse, heart rate, blood pressure, respiration, ventilation, or urine output, using invasive and noninvasive techniques.
10. Perform or manage regional anesthetic techniques such as local, spinal, epidural, caudal, nerve blocks and intravenous blocks.
11. Prepare prescribed solutions and administer local, intravenous, spinal, or other anesthetics following specified methods and procedures.
12. Respond to emergency situations by providing airway management, administering emergency fluids or drugs, or using basic or advanced cardiac life support techniques.
13. Select, order, or administer anesthetics, adjuvant drugs, accessory drugs, fluids or blood products as necessary.
14. Assess patients' medical histories to predict anesthesia response.
15. Develop anesthesia care plans.
16. Obtain informed consent from patients for anesthesia procedures.
17. Select, prepare, or use equipment, monitors, supplies, or drugs for the administration of anesthetics.
18. Calibrate and test anesthesia equipment.
19. Disassemble and clean anesthesia equipment.
20. Insert arterial catheters or perform arterial punctures to obtain arterial blood samples.
21. Insert peripheral or central intravenous catheters.
22. Instruct nurses, residents, interns, students or other staff on topics such as anesthetic techniques, pain management and emergency responses.
23. Read current literature, talk with colleagues, and participate in professional organizations or conferences to keep abreast of developments in nursing.
24. Request anesthesia equipment repairs, adjustments, or safety tests.

➢ Recovery Nurse:

Recovery nurses, also known as perianesthesia nurses, provide critical care to patients before and after surgery. **Recovery** nurses treat a wide range of patients, from newborns to the elderly. They clean wounds, administer medication and monitor the progress of the patients' conditions.

General Nurse Duties

- Conduct physical exams.
- Take detailed health care histories.
- Listen to patients and analyze their physical and emotional needs.

- Provide counseling and health care **education** to patients.
- Coordinate care with other health care providers and specialists.

Duties and Responsibilities:

Initial Care: A recovery room nurse provides constant care to patients immediately following surgery. This may be a time frame anywhere from 30 minutes to a few hours until the patient is stable enough either to be transported to his hospital room or discharged from the facility. The recovery room nurse connects the patient to devices such as cardiac monitoring equipment, and to intravenous therapy for fluids and pain medication.

Patient Monitoring: Patient observation is an essential role of the recovery room nurse. On a regular basis, she takes the patient's vital signs, such as blood pressure, pulse and temperature. The nurse ensures that the patient is breathing properly and administers oxygen when needed. Recovery room nurses must react rapidly to signs of negative physical changes, calling for assistance and beginning cardiopulmonary resuscitation if necessary.

Pain Intervention: Pain intervention is another important part of the job description of a recovery room nurse. The nurse observes patients to assess their comfort level, asks patients about their level of pain, and administers pain medications that have been prescribed. He notifies the physician if more pain medication appears to be needed. The nurse must be able to use patient-controlled pumps, and intravenous and epidural infusions.

Additional Duties: Recovery room nurses make complete notes on the charts, and communicate information in verbal or written form to other PACU nurses and to physicians. They complete any forms required by the facility. Some recovery room nurses supervise supplemental staff members.

Considerations:

Recovery room nurses can work any type of shift, days or nights, and also can work on a per diem, or as needed, basis. Traveling nurse organizations recruit for recovery room nurses as well. They must be able to communicate effectively with patients of different ages and backgrounds. Recovery room nurses must have excellent observation skills, be able to think critically, and be able to make quick and effective decisions.

3. c. Infection Control in OT

Introduction: Good Infection Prevention and Control is essential to ensure that patients who undergo any surgical procedure within the operating theatre receive safe and effective care. There should be a separate hospital acquired infection control policy in practices in every hospital, which should be strictly followed by working operating department.

Infection Control Practices:

- Standard precautions
  - Hand washing and Antisepsis (hand hygiene)
  - Use of personal protective equipment
  - Scrubbing, gowning and gloving
  - Management of health-care waste
- Theatre traffic

Infection Control Practices:

- Cleaning, disinfection and sterilization
- Additional (transmission-based) precautions
  - Airborne precautions
  - Droplet precautions
  - Contact precautions

Standard precautions:

- "Standard precautions" or 'universal precautions'' state that health care workers must assume all the blood and body substances of all patients are potential sources of infection, regardless of the diagnosis, or presumed infectious status.
- Standard Infection Control Precautions, are intended for use by **all** staff, in **all** care settings, at **all** times, for **all** patients, whether infection is known to be present or not.
- Use of Personal Protective Equipment (PPE)
- Gloves, gowns, surgical face masks, disposable plastic aprons, goggles, face shields, surgical gown etc.

Scrubbing, Gowning and Gloving:

- All sterile members of the surgical team are required to cleanse their hands and arms by scrubbing as per the hospital's guidelines before entering to the sterile field.
- It helps to eliminate dirt and skin oil and to decrease the miocrobial counts as much as

possible.

- The procedure is standardized for all the personnel.
- While scrubbing, the team members' fingers and hands should be scrubbed first with progression to the forearms and elbows.
- The hands should be held away from surgical attire and higher than elbows at all times to prevent contamination from clothing and draining water from unclean areas above elbows.
- Once scrub procedure is completed, the team members enter the room to put on surgical gowns and gloves and then towards the operating area.

Theatre TRAFFIC:

- The numbers and movement of staff through the operating theatre environment should minimize.
- To maximize the ventilation, all doors should remain closed when not in use as this helps to maintain the air pressure, temperature and humidity for that theatre.
- Also, Keep main doors closed when not in use.
- If it is necessary to visit another theatre, staff must remove PPE and wash hands before leaving the theatre.

Theatre Attire:

- Theatre attire is necessary for identification of theatre personnel, and is designed to minimize the potential transfer of micro organisms between theatre staff and patients.
- All personnel entering an OT should wear green scrub tops and trousers, provided freshly laundered. These must be changed daily and whenever visibly soiled.
- Footwear should be antistatic and washable, and should be worn only in the theatre department.
- Hair should be completely covered by a disposable or washable that, this should be donned before scrubs to prevent contamination of clean scrubs by staff hair.
- Jewelries cannot only harbor bacteria, but also be a hazard in theatres in many ways.
- Earrings should not be worn, as they could potentially fall into a wound.
- Fingernails should be kept clean, short and free from nail polish.
- Theatre staff with open cuts, wounds or skin breaks should cover these with a waterproof dressing.
- If staffs have ongoing skin conditions such as eczema or similar, an Occupational Health Department referral should be considered before participation in exposure prone procedures.
- Personal hygiene must be of a high standard.

Waste disposal:

- Sharps Use and Disposal
- Clinical waste
- Cytotoxic waste
- Radioactive waste
- Blood spillage
- Linen
- Household waste

Sterilization and disinfection:

- **Sterilization:** Heat sterilization in autoclave machine. Ethylene oxide gas or Glutaraldehyde (2%) over 6 hours.
- **Disinfection:** Sodium hypochlorite (1%), ethyl or iso-propyl alcohol (70-90%), Glutaraldehyde (2%) over 30 minutes.
- All articles to be disinfected or sterilized are to be thoroughly cleaned with detergent and water

Cleaning and Disinfection:

Environmental cleaning and decontamination:

- Cleaning between patients: Each case should have assessed individually with all items which have been in contact with the patient cleaned with either detergent wipes or a detergent solution. Any body fluid spills should be cleaned and disinfected. Floors and equipment should be cleaned if visibly soiled or if contact with patient has taken place.
- Daily and weekly cleaning schedule
- Pre-planned and annual cleaning and maintenance
- Standard environmental cleanliness

Environmental cleaning and decontamination:

- **Standard environmental cleanliness:**
  - The operating room and accompanying rooms, i.e. anesthetic room, prep area etc. should be kept free of unnecessary equipment and clutter to facilitate cleaning
  - Theatres should be free of visible dust
  - Storage of equipment and consumables should be above floor level
  - Storage of consumables, supplies etc should be kept to a minimum in theatre, and stock should be rotated to ensure there is no build up of dust or bio-burden.
  - Any chipped paintwork, tiling or defects in floors or fabrics should be reported and dealt with promptly

- **Air quality monitoring:**
  - Each theatre has the air quality tested after any major maintenance or building work has taken place.
  - This testing is done by putting agar plates in the theatre after any works have been completed, and the theatre has been cleaned.
  - The theatre is then sealed so that any bacteria grown on these plates can only have come from the air flow in that theatre and not from staff movement.
  - The theatre is opened again once the plates have been removed. Results are sent to the theatre management team

Audit, Surveillance and Monitoring:

- The Hospital Infection Control Committee should undertake numerous audits including observation of hand hygiene practices, surgical site infection surveillance.
- The data should be collated and use to monitor standards.
- All staff are expected to take part in these audits where relevant, to help the HCIC build upon its evidence based practice.

3.d. Hazards in Operation Theatre

Introduction

- **Hazard:** It is a situation that poses a level of threat to life, health, property or environment.
- The peri-operative environment poses many hazards for both patient and health personnel.
- Therefore it is important for all the members in OT to have knowledge of the hazards involved in the equipment use, the causes of accidental injury and the sources of health risks.

Major hazards:

- Blood/body fluid exposures from sharps
- Exposures to waste anesthetic gases
- Possible exposures to chemical cleaning agents
- Slips/trips/fall hazards
- Exposures to lasers
- Electric hazards
- Fires

Classification of hazards:

- **Physical:** It includes hazards such as fall injuries, noise pollution, irradiation, electricity and fire.
- **Chemical:** It includes hazards from anesthetic agents, toxic fumes from gases and liquids, cytotoxic drugs and cleaning agents.

– **Biological:** Including the patient (as a host for or source of microorganisms), infectious waste, cuts or needle stick injuries and latex sensitivity.

Blood/Body Fluid Exposures:

– 50% of sharps injuries occur during use.
– Procedures with the most sharp injuries:
– Suturing
– Blood sampling
– Intra-dermal injections (lidocaine)
– Cutting (scalpel injuries)
– Inserting peripheral I.V. line, setting up heparin lock
– Withdrawing needle from patient
– During clean up and disassembly
– During disposal
– Overfilled sharps container, protruding needles
– Stuck by needle left in trash, laundry, beds, & on floor
– Patient movement

Prevention

– Utilize safe zone during each surgical procedure
– Account for all sharps used
– Dispose of sharp in sharps container immediately after use
– When emptying suction containers, always pour carefully and wear eye/face protection
– Using personal protective equipment (PPE)

- **If an exposure occurs:**

– **For eye/face exposures:** Use an eyewash station and rinse for about 15 minutes
– **For a needle stick:** Wash with soap/water
– **Report exposures immediately** to Health Service for further post exposure prophylaxis measures and counselling

Waste Anesthetic Gases:

– Releases of anesthetic gases into an OR can result in **loss of small motor skills, slowing of reflexes, mental confusion, tiredness**
– Action by the anesthesiologist can minimize these exposures:
– Check all connections before use for leaks
– Pack endotracheal tube to prevent leaks
– Have equipment serviced/checked periodically

Slips/Trips/Falls:

- The walking surface of OR locations can be slippery, causing an injury
- Take the appropriate precautions
- Wear slip resistant foot wear
- Report water/fluids on floor for clean up
- Have personnel place a "CAUTION –WET FLOOR" sign on floor until cleaned

Lasers:

- The Laser Nurse/Technician must prepare the OR for use
- Place any needed eye protection at the entries (needed except for certain ophthalmic procedures)
- Some applications may require covering windows and other reflective surfaces
- When personnel enter the room, verify they have laser eye protection on
- Maintain a log of laser use

The following safeguards should be followed for radiation safety:

- Appropriate warning signs at the entrance to OR before x-ray equipment is in use.
- Machines like x-ray tube fluoroscope and image intensifier should be turned off when not in use.
- Sterile team members and others who cannot leave room should stand 6feet or more from the patient, if possible, and out of the direct beam during exposure.
- Ensure that essential staff remains, wearing protective cloth (lead apron) during the image intensifier.

Electrical Hazards:

- An electrical hazard can be defined as a dangerous condition where a person could make electrical contact with energized equipment or a conductor, and from which s/he may sustain an injury from shock and there is potential to result in an arc flash burn, thermal burn, or blast injury.
- In the operation theater the patient and the personnel are more vulnerable to the electrical hazards due to the following factors:
  - Anesthetic explosion
  - Faulty electro-medical equipment
  - Static electricity
- An electric shock occurs when a person comes into contact with an electrical energy source.

- Electrical energy flows through a portion of the body causing a shock.
- Exposure to electrical energy may result in no injury at all or may result in devastating damage such as tissue necrosis, ventricular fibrillation or death.
- Burns are the most common injury from electric shock.

Macroshock:

- It is the usual cause of operator electrocution or skin burns, occurs whenever an electrical current enters the body through the intact skin.
- Inadequate machine grounding or insulation defects, which cause the operator to act as the pathway to ground, are the most common reasons for this problem.
- It begins beneath the cutaneous barrier and can be caused by innocuous currents from inappropriately grounded electrical devices.
- These currents are often below the threshold of sensation (less than one milliampere) and can travel through the heart, infrequently producing ventricular fibrillation.
- In this situation, the current is typically conducted either through an electrocardiograph (ECG) lead or a pacemaker catheter instead of the grounding pad.
- In addition to the risk of microshock, the electrocautery may cause burns with a highly concentrated electrical charge that produces thermal energy at the ECG lead.

Electrical Safety in the Operating Room:

The following safeguards should be used when working with electrical equipment:

- All electrical equipment used in the operating room should be grounded.
  When electro surgery is in use, a grounding pad should be used that connects the patient to the ground connection provided on the electro surgery machine.
- The grounding pad should be well gelled and placed in contact with the patient across a large area.
- The electrosurgical ground pad should be placed as near to the operative site as reasonably possible and as far as possible from pacemaker wires and ECG wires.
- Particular care should be used when operating high voltage equipment such as radiograph machines, lasers and electronic monitoring devices.
- Machine should be turned off when plugging them into or unplugging them from the power receptacle and when attaching cords to the machine.
- The electrical equipment should be mounted securely so that it cannot be dislodged by the patient's unexpected movement and cause breakdown of wire resulting in the physical injury to the patient.
- The hands should be kept dry before touching the patient or electrical equipment as moisture allows more current to flow.
- Anesthesia machines, cylinders of compressed gas and flammable liquid containers should be

kept away from any source of heat and must not touch one another.

- The relative humidity (weight of water vapor present) in the operative environment should be maintained between 50% and 60%.
- Moisture provides a relatively conductive medium, therefore allowing static electricity to leak to earth as fast as it is generated.
- Sparks form more readily in low humidity.
- Patients should be covered with cotton blankets. Woolen and synthetic blankets are prone to produce static electricity.
- The hair of patients, personnel should be covered to avoid static discharge.
- Every one entering the theatre must wear shoes of either conducting rubber or leather (antistatic).
- Employees must know the location and use of emergency equipment such as fire extinguisher and shut-off valves.

3.e. Anesthetic Technique, Drugs, Stages, Types of Anesthesia, and Its Complications

Introduction: Is an induced state of partial or total loss of sensation, occurring with or without loss of conscience. Anesthesia is defined as the absence of normal sensation. This also includes loss of protective reflexes. Anesthesia provides:

History of Anesthesia:

- Ether synthesized in 1540 by Cordus
- Ether used as anesthetic in 1842 by Dr. Crawford W. Long
- Ether publicized as anesthetic in 1846 by Dr. William Morton
- Chloroform used as anesthetic in 1853 by Dr. John Snow
- Endotracheal tube discovered in 1878
- Local anesthesia with cocaine in 1885
- Thiopental first used in 1934
- Curare first used in 1942: opened the "Age of Anesthesia"

Purposes of Anesthesia:

- To produce muscle relaxation
- To produce analgesia
- To produce artificial sleep or to cause loss of consciousness
- To block transmission of nerve impulses
- To suppress reflexes

Selection of anesthesia is influenced by the following:

- Type and duration of the procedure
- Area of the body having surgery
- Safety issues to reduce injury, such as airway management
- Whether the procedure is an emergency
- Options for management of pain after surgery
- How long it has been since the client ate, had any liquids, or any drugs
- Client position needed for the surgical procedure

Classification:

- General anesthesia

– Local or regional anesthesia

General anesthesia:

– Is a reversible loss of consciousness induced by inhibiting neuronal impulses in several areas of the central nervous system?
– General anesthetics are agents that block the pain stimulus at the cortex.

Produces a state of the:

– Analgesia
– Amnesia
– Unconsciousness characterized by loss of reflexes and muscle tone

Stages of General anesthesia

Stage 1: analgesia and sedation, relaxation:

— Begins with induction and ends with loss of consciousness
— Client feels drowsy and dizzy, has a reduced sensation to pain and is amnesic
— Hearing is exaggerated

Nursing Intervention

— Close operating room doors, dim the lights, and control traffic in the operating room
— Position client securely with safety belts

Stage 2: Excitement, delirium:

– Characterized by struggling, shouting, laughing, singing or crying--- maybe prevented if anesthetic is administered smoothly and quickly
– Client may have irregular breathing, increased muscle tone, and involuntary movement of the extremities during this stage
– Laryngospasm or vomiting may occur
– Pupils dilate but contract if exposed to light

Nursing Intervention

– Avoid auditory and physical stimuli
– Protect the extremities
– Assist the anesthesiologist or CRNA with suctioning as needed
– Stay with client.

Stage 3: Operative anesthesia, surgical anesthesia

– Begins with generalized muscle relaxation and ends with loss of reflexes and depression of vital function

– Pupils are small but contract when exposed to light. Respirations are regular, the pulse rate and volume are normal, and the skin is pink or slightly flushed
– The jaw is relaxed, and there is quite, regular breathing.
– The client cannot hear
– Sensations are lost

Nursing Intervention

- Assist the anesthesiologist with intubation
- Place patient into operative position
- Prepare the clients skin over the operative site as directed.

Rationale

- Providing assistance helps promote smooth intubation and prevent injury
- Performing procedures as soon as possible promotes time management to minimize total anesthesia time for the client.

Stage 4: Danger

– Begins with depression of vital function and ends with respiratory failure, cardiac arrest, and possible death
– Respiratory muscles are paralyzed; apnea occurs
– Pupils are fixed and dilated.

Nursing Intervention

– Prepare for and assist in treatment of cardiac and /or pulmonary arrest
– Document occurrence in the client's chart

Rationale

– Teamwork and preparedness help decrease injuries and complications, and promote the possibility of a desired outcome for the client

Administration of General Anesthesia:

Inhalation:

– **Gaseous Agent:** nitrous oxide is the most common used agent and is usually given with oxygen. It is colorless, odorless gas that provides analgesia
– **Volatile agents:** liquid agents vaporized for inhalation. O2 is the carrier, flowing over or bubbling through the liquid in the vaporizer system on the anesthesia machine.

Intravenous injection: administered through a vein. The patient feels a simple, pleasant and rapid induction. Unconsciousness generally occurs about 30 seconds to 1 minute after the initial IV administration.

- **Barbiturates:** it acts rapidly, causing unconsciousness within 30 seconds. Ex: Thiopental Na (Penthotal Na)
- **Ketamine (Ketalar):** ketamine is a dissociative anesthetic agent. Rapid onset of a rancelike, analgesic state occurs. Often used for diagnostic and short surgical procedures.
- **Propofol (Diporivan):** is a short acting anesthetic agent. Hypnosis occurs in less than 1 minute from the time of injection. The drug is eliminated rapidly and the client becomes responsive within 8 minutes after the infusion ends.

Adjuncts to General Anesthetic Agents:

- **Sedatives:** common drugs in the class include midazolam (Dormicum) and diazepam (Valium). All have hypnotic, sedative, muscle relaxant, and amnesic effects
- **Opioid analgesics (narcotics):** common opioid analgesic enhance anesthesia include morphine sulfate, meperidine, fentanyl and sufentanil
- **Neuromuscular Blocking Agents:** are used to relax the jaw and vocal cords immediately after induction so that the endotracheal tube can be placed. This is used to provide continued muscle relaxation. Ex: Succinylcholine

Potential Complications of General Anesthesia:

- Overdose
- Unrecognized hypoventilation
- Complications of intubation
- Anaphylaxis
- Hypothermia
- Injury r/t positioning, burns
- Malignant hyperthermia

Malignant Hyperthermia:

- Rare but extreme emergency
- Occurs most often with inhalants
- Genetic predisposition
- Uncontrolled acceleration of muscle metabolism and increased BMR
- Life threatening elevated temperature, hyperkalemia, acidosis

Emergency Treatment of Malignant Hyperthermia:

- Stop surgical procedure/anesthesia if possible
- Hyperventilate with 100% oxygen
- Administer DANTROLENE intravenously
- Undertake body cooling measures: Iced NS intravenously, Cooling blanket

Local anesthesia:

– Injection of a solution containing anesthetic into the tissues at the planned incision site
– Briefly disrupts sensory nerve impulse transmission form a specific body area or region.

Advantages:

– Simple, economical, and non-explosive
– Equipment needed is minimal
– Post operative recovery is brief
– Undesirable effects of GA are avoided
– Ideal for short and superficial surgical procedures
– Client remains conscious
– Cost effective
– Minimal recovery time
– Vasoconstrictive agents decrease bleeding
– Client remains conscious
– Potential for local tissue irritation
– Potential for sudden systemic reaction such as hypotension

Types of Local anesthesia:

– **Topical anesthesia:** topical agents are applied directly to the area of skin or mucous membrane surfaced to be anesthetized
– **Local infiltration:** is the injection of an anesthetic agent directly into the tissue around an incision, wound, or lesion.

Regional Anesthesia:

A form of local anesthesia in which an anesthetic agent in injected around the nerves so that the area supplied by the nerves is anesthetized. The patient receiving RA is awake and aware of his surroundings unless medications are given to produce mild sedation or to relieve anxiety.

Regional Anesthesia Types:

– **Field Block:** Injected around the operative field
– **Nerve Block:** Into or around a nerve or nerve group
– **Spinal:** Into subarachnoid space
– **Epidural:** Into epidural space

Administration of Regional Anesthesia:

- **Spinal Anesthesia:** produces a nerve block in the subarachnoid space by introducing a local anesthetic at the lumbar level, usually between L4 and L5.
- Autonomic nerve fibers are the first affected and the last to recover

Peripheral nerve blocks:

- Blockade of brachial plexus, lumbar plexus, and specific peripheral nerves via injection of local anesthetic solutions into tissues surrounding individual peripheral nerves or nerve plexuses
- Local anesthetics deposited near the vicinity of the nerve diffuses from the outer surface (mantle) to the center (core) of the nerve along a concentration gradient
  - **Proximal structure:** mantle
  - **Distal structures:** core

Peripheral Nerve Block:

- **Advantages:**
  - reduced physical stress (compared to central neuraxis anesthesia)
  - Avoids airway manipulation and complications associated with endotracheal intubation
  - Indwelling catheters may be placed for prolonged block and analgesia
  - Provides surgical anesthesia and postoperative analgesia
- **Requirements:**
  - Cooperative patient
  - Skilled anesthesiologist
  - Surgeon accustomed to operating on awake patients

Head and Neck blocks:

- Intracranial Blocks
- Neurosurgery and Scalp Surgeries
- Eye Blocks
- Face Blocks
- Ophthalmic Nerve Block
- Maxillary Nerve Block
- Mandibular Nerve Blocks
- Cervical Plexus Blocks

Upper limb BLOCKS

– Interscalene block
– Supraclavicular blocks
– Infraclavicular blocks
– Axillary block

Lower limb BLOCKS

– Lumbar plexus block
– Iliofascial block
– Obturator block
– Sciatic blocks
– Ankle blocks

Advantages

– Eliminates the need for expensive equipments and drugs
– Relatively safe method of anesthesia
– Provides excellent method of anesthesia
– Does not cloud the patient's consciousness or alertness
– Useful for patients with respiratory or cardiac problems

Regional Anesthesia advantages:

– Patient remains conscious
– No respiratory depression or irritation
– Enhanced pain management post-operatively
– Patient remains conscious
– Circulatory depression/stasis
– Potential trauma/infection @ site of injection
– Edema - potential for spinal headache

Complications

– Hypotension
– Headache
– Post op paralysis
– Nausea and vomiting
– Urine retention

Epidural Anesthesia:

- A commonly used conduction block by injecting a local anesthetic into the epidural space that surrounds the dura matter of the spinal cord
- Blocks sensory, motor, and autonomic functions
- Have much higher doses
- All the complications in the SA can be observed except headache
- Injection of a certain amount of local anesthetic (with or without opiates) into the lumbar or thoracic *epidural space*
- A catheter is inserted after the epidural space has been located with a needle:
    - Controlled local anesthetic delivery
    - "Redosing" of anesthesia for long procedures
    - Post-operative analgesia with local anesthetics and opiates
- **Indications:** abdominal, thoracic, and lower extremity procedures

Advantages of Epidural Anesthesia:

- **Hip Surgery:** Decrease blood loss and incidence of deep venous thrombosis
- **Thoracic Surgery:** superior pain control, less sedation, better pulmonary function
- Rapid recovery of gastrointestinal function
- Early ambulation
- Others:
    - Labor analgesia
    - Interventional pain modalities

Complications of Epidural Anesthesia: [Similar to that of Spinal Anesthesia]

- Total Spinal Anesthesia
- Local Anesthetic Toxicity
- Spinal / Epidural hematoma
- concerns regarding catheter placement and removal in patients on anticoagulation
- Epidural Abscess

Technique of EA:

- Patient positioned
- Landmarks identified
- Aseptic Preparation
- Local infiltration of LA at injection site
- Epidural puncture with Tuohy needle
- Epidural space identified: LORT, hanging drop technique

- Note +/- of CSF, blood, paresthesia
- Epidural catheter threaded into space
- Test for inadvertent intravascular and intrathecal placement of catheter
- Epidural injection of LA

Local conduction blocks:

- **Brachial plexus block:** produces anesthesia of the arm
- **Para vertebral anesthesia:** produces anesthesia of the nerves supplying the chest, abdominal wall and extremities
- **Transsacral (caudal) block:** produces anesthesia of the perineum and occasionally the lower abdomen

Admitting the patient to the Post-Anesthesia Care Unit (PACU):

- Transferring of the patient from the OR to the PACU is the responsibility of the anesthesiologist.
- During transport the anesthesiologist remains at the head part of the patient and a surgical team member remains at the opposite side.
- Transporting the patient involves the special consideration of the incision site, potential vascular changes and exposure.

Nursing assessment in the PACU:

- Vital signs- presence of artificial airway, o2 saturation, BP, pulse, temperature
- LOC- ability to follow command, pupillary response
- Urinary output
- Skin integrity
- Pain
- Condition of surgical wound
- Presence of IV lines
- Position of patient

Post-**A**nesthesia **C**are **U**nit **(PACU):**

- Also called the recovery room or post-anesthesia recovery room
- Kept clean, quiet, free of unnecessary equipment, with indirect lighting, and well ventilated to help patients decrease anxiety and promote comfort
- Should be equipped with necessary facilities

Phases of Post-Anesthesia Care:

- **Phase I PACU:** used during the immediate recovery phase, intensive nursing care is provided.
- **Phase II PACU:** the patient is prepared for self care or care in the hospital or an extended care setting.
- **Phase III PACU:** patient is prepared for discharge

Measures used to determine readiness for discharge in the PACU:

- Stable vital sign
- Orientation to person, place, events and time
- Uncompromised pulmonary function
- Adequate O2 saturation
- UO at least 30ml/hr
- N and V absent or under control
- Minimal pain

Evaluation:

Expected outcomes:

1. Indicates that pain is decreased intensely
2. Maintains optimal respiratory function
3. Does not develop DVT
4. Exercises and ambulates as prescribed
    a. alternates periods of rest and activity
    b. progressively increases ambulation
    c. resumes normal activities with prescribed time frame
    d. performs activities r/t self care
5. Wounds heal without complications
6. Resumes oral intake and normal bowel function
    a. reports absence of N and V
    b. takes at least 75% of usual diet
    c. is free of abdominal distress and gas pains
    d. exhibits normal bowel elimination pattern
7. Acquires knowledge and skills necessary to manage therapeutic regimen
8. Experiences no complications and has normal Vitals

Common Complications Post-anesthesia:

– Nausea/vomiting 5%
– Unexpected alterations in mental state 5%
– Requirement for upper airway support 3.6%
– Hypotension 3%
– Dysrhythmias 2%
– Hypertension, myocardial ischemia, or a major cardiovascular complication <1%

Checklist for Evaluating Patients Before Departing the OR and After Arriving in the PACU:

– Airway patency
– Breathing (rate and depth)
– Arterial oxygenation (pulse oximeter)
– Blood pressure
– Heart rate, ECG
– Level of SAB or EPIDURAL
– Level of consciousness

Delayed Awakening:

- Acute metabolic disorders
  – Hypoxia
  – Hypercarbia
  – Hypoglycemia
  – Other electrolyte disorders
  – Water intoxication
- Residual neuromuscular blockade
- CNS disorders
  – Stroke
  – Post-anoxic encephalopathy
- Residual effects of anesthetics, sedatives
- Other medications
  – Premedicants
  – Central anticholinergic syndrome: scopolamine, atropine
  – Illicit drugs
  – Cimetidine
- Hypothermia
- Preexisting coma or obtundation

- Interpatient viariation in response to anesthetics

Agitation and Delirium:

— Hypoxemia or airway obstruction
— Hypercarbia
— Cerebral ischemia
— Pain
— Full bladder
— Incomplete reversal of neuromuscular blockade
— Withdrawal from alcohol or other drugs
— Central anticholinergic syndrome (scopolamine, atropine, tricyclic antidepressants, antihistamines, butyrophenones or phenothiazines)
— Residual anesthetics or sedatives (barbiturates, ketamine)
— Senile dementia
— Emotional or anxious state prior to anesthesia
— Patients who awaken restrained (e.g. casts)

Pain:

– Operative site
– Muscle spasm
– Bladder distension
– Musculoskeletal
    - Exacerbation of arthritis
    - Injury from positioning
– Tight cast or dressing
– Phlebitis, infiltration of IVF
– Angina
– Corneal abrasion

Nausea and Vomiting:

– History of nausea or vomiting after previous operations
– Gastric distension
– Ileus
– Bowel obstruction
– Prolonged or inept mask ventilation
– Full stomach before surgery

- Opioids
- Type of surgery
- Ophthalmologic procedures
- Laparoscopy
- Otorhinologic procedures especially inner ear
- Abdominal operations

Residual NMB:

- Any patient with unexplained upper airway obstruction, hypoventilation, or delayed awakening after a general anesthetic should be evaluated for residual neuromuscular blockade.
- Head or leg lift test for 5 seconds
- Treatment additional neostigmine

Airway Obstruction:

- **Causes**
  - Somnolence
  - Residual weakness
  - Obtunded airway reflexes
  - Upper airway edema
  - Sleep apnea
  - Obesity
  - Partial airway obstruction preoperatively

- **Signs**
  - Noisy breathing
  - Dyspnea
  - Cyanosis
  - Hypoxemia
  - CV abnormalities
  - Tracheal tug
  - Nasal flaring
  - Rocking motions of the chest
- **Treatment**
  - Repositioning the head and neck
  - Oxygenation
  - Jaw thrust

- Nasal and oral airways
- Tracheal intubation

Hypoxemia:

- Atelectasis
- Aspiration pneumonitis
- Decreased FRC
- Pulmonary edema
- Pneumothorax
- Pneumonia
- Splinting from incisional pain
- Increased oxygen consumption (fever, shivering)
- Decreased cardiac output
- Depression of ventilatory responses to hypoxemia by residual anesthetics
- Depression of ventilatory responses to hypercarbia by opioids

Respiratory Depression

Causes

- Residual drug effects
- Airway obstruction
- Lung disease (COPD)
- Increased CO2 production (shivering, fever)
- Opioids

Treatment

- Oxygenation
- Stimulation
- Assisted or controlled PPV
- Naloxone (40-80mg) if due to opioids

Hypertension/ Hypotension

Hypertension:

- Preexisting HTN
- Anti-HTN medication not taken
- Pain
- Distended bladder
- Volume overload
- Emergence delirium

- Hypoxemia, hypercarbia
- Hypothermia with vasoconstriction

Hypotension:

- Hypovolemia due to unreplaced intraoperative losses, continuing bleeding and third space losses
- Residual effects of SAB or epidural anesthesia by blunting sympathetic responses
- Occult hypovolemia after opioids
- LVF
- Sepsis
- Pulmonary embolus
- Tension pneumothorax

Hypothermia:

Effects:

- Slows emergence
- Impairs organ function and coagulation
- Exacerbates HTN
- Increases oxygen consumption and demands in cardiac output

Management:

- Warm the OR to 26C
- Use warming blankets or active heating devices
- Warm IVFs

Fever:

- Less common than hypothermia
- Common case: pulmonary atelectasis
- Less common: febrile reactions to drugs and transfused blood
- Rare but grave: onset of MH

Post-operative Pain:

- **Acute** pain is experienced immediately after surgery (up to 7 days).
- **Chronic** pain lasts more than 3 months after the injury.

Routine Discharge Criteria from PACU:

- Vital signs satisfactory and stable
- Return to postoperative mental state
- Adequate pain control

– Immediate treatment of any complications
– Adequate treatment of nausea/vomiting
– Adequate function of all drains, tubes, catheters
– Surgical bleeding controlled or treated
– Postoperative orders reviewed and implemented
– Laboratory studies needed immediately obtained and results reviewed

Common Anesthetic Drugs:

As a Special Forces Medic given a patient requiring anesthesia, administer anesthesia utilizing your knowledge of anesthesia pharmacology and applying the five rights: right patient, right drug, right amount, right route, right time.

Procedures:
- Review local/regional anesthesia pharmacology
- Review anesthesia pharmacology adjuncts
- Review intravenous anesthetics
- Review intravenous anesthetics reversal agent

Local/Regional Anesthetics
– Amide type anesthetic
– The most commonly used local anesthetic
– Rapid onset and a duration of 60-75 minutes
– Extended when solutions with epinephrine are used for up to 2 hours
– Metabolized in the liver and excreted by the kidneys.

➢ Lidocaine:

Indications: Used to produce local and regional anesthesia for surgical and diagnostic procedures
Dose and Routes:
- Percutaneous infiltration: 0.5%, 1.0%
- Regional infiltration: 0.5%
- Peripheral nerve: 1.0%, 1.5%, 2.0%
- Max dose 4 mg/kg or 7 mg/kg with epinephrine
- Toxic IV dose: 250 mg

Adverse Reactions, Precautions, and Interactions:
- Contraindicated in patients with a known sensitivity to amide type anesthetics
- All local anesthetics can produce CNS stimulation, depression, or both

➢ Chloroprocaine:

- Ester type local anesthetic
- Onset of action is rapid (6-12 min.) and duration of anesthesia is up to 60 min.
- Rapidly metabolized in the plasma

Indications: Production of local and regional anesthesia for surgical and diagnostic procedures
Dose and Routes:

- Local infiltration: 2.0%, 3.0% for motor block
- Peripheral nerve block: 1.0%, 2.0%
- Maximum dose 11 mg/kg or 13 mg/kg with Epinephrine
- Toxic IV dose: 450 mg

Adverse Reactions, Precautions, And Interactions:

- Contraindicated in patients with known hypersensitivity to drugs of the PABA ester group
- All local anesthetics can produce CNS stimulation, depression, or both

➢ Procaine

- Ester type local anesthetic
- Slower onset of action than Lidocaine
- Duration of action is approximately one hour
- Primarily metabolized in the plasma

Indications: Used to produce local and regional anesthesia for surgical and diagnostic procedures

Dose and Routes:

- Infiltration: 0.25%, 0.5%
- Nerve block: 1.0%, 2.0%
- Maximum dose 11 mg/kg or 13 mg/kg with Epinephrine
- Toxic IV dose: 450 mg

Adverse Reactions, Precautions, and Interactions:

- Contraindicated in patients with a known hyper-sensitivity to PABA ester type anesthetics
- All local anesthetics can cause CNS stimulation, depression or both

➢ Bupivicaine

- Amide-type local anesthetic
- Onset of action is slower than lidocaine and anesthesia is long acting
- Metabolized in the liver and excreted by the kidneys
- Normally provides 2-4 hours of anesthesia
- Can be extended in some cases by using solution with epinephrine to 7 hours

Indications: Production of local or regional anesthesia for surgical, diagnostic, or obstetrical procedures

Dose and Routes:

- Local infiltration: 0.25%
- Peripheral nerve block: 0.25%, 0.5%
- Maximum dose 3 mg/kg or 4 mg/kg with Epinephrine
- Toxic IV dose 80 mg

Adverse Reactions, Precautions, And Interactions:

— Contraindicated for use in pts with known hypersensitivity and in obstetrical para-cervical blocks

— All local anesthetics can produce CNS stimulation, depression or both Adjuncts to Anesthesia

➢ Atropine:

- anticholinergic drug that blocks the muscarinic receptor sites (mainly organs innervated by the Vagus nerve)
- Reduction in salivary and other airway secretions

- Inhibits Acetylcholine at the parasympathetic neuroeffector junction, blocking vagal effects on the SA node; this enhances conduction through the AV node and speeds heart rate
- Inhibits heat loss by suppressing perspiration
- antisialogogue effects last up to 4 hours
- Increase in heart rate peaks in one hour.

Indications: Used preoperatively for diminishing secretions and blocking cardiac vagal reflexes
Dose and Routes: 0.4-0.6 mg IM 45-60 prior to anesthesia
Adverse Reactions, Precautions, And Interactions:

- May cause tachycardia
- Excessive dryness of the mouth and throat
- Dilation of the pupils
- Fever, flushing of the face, confusion, mania, and hallucinations
- May increase intraocular pressure-contraindicating its use in narrow angle glaucoma

➢ Promethazine

Indications: Is used for preoperative sedation and as an analgesic adjunct
Dose and Routes:

- 25-50 mg Deep IM, IV, or PO 30 min prior to anesthesia
- If giving IV dilute with normal saline
- Never give SC as this is an irritating solution. Injections should be deep IM

Adverse Reactions, Precautions, And Interactions:

- Contraindicated in patients with increased intraocular pressure, intestinal obstruction, prostatic hypertrophy, bladder neck obstruction, epilepsy, bone marrow depression, coma, CNS depression, or stenosing peptic ulcers
- Additive effects with other Phenothiazines and CNS depressants

Intravenous Anesthetics

Review the Components of General Anesthesia

- Muscle Relaxation
- Unconsciousness
- Analgesia

Muscle Relaxation:

➢ Diazepam

- Benzodiazepine with sedative and amnesic properties
- Depresses the CNS at the limbic and subcortical levels of the brain
- Depresses the ventilatory response to $PaCO_2$
- Mild muscle relaxation mediated at the spinal cord level; not at the neuromuscular junction
- Highly alkaline pH
- No analgesic properties

Indications:

- Basal sedation
- Induction agent

- Preanesthetic
- Drug of Choice for seizures

Dose and Routes:

- IV, IM, PO, and rectally
- Pre-op sedation: 5 to 10 mg PO 1h before surgery
- Induction of anesthesia: 0.1-0.2 mg/kg IV
- Seizures: 5-10 mg IV q5min up to 30 mg
- Basal sedation: Increments of 2.5 mg until pt. falls into light sleep (5-30 mg may be required)

Adverse Reactions, Precautions, And Interactions:

- Apnea, respiratory depression, post-op respiratory depression
- Contraindicated narrow angle glaucoma or patients < 6 m/o (in oral form)
- Incompatible with many drugs; when given IV with other medications, the IV line should be adequately flushed
- Should be injected < 5 mg/min to avoid respiratory arrest

➢ Midazolam

- Benzodiazepine that has a rapid onset with sedative and amnesic properties
- Depresses the CNS at the limbic and subcortical levels of the brain
- Depresses the ventilatory response to $PaCO_2$
- No analgesic properties
- Mild muscle relaxation mediated at the spinal cord; not at the neuromuscular junction
- Water soluble--which allows for better absorption following IM injection

Indications:

- Pre-op sedative
- Induction of anesthesia
- Conscious sedation
- Commonly used for short diagnostic or endoscopic procedures
- May be given IM, PO, or IV
- Pre-op sedation: 0.07-0.08 mg/kg IM 1 hr prior
- Induction of anesthesia: 0.050 - 0.350 mg/kg IV
- Basal sedation: 0.035 mg/kg initially, then titrated slowly to a total dose of 0.1 mg/kg

Adverse Reactions, Precautions, And Interactions :

- Apnea, respiratory depression, post-op respiratory depression
- Contraindicated in patients with known hypersensitivity, and acute narrow angle glaucoma
- Tends to reduce BP and peripheral vascular resistance more than Diazepam

Reversal Agent

- For Benzodiazepine

➢ Flumazenil

- Selective, competitive antagonist of benzodiazepines
- Relatively short duration of action between one and two hours
- Acts through competitive inhibition of GABA (benzodiazepine receptor in the CNS)

Indications: Reversal of benzodiazepine sedation or overdose

Dose and Routes:

- Reversal of conscious sedation 0.2-1.0 mg IV q 20 min @ 0.2 mg/min

- Overdose 1.0 mg IV @ 0.5 mg/min
- Maximum total safe total dose 3mg in an hour

Adverse Reactions, Precautions, And Interactions:

- CNS excitation including seizures, nausea, dizziness, and agitation
- May precipitate acute withdrawal

Intravenous Anesthetics:

Analgesics:

➢ Morphine

- Most common opioid analgesic used in anesthesia
- Both depressive and stimulatory effects
- Binds with opiate receptor sites in the CNS, altering both perception of and emotional response to pain
- Has little CV effect, but produces peripheral dilation
- Blocks the responsiveness to elevation of $PaCO_2$
- Tidal volume remaining unchanged and respiratory rate diminishes
- Stimulates the chemoreceptor trigger zone in the medulla causing nausea and vomiting
- Hyperactive spinal reflexes, seen as truncal rigidity occasionally follow administration
- Frequently causes constipation from decreased peristalsis
- Can also cause Oddi's sphincter and bladder sphincter spasms, leading to biliary colic and urinary retention
- Causes histamine release which can result in bronchial constriction and vasodilatation
- Inactivated in the liver with 90% eliminated by the kidneys and 10% excreted in bile or found in feces

Indications: Used for the relief of moderate to severe pain

Dose and Routes:

- May be given IM, SC or IV
- 1- 3 mg IV prn
- 10 -15 mg IM or SC q4h
- 2 - 20 mcg/kg/hr infusion rate

Adverse Reactions, Precautions, And Interactions:

- Apnea, resp. depression
- Contraindicated in patients with asthma or acute bronchitis
- May have additive effects when combined with other CNS depressants
- Use with caution in pts with head injury, IICP, and seizures
- Orthostatic hypotension, N/V, urinary retention, bradycardia, CNS depression, and pupillary constriction

➢ Nalbuphine

- Synthetic opioid agonist-antogonist that binds with opiate receptor sites in the CNS, altering both perception of and emotional response to pain
- Relative potency of Nalbuphine as compared to Morphine is 0.5 to 0.9
- Inactivated in the liver and eliminated primarily by secretion in the bile with fecal excretion

Indications:

- Relief of moderate to severe pain

- Not a useful component in balanced anesthesia because of its ceiling analgesia action
- May be used as a pre-op sedative-analgesic

Dose and Route:

- There is a ceiling for analgesia that is not increased beyond doses greater than 0.4 mg/kg IV
- 10 mg q 3-6 hr prn SC, IV, IM

Adverse Reactions, Precautions, And Interactions:

- Adverse reactions of Nalbuphine are essentially the same as those of Morphine
- May cause respiratory depression with usual doses, however depression will not increase by larger doses (> 30 mg)

Reversal Agent: For Narcotics

➢ Naloxone

- Narcotic antagonist
- Use in the management and reversal of overdoses caused by narcotics or synthetic narcotics

Indications: For the complete and partial reversal of depression caused by the following drugs,

- **Narcotics**: Morphine, Heroin, Dilaudid, Percodan, Methadone, Demerol, Paregoric, Codeine, and Fentanyl
- **Synthetic Narcotics:** Nubain, Stadol, Talwin, Darvon

Dose and Routes:

- 1-2 MG IV q5min up to 3 times
- Continuos infusion may be started at 400 mcg/hr.

Adverse Reactions, Precautions, And Interactions:

- Contraindicated in patients with known hypersensitivity
- May cause withdrawal type effects in abrupt reversals

➢ Ketamine

- Non-barbiturate, rapid acting general anesthetic
- Dissociated from the environment, immobile, and unresponsive to pain
- Profound analgesic
- Selectively blocks the associative pathways producing sensory blockade
- Preserved pharyngeal-laryngeal reflexes
- Normal or slightly enhanced skeletal muscle tone
- Cardiovascular and respiratory stimulation

Indications:

- Sole agent for procedures that do not require skeletal muscle relaxation
- Induction of anesthesia prior to the administration of other anesthetic agents
- Supplementation of low potency agents

Dose and Routes:

- May be injected IM or IV
- Induction: 1-2 mg/kg Slow IV
- Maintenance: 30-90 mcg/kg/min IV drip
- Intramuscular: 6.5-13 mg/kg IM
- 10 mg/kg IM will produce approximately 12-25 min of surgical plane.

Adverse Reactions, Precautions, and Interactions:

- Contraindicated in patients with known hypersensitivity or can't tolerate a significant increase in blood pressure
- IV dose should be administered over 60 seconds. Rapid administration may cause respiratory depression or apnea
- BP, pulse rate, and respiratory rate are often stimulated
- Concomitant use of barbiturates or narcotics prolong recovery time

➢ Propofol

- Propofol is a diisopropylphenol intravenous hypnotic agent that produces rapid induction of anesthesia with minimal excitatory activity
- It undergoes extensive distribution and rapid elimination by the liver

Indications

- Conscious sedation
- Induction agent of anesthesia
- Maintenance of anesthesia
- Antiemetic

Dose And Routes

Conscious sedation: 25 - 50 mg IV, Titrate slowly to desired effect (on set of slurred speech)
Induction: 2 - 2.5 mg/kg IV, given slowly over 30 seconds in 2 - 3 divided doses
Maintenance: 25 - 50 mg IV bolus, Infusion 100 - 200 mcg/kg/min
Antiemetic: 10 mg IV

Adverse Reactions, Precautions, and Interactions:

- Reduce doses in elderly, hypovolemic, high risk surgical patients and with use of narcotics and sedative hypnotics
- Minimize pain by injecting into a large vein and/or mixing IV lidocaine (0.1 mg/kg) with the induction dose of Propofol
- Not recommended for patient with increased intracranial pressure
- Should be administered with caution to patients with a history of epilepsy or seizures disorder
- Soybean-fat emulsion vehicle of Propofol supports rapid growth of bacteria, and strict aseptic technique must be maintained during handling, Propofol ampule should be discarded after a single use
- Use is contraindicated in patients allergic to eggs or soybean oil

3.f. Various Positions Used during Surgery

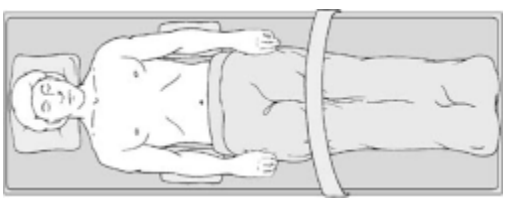
Surgical positioning is the practice of placing a patient in a particular physical position during surgery. The goal in selecting and adjusting a particular surgical position is to maintain the patient's safety while allowing access to the surgical site. Supine is the most commonly used position for surgical procedures. In this position, the patient is face-up with their arm tucked by their sides or extended, secured on arm boards. Variations to supine position may include abducted legs, neck extension or cranial fixation.

➢ Supine:

The ulnar nerve is the most frequently injured nerve in the perioperative period.1 It's theorized that damage occurs secondary to compression of the nerve at the level of the elbow. When in the supine position, supination of the patient's forearm minimizes compression of the nerve against the operating table. Furthermore, ensuring that the elbow is adequately padded with either foam or commercially prepared elbow pads also helps insulate the ulnar nerve.

The patient's arms in the supine position, or any surgical position, should never be abducted greater than 90 degrees. Extending the arms further than this can stretch and injure the brachial plexus. The brachial plexus is second only to the ulnar nerve in frequency of perioperative nerve injuries and is also vulnerable to injury from other maneuvers. Allowing the arms to extend dorsally, or fall below the rest of the body, especially in conjunction with turning the patient's head, can damage the plexus. The patient's shoulders should remain parallel with the table and the arms should be secured to prevent them from falling off the table during the procedure.

The patient's lower extremities are also of concern in the supine position. The patient shouldn't have his legs crossed because this may cause pressure on the sural nerve of the upper leg and the peroneal nerve of the lower leg. His knees and hips should be slightly flexed to reduce stress on the back and abdomen. Allowing the patient to place himself in a comfortable position prior to anesthesia may prevent postoperative discomfort.



➢ Lithotomy:

There are many concerns to address when placing a patient in the lithotomy position. The patient can be injured while being placed in and out of the position, as well as while in the position.

When placing the patient in the lithotomy position, both legs should be moved in unison to avoid overstretching the nerves of the lumbosacral plexus. Once the calves are in the stirrups, the thighs shouldn't be flexed more than 90 degrees. The legs should be padded so that they don't touch the poles of the stirrups directly. Compression along the medial calf can damage the saphenous nerve, which will result in weakness below the knee postoperatively. If the legs are placed inside the stirrup poles, compression of the lateral aspect of the calf will damage the peroneal nerve.

Although uncommon, a patient's hand may suffer a crush injury if caught between moving parts of the OR table. This can happen when returning the foot of the OR table to the horizontal position at the end of the surgical case. Always ensure that the patient's hands and fingers are clear of all moving parts when returning the table to its original position.

Compartment syndrome has been reported in conjunction with the lithotomy position. Extreme knee flexion, or leg holders that lie underneath the calf, can decrease arterial flow and venous return. Suspension leg holders are preferable to those that cradle the calf because the latter can transmit pressure to the muscle and fascia. Compartment syndrome is associated with prolonged surgical duration in the lithotomy position.

➢ Lateral decubitus:

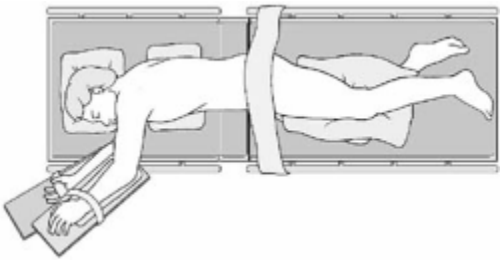
The lateral decubitus position can be used for thora-cic and renal surgery, as well as some orthopedic procedures such as shoulder surgery. For the purposes of this discussion, the side of the patient that lies on the OR table will be referred to as 'dependent'. The side of the patient not touching the OR table will be referred to as 'nondependent'.

Maintaining body alignment is crucial to proper positioning. The spine, head, and neck should all be in the neutral position. Blankets may be necessary to support the head. When the head is in its final position, make sure the dependent ear isn't bent or kinked.

The axillary vessels and brachial plexus of the dependent shoulder can be compressed. A roll should be placed beneath the ribs just below the axilla to relieve pressure on the brachial plexus and axillary vessels. Although often called an axillary roll, the roll shouldn't be placed in the axilla.

The upper arm should be placed on a padded stand, neutral in relation to the shoulder and 90 degrees from the body. Both arms should be secured so that they don't move during the surgery. The upper arm should never be abducted higher than the shoulder or placed so that it extends above the head.

Once rolled laterally, the dependent leg should be flexed at the knee. This will provide a stable base for the patient. Blankets, pillows, or some other padding should be placed between the knees to prevent pressure on the peroneal nerve. The nondependent leg should be further supported to prevent excessive adduction of the leg and to decrease the weight of the superior leg against the dependent leg.



The patient is secured in the position using a variety of methods, such as pillows, braces, or "bean bag" devices. When securing the patient to the table, the belt must be placed over the patient's iliac crest. If it's placed across the hip, avascular necrosis of the superior femoral head may occur. Also, placement of a strap or belt across the thorax can prevent optimal chest expansion.

➢ Prone:

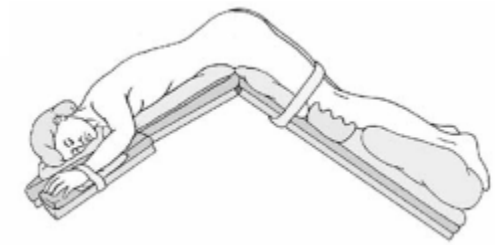
The prone position and its variations-the jackknife and sitting-prone positions-are used mainly for spinal procedures and certain types of intracranial procedures. Regardless of the type of prone position used, certain principles remain constant.

The patient should be turned with the help of the entire OR team (at least four team members) in unison. Make sure the head is in-line with the rest of the body as the patient is being turned. Once the patient is prone, excessive rotation of the head and neck should be avoided. Ideally, the head should be maintained in the midline position. The neck should be in neutral alignment with the spine and head. Eyes should be free and clear of any pressure; compression of the eyes can cause a corneal abrasion. Also, pressure on the eyes is a possible etiology of postoperative blindness, a rare but devastating complication.

The arms can be placed either at the patient's sides or supported along the head. If the arms are tucked at the sides, they should be pronated and have adequate padding at the elbows.

When not at the sides, the arms should be placed slightly lower than the shoulders. Keeping the arms abducted less than 90 degrees at the shoulders will help protect the brachial plexus. The elbows are bent so that the hands lie at the side of the head. Adequate padding of the elbows protects the ulnar nerve. The arms should be supported to prevent them from hanging too far below the patient's body. The upper portion of the arm should be free of pressure from the operating table and any positioning devices.

While in the prone position, the mattress can press against the abdomen, impeding both ventilation and venous return. Rolls or bolsters free the abdomen and relieve the increase in intraabdominal pressure. The rolls should extend from the iliac crest to the clavicle on both sides of the patient. After the rolls are placed, they shouldn't exert pressure on the upper arms.



Flexion of the knees reduces lumbosacral stretch and may prevent postoperative discomfort. The knees and ankles should be padded. In male patients, ensure that the testicles aren't compressed under the patient's body. In female patients, check to make sure pendulous breast tissue is not compressed or twisted under the body.

Once positioned for surgery, it's helpful to step back and visually inspect the patient before draping. This is the last chance to correct any mistakes made while placing the patient in the operative position. This is useful for any surgical position, not just when the prone position is employed.

➢ Dorsosacral position / Lithotomy position:

Ideal positioning for gynecology and urology surgery requires that the pelvis is positioned to prevent a hollow back (lordosis) and to provide the largest possible supporting surface of the calf in the knee crutch. The popliteal fossa and heels should be freely positioned. The foot and knee should be positioned in line with the opposite shoulder.

➢ Genucubital position / Knee elbow position:

For gynecological or rectal surgery, patients are anesthetized in supine position, and then repositioned into a Trendelenburg position for surgery to prevent sliding. Positioning aids play an important role in this position. The thorax must be placed on a pad with a large opening to reduce intra-abdominal pressure and aid breathing. Protect the patella with a gel pad, and use additional padding at the hip.

➢ Beach chair position:

The legs and knees should be relaxed and not overstretched. Raise the front and back stepwise, alternating between the two to reduce shear and friction forces. Once the patient has been placed into the sitting position, again assess the patient's position to eliminate any forces that might have arisen during the positioning process.

➢ Maximize access and minimize risk in general surgery:

Surgical teams should always choose a position that maximizes surgical site access while minimizing the risk of complications. The positioning guide provides illustrative examples of what have been found to be the most suitable and effective positions.

➢ Effective positioning for gynecological and urological surgery:

The proper table position and complementary accessories improve access for gynecological and urological positions. Download our guide to effective positioning that optimizes access while minimizing patient strain.

➢ Secure patient positioning in ophthalmology, ENT, oral and facial surgery:

Optimize access to the patient's head while minimizing the risk of complications. Our patient positioning guide provides illustrative examples of the most suitable positions for ophthalmology, ENT, oral, and facial surgeries.

➢ Stable positioning in neurosurgery:

Neurosurgery requires precise positioning for unobscured access. The positioning guide illustrates the most suitable and stable positions for neurosurgery.

➢ Clear site access for orthopedics and traumatological surgery:

Orthopedic and trauma surgeries need a broad, unobstructed view of the surgical site. Our patient positioning guide provides illustrative examples best practices in orthopedic patient positioning.

A team effort: The surgical patient is under the effects of anesthesia and unable to protect himself from injury due to poor positioning. It's the responsibility of every member of the OR team to pay strict attention to the proper positioning of the patient. By adhering to sound principles of positioning, the OR nurse can spare the patient unnecessary pain and complications in the postoperative period.

4. Post-Operative Nursing:

Post-operative Complications: Assessment, Management and Nursing Responsibilities

Introduction: The post-operative period begins immediately after surgery and continues till the patient is discharged from the medical care. Postoperative care is provided by peri-operative nurses. They are often experienced in a specialized area of surgery that requires specific care for the intervention performed.

Purposes

– To enable a successful and faster recovery of the patient post operatively
– To reduce post-operative mortality rate
– To reduce the length of hospital, stay of the patient
– To provide quality care service
– To reduce hospital and patient cost during post-operative period

Post-Operative Care Unit or Post Anesthetic Care Unit [PACU]

– Patients still under anesthesia or recovering from anesthesia are placed in the unit for observation by highly skilled nurses, anesthetist and surgeon.
– PACU should be sound proof, painted in soft color, isolated and these features will help the patient to reduce anxiety and promote comfort.

Goals:

During the postoperative period, reestablishing the patient's physiologic balance, pain management and prevention of complications should be the focus of the nursing care. To do these it is crucial that the nurse perform careful assessment and immediate intervention in assisting the patient to optimal function quickly, safely and comfortably as possible.

1. Maintaining adequate body system functions.
2. Restoring body homeostasis.
3. Pain and discomfort alleviation.
4. Preventing postoperative complications.
5. Promoting adequate discharge planning and health teaching.

The mnemonic "POSTOPERATIVE" may also be helpful:

- P – Preventing and/or relieving complications
- O – Optimal respiratory function
- S – Support: psychosocial well-being
- T – Tissue perfusion and cardiovascular status maintenance
- O – Observing and maintaining adequate fluid intake

- P – Promoting adequate nutrition and elimination
- A – Adequate fluid and electrolyte balance
- R – Renal function maintenance
- E – Encouraging activity and mobility within limits
- T – Thorough wound care for adequate wound healing
- I – Infection Control
- V – Vigilant to manifestations of anxiety and promoting ways of relieving it
- E – Eliminating environmental hazards and promoting client safety

Phases of Post-Operative Unit:

Two phases: Phase I and Phase II
Phase- I
– It is the immediate recovery phase and requires intensive nursing care to detect early signs of complication.
– A complete patient record from the operating room is received to plan post operative care.
– It is designated for care of surgical patient immediately after surgery and patient requiring close monitoring

Phase- II
– Care of the surgical patient who has been transferred from the Phase I post op unit.
– Patient requiring less observation and less nursing care than Phase I
– This phase is also known as Step down or progressive care unit.

Patient Assessment:

Special consideration to the patient's incision site, vascular status and exposure should be implemented by the nurse when transferring the patient from the operating room to the post-anethesia care unit (PACU) or post-anesthesia recovery room (PARR). Every time the patient is moved, the nurse should first consider the location of the surgical incision to prevent further strain on the sutures. If the patient comes out of the operating room with drainage tubes, position should be adjusted in order to prevent obstruction on the drains.

1. Assess air exchange status and note patient's skin color
2. Verify patient identity. The nurse must also know the type of operative procedure performed and the name of the surgeon responsible for the operation.
3. Neurologic status assessment. Level of consciousness (LOC) assessment and Glasgow Coma Scale (GCS) are helpful in determining the neurologic status of the patient.
4. Cardiovascular status assessment. This is done by determining the patient's vital signs in the immediate postoperative period and skin temperature.
5. Operative site examination. Dressings should be checked.

Nursing Responsibilities
– Handover of patient from PACU
– Transfer of patient to the bed

- Assessment of patient (Vitals, Level of Consciousness, Airway, Surgical site)
- Recording/Reporting
- Administering post-op medications
- Intake/Output records
- Positioning
- Maintaining body temperature
- Patient teaching

Nursing Management in Post-Up Unit:

Assessing the patient:

- Monitor vitals-pulse volume and regularity, depth and nature of respiration.
- Assessment of patient's O2 saturation
- Skin color
- Keep Monitoring Vitals
- Check the level of consciousness, Ability to respond to commands.
- Maintain Intake and Output

Protect airway:

- By proper positioning of patient's head
- By clearing airway
- Oxygen therapy

Pharyngeal obstruction can occur when the patient lies on the back as there are chances for tongue to fall back.

Maintaining IV Stability:

- Hypovolemic shock: can be avoided by timely administration of IV Fluids, blood and blood products and medication.
- Replacement of fluids
- Keeping the patient warm
- Monitoring intake and output balance
- Monitoring the vitals continuously with the patient condition

Breathing:

- **B:** Bilateral lung auscultation frequently.
- **R:** Rest and place the patient in a lateral position with the neck extended, if not contraindicated, and the arm supported with a pillow. This position promotes chest expansion and facilitates breathing and ventilation.
- **E:** Encourage the patient to take deep breaths. This aerates the lung fully and prevents hypostatic pneumonia.
- **A:** Assess and periodically evaluate the patient's orientation to name or command. Cerebral function alteration is highly suggestive of impaired oxygen delivery.
- T: Turn the patient every 1 to 2 hours to facilitate breathing and ventilation.
- H: Humidified oxygen administration. During exhalation, heat and moisture are normally lost, thus oxygen humidification is necessary. Aside from that, secretion removal is facilitated when kept moist through the moisture of the inhaled air. Also, dehydrated

patients have irritated respiratory passages thus, it is very important make sure that the inhaled oxygen is humidified.

Positioning the patient:
The semi-conscious patient should be positioned, unless contraindicated by their surgery, in a lateral or semi-prone position without a pillow under their head. In this position the head is hyperextended, which allows the free entry of air into and out of the lungs. Shock Position: Keep the patient in shock position, flat on back, legs elevated at 20 degree and knee straight.

Assessment of the surgical site:
Hemorrhage:
- It is a serious complication of surgery that resulting death.
- It can occur in immediate post operatively or up to several days after surgery.
- If left untreated, cardiac output decreases and blood pressure and Hb level will fall rapidly.

Keep The Patient Warm:
- Use warmer (Bair Hugger) blankets
- Use warm lights

Hypothermia:
- When the core body temperature is less than 96.8^{0F} (36^{0C})
- It occurs when heat loss exceeds heat production
- May be result of heat loss from warm body to cold OR or loss of heat from exposed body organ to the air

Relieving pain and Anxiety:
- Administer opioid analgesia as prescribed.
- Epidural analgesia
- NSAIDS
- Psychological support to relieve fear and to give support

Controlling Nausea Vomiting:
- Medication can be administered as per doctor's order, e.g.: Inj. Metaclopramide, Inj Ondansetron (Emeset)

Teaching, Patient Self Care
- Immediate post-op changes
- Written instructions like
- Wound care
- Activity and dietary recommendation
- Medications
- Follow up

Common Nursing Diagnoses:
- Acute pain related to surgical incision and reflex muscle spasm as manifested by complains of pain, tense and guarded body posture, irritability and tachycardia.

- Nausea related to GI distension and medication effects as manifested by complains of nausea, refuse to take fluids, observed or reported vomiting.
- Ineffective airway clearance related to inability to clear tenacious secretions as manifested by abnormal breath sounds, shallow respiration, non-productive cough and low O2 saturation.
- Hemorrhage related to ineffective vascular closure or alterations in coagulation.
- Risk for infection related to surgical incision, inadequate nutrition and fluid intake, presence of environmental pathogens, invasive catheters and immobility.
- Urinary retention related to horizontal positioning, pain, fear, anesthetic medications and surgical procedure.

Nursing Competencies:

- Quick/Active
- Responsible
- Knowledgeable
- Good Communicator
- Far sightedness
- Patience
- Punctual

Postoperative Nursing Care:

Airway:

- Keep airway in place until the patient is fully awake and tries to eject it. The airway is allowed to remain in place while the client is unconscious to keep the passage open and prevents the tongue from falling back. When the tongue falls back, airway passage obstruction will result. Return of pharyngeal reflex, noted when the patient regains consciousness, may cause the patient to gag and vomit when the airway is not removed when the patient is awake.
- Suction secretions as needed.

Breathing:

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- H – Humidified oxygen administration. During exhalation, heat and moisture are normally lost, thus oxygen humidification is necessary. Aside from that, secretion removal is facilitated when kept moist through the moisture of the inhaled air. Also, dehydrated patients have irritated respiratory passages thus, it is very important make sure that the inhaled oxygen is humidified.

Circulation:

- Obtain patient's vital signs as ordered and report any abnormalities.
- Monitor intake and output closely.
- Recognize early symptoms of shock or hemorrhage such as cold extremities, decreased urine output – less than 30 ml/hr, slow capillary refill – greater than 3 seconds, dropping blood pressure, narrowing pulse pressure, tachycardia – increased heart rate.

Thermoregulation:

- Hourly temperature assessment to detect hypothermia or hyperthermia.
- Report temperature abnormalities to the physician.
- Monitor the patient for postanethesia shivering or PAS. This is noted in hypothermic patients, about 30 to 45 minutes after admission to the PACU. PAS represents a heat-gain mechanism and relates to regaining the thermal balance.
- Provide a therapeutic environment with proper temperature and humidity. Warm blankets should be provided when the patient is cold.

Fluid Volume:

- Assess and evaluate patient's skin color and turgor, mental status and body temperature.
- Monitor and recognize evidence of fluid and electrolyte imbalances such as nausea and vomiting and body weakness.
- Monitor intake and output closely.
- Recognize signs of fluid imbalances. HYPOVOLEMIA: decreased blood pressure, decreased urine output, increased pulse rate, increased respiration rate, and decreased central venous pressure (CVP). HYPERVOLEMIA: increased blood pressure and CVP, changes in lung sounds such as presence of crackles in the base of both lungs and changes in heart sounds such as the presence of S3 gallop.

Safety:

- Avoid nerve damage and muscle strain by properly supporting and padding pressure areas.
- Frequent dressing examination for possible constriction.
- Raise the side rails to prevent the patient from falling.
- Protect the extremity where IV fluids are inserted to prevent possible needle dislodge.
- Make sure that bed wheels are locked.

GI Function and Nutrition:

- If in place, maintain nasogastric tube and monitor patency and drainage.
- Provide symptomatic therapy, including antiemetic medications for nausea and vomiting.
- Administer phenothiazine medications as prescribed for severe, persistent hiccups.
- Assist patient to return to normal dietary intake gradually at a pace set by patient (liquids first, then soft foods, such as gelatin, junket, custard, milk, and creamed soups, are added gradually, then solid food).
- Remember that paralytic ileus and intestinal obstruction are potential postoperative complications that occur more fre-quently in patients undergoing intestinal or abdominal surgery.
- Arrange for patient to consult with the dietitian to plan appealing, high-protein meals that provide sufficient fiber, calories, and vitamins. Nutritional supplements, such as Ensure or Sustacal, may be recommended.
- Instruct patient to take multivitamins, iron, and vitamin C supplements postoperatively if prescribed

Comfort:

- Observe and assess behavioral and physiologic manifestations of pain.
- Administer medications for pain and document its efficacy.
- Assist the patient to a comfortable position.

Drainage:

- Presence of drainage, need to connect tubes to a specific drainage system, presence and condition of dressings

Skin Integrity:

- Record the amount and type of wound drainage.
- Regularly inspect dressings and reinforce them if necessary.
- Proper wound care as needed.

- Perform hand washing before and after contact with the patient.
- Turn the patient to sides every 1 to 2 hours.
- Maintain the patient's good body alignment.

Assessing and Managing Voluntary Voiding:

- Assess for bladder distention and urge to void on patient's arrival in the unit and frequently thereafter (patient should void within 8 hours of surgery).
- Obtain order for catheterization before the end of the 8-hour time limit if patient has an urge to void and cannot, or if the bladder is distended and no urge is felt or patient cannot void.
- Initiate methods to encourage the patient to void (eg, letting water run, applying heat to perineum).
- Warm the bedpan to reduce discomfort and automatic tightening of muscles and urethral sphincter.
- Assist patient who complains of not being able to use the bedpan to use a commode or stand or sit to void (males), unless contraindicated.
- Take safeguards to prevent the patient from falling or fainting due to loss of coordination from medications or orthostatic hypotension.
- Note the amount of urine voided (report less than 30 mL/h) and palpate the suprapubic area for distention or tenderness, or use a portable ultrasound device to assess residual volume.
- Continue intermittent catheterization every 4 to 6 hours until patient can void spontaneously and postvoid residual is less than 100 mL.

Encouraging Activity:

- Encourage most surgical patients to ambulate as soon as possible.
- Remind patient of the importance of early mobility in preventing complications (helps overcome fears).
- Anticipate and avoid orthostatic hypotension (postural hypotension: 20-mm Hg fall in systolic blood pressure or 10-mm Hg fall in diastolic blood pressure, weakness, dizziness, and fainting)
- Assess patient's feelings of dizziness and his or her blood pressure first in the supine position, after patient sits up, again after patient stands, and 2 to 3 minutes later.
- Assist patient to change position gradually. If patient becomes dizzy, return to supine position and delay getting out of bed for several hours.
- When patient gets out of bed, remain at patient's side to give physical support and encouragement.

- Take care not to tire patient.
- Initiate and encourage patient to perform bed exercises to improve circulation (range of motion to arms, hands and fin-gers, feet, and legs; leg flexion and leg lifting; abdominal and gluteal contraction).
- Encourage frequent position changes early in the postoperative period to stimulate circulation. Avoid positions that compromise venous return (raising the knee gatch or placing a pillow under the knees, sitting for long periods, and dangling the legs with pressure at the back of the knees).
- Apply antiembolism stockings, and assist patient in early ambulation. Check postoperative activity orders before get-ting patient out of bed. Then have patient sit on the edge of bed for a few minutes initially; advance to ambulation as tolerated

Gerontologic Considerations:

Elderly patients continue to be at increased risk for postoperative complications. Age-related physiologic changes in respiratory, cardiovascular, and renal function and the increased incidence of comorbid conditions demand skilled assessment to detect early signs of deterioration. Anesthetics and opioids can cause confusion in the older adult, and altered pharmacokinetics results in delayed excretion and prolonged respiratory depressive effects. Careful monitoring of electrolyte, hemoglobin, and hematocrit levels and urine output is essential because the older adult is less able to correct and compensate for fluid and electrolyte imbalances. Elderly patients may need frequent reminders and demonstrations to participate in care effectively.

- Maintain physical activity while patient is confused. Physical deterioration can worsen delirium and place patient at increased risk for other complications.
- Avoid restraints, because they can also worsen confusion. If possible, family or staff member is asked to sit with patient instead.
- Administer haloperidol (Haldol) or lorazepam (Ativan) as ordered during episodes of acute confusion; discontinue these medications as soon as possible to avoid side effects.
- Assist the older postoperative patient in early and progressive ambulation to prevent the development of problems such as pneumonia, altered bowel function, DVT, weakness, and functional decline; avoid sitting positions that promote venous stasis in the lower extremities.
- Provide assistance to keep patient from bumping into objects and falling. A physical therapy referral may be indicated to promote safe, regular exercise for the older adult.
- Provide easy access to call bell and commode; prompt void-ing to prevent urinary incontinence.

- Provide extensive discharge planning to coordinate both professional and family care providers; the nurse, social worker, or nurse case manager may institute the plan for continuing care.

Evaluation:

Patients in PACU are evaluated to determine the client's discharge from the unit. The following are the expected outcomes in PACU:

1. Patient breathing easily.
2. Clear lung sounds on auscultation.
3. Stable vital signs.
4. Stable body temperature with minimal chills or shivering.
5. No signs of fluid volume imbalance as evidenced by an equal intake and output.
6. Tolerable or minimized pain, as reported by the patient.
7. Intact wound edges without drainage.
8. Raised side rails.
9. Appropriate patient position.
10. Maintained quiet and therapeutic environment.

To Surgical Unit:

Patient Care during Immediate Postoperative Phase: Transferring the Patient from RR to the Surgical Unit. To determine the patient's readiness for discharge from the PACU or RR certain criteria must be met. The parameters used for discharge from RR are the following:

1. Uncompromised cardiopulmonary status
2. Stable vital signs
3. Adequate urine output – at least 30 ml/ hour
4. Orientation to time, date and place
5. Satisfactory response to commands
6. Minimal pain
7. Absence or controlled nausea and vomiting
8. Pulse oximetry readings of adequate oxygen saturation
9. Satisfactory response to commands
10. Movement of extremities after regional anesthesia

Most hospitals use a scoring system to assess the general condition of patient in RR or PACU. Observation and evaluation of the patient's physical signs is based on a set of objective criteria. The evaluation guide used is a modification of the APGAR scoring system used for newborns. Through this, a more objective assessment of the patient's physical condition is guaranteed while

recovering the RR or PACU. The perfect possible score in this modified APGAR scoring system is 10. To be discharge from RR or PACU the patient is required to have at least 7 to 8 points. Patients with score less than 7 must remain in RR or PACU until their condition improves.

Areas of assessment in PACU or RR evaluation guide are:

1. Respiration – ability to breathe deeply and cough.
2. Circulation – systolic arterial pressure >80% of pre-anesthetic level
3. Consciousness Level – verbally responds to questions or oriented to location
4. Color – normal skin color and appearance: pinkish skin and mucus
5. Muscle activity – moves spontaneously or on command

5. OT Techniques:

5.a. Scrubbing, Gowning, Gloving, Sterilization, Antiseptic and Disinfectant in OT

Scrub, **gown, and glove procedures** are performed to eliminate some of the controllable sources of contamination in the performance of aseptic procedures. The operating room specialist assigned to scrub for an operation should adhere absolutely to the exacting techniques. The surgical scrub is an important procedure required to reduce the risk of contamination by microorganisms during operative procedures. The surgical scrub involves first decontaminating the hands, then donning a sterile surgical gown and pair of sterile gloves. This guide will take you through the important considerations when **scrubbing for theatre**, in particular:

1. Preparing to scrub
2. Surgical hand wash
3. Gloving and gowning

Preparing to scrub:
You should be dressed appropriately to enter the operating theatre. Although this may vary from hospital to hospital, generally you must wear:

- Surgical scrubs (bare below the elbows, including removing watches and rings)
- Footwear such as clogs
- Theatre hat (with hair tied up if necessary)
- ID badge

Ensure you ask the **Lead Surgeon** whether or not they would mind you scrub in, and then make your way to the scrub area. You must **open your gown** and **gloves before you scrub**, so as not to contaminate your hands:

- First, **open the gown**. Carefully use the **edges** of the paper to **open the packet** and expose the surgical gown.
- Next, **choose your gloves**. Peel the plastic glove packet open **over the gown** and **drop the gloves** onto the sterile gown **without touching them**.
- This will ensure your gloves and gown are untouched, and therefore sterile.
- Finally, put on a **surgical mask** and **eyewear protection**. Make sure you are comfortable, as you cannot adjust these once you are scrubbed.

Surgical scrub:

Pre-scrub wash:

1. Run the tap to an adequate temperature and flow (to avoid water splashing).
Then **test the water** before starting to scrub to ensure the temperature is comfortable.
2. Open the package containing the **nail brush**/**scrub sponge** and **nail pick**, then lie it on the back of the scrub sink still in the opened package.
3. Wet the hands and arms for an initial pre-scrub wash. Use several drops of **scrub solution** and work up a **heavy lather**, then **wash the hands** and **arms** to the **elbows**.
Cleansing solutions are non-irritating to most people and include:

- Povidone Iodine
- Chlorhexidine
- Some hospitals use dispensable alcohol gel, which can be used between short, 'clean' procedures. Check with the operating surgeon if they are happy for you to use this.

4. Rinse the hands and arms thoroughly, allowing the water to run from the hands to the elbows.
5. Remove the **sterile nail brush** and **nail pick** from the opened package. **Clean under the nails** with the **nail pick** and then discard in the bin (making sure not to touch the bin by using a foot-pedal).
6. Moisten the nail brush and dispense **antimicrobial solution** onto the **sponge-side**.
7. Lather the fingertips with sponge-side of brush, washing **all four sides of the fingers**.
8. Then using the **bristle** side of the **nail brush**, scrub the spaces under the **fingernails** of the right or left hand. Repeat the process on the other hand.

Scrubbing procedure:

During each of the following steps keep hands (clean area) above the elbows (dirty area) allowing water to drain away, making sure to avoid splashing surgical attire. Each step of surgical 'scrubbing' consists of five strokes rubbing backwards and forwards.

Step 1: Wet the hands and **forearms**.
Apply the specified amount of appropriate **antimicrobial solution**, according to the manufacturer's recommendations, from the dispenser (one downward stroke action).
Work the cleaning solution into the hands **palm to palm**, creating a **lather**.
Rinse hands and forearms

Step 2: Rub the right palm over the **back of** the **left** and vice versa with the **fingers interlaced**.
Rub the right palm over the back of the left and vice versa with the fingers interlaced

Step 3: Rub hands **palm to palm**, with **fingers interlaced**.
Rub hands palm to palm, with fingers interlaced.

Step 4: Perform **rotational rubbing** backwards and forwards with **clasped fingers** of the right hand into the left palm hand and vice versa.
Perform rotational rubbing backwards and forwards with clasped fingers of the right hand into the left palm hand and vice versa.

Step 5: Perform **rotational rubbing** of the right **thumb** clasped in the left hand and vice versa.
Perform rotational rubbing of the right thumb clasped in the left hand and vice versa.

Step 6: Rub the **fingertips** of the left hand on the **palm** of the right hand and vice versa.
Rub the fingertips of the left hand on the palm of the right hand and vice versa.

Step 7: Continue with the **rotating action** down **opposing arms**, working to just **below the elbows**.
Continue with the rotating action down opposing arms, working to just below the elbows.

Step 8: Rinse and **repeat steps 1-7** keeping hands raised above elbows at all times.
The **second wash** should only cover **two-thirds** of the **forearms** to avoid compromising the cleanliness of the hands.
Local policy may include repeating these steps a **third time** but to **wrists only**.
The scrub procedure should last for **5 minutes**, with further scrubs during the day lasting **3 minutes**.
Step 9: Rinse the **hands** under running water, allowing the water to run from **fingertips to elbows**. **Turn the tap off** (if necessary) with your **elbow** and keep your **hands up**, allowing water to **drip from your elbows**. Rinse hands and forearms

Step 10: Pick up **one hand towel** from the top of the gown pack and **step back** from the surface.
Grasp the **towel** and **open it** fully. Do not allow the towel to touch any unsterile object or unsterile parts of your body.
Hold your **hands** and arms **above** your **elbow**, and keep your arms **away** from your **body**.

Step 11: Holding one end of the towel with one hand **dry the fingers** of the opposite hand using a **blotting rotational motion**.

Move to the **dry area** of the towel and continue in this manner **down the forearm** to the **elbow**.
Ensure you **do not retrace** from the forearm back up to the hands and **do not wipe** the skin dry. This may **contaminate** your hands with micro-organisms from your proximal forearm – you will be asked to re-scrub.

Repeat with the **other towel** from the pack for the **other hand** and **arm**.
Dry each arm, starting at the fingertips, working towards the elbow.
If you accidentally touch the tap or any surrounding objects, **you must re-scrub**.

Gowning

Picking up the gown:
1. With one hand, pick up the entire folded gown from the wrapper by grasping the gown through all layers, being careful to touch only the inside top layer which is exposed.
2. Once your hands are securely pinching the gown in these slots, step back from the shelf and allow the gown to drop.
3. Make sure the gown does not touch any surrounding unsterile objects.

Inserting your arms into the sleeves of the gown:

4. Grasp the inside shoulder seams and open the gown with the armholes facing you.
5. Carefully insert your arms partway into the gown one at a time, keeping hands at shoulder level away from the body.
6. Slide the arms further into the gown sleeves and when the fingertips are level with the proximal edge of the cuff, grasp the inside seam at the cuff hem using thumb and index finger. Be careful that no part of the hand protrudes from the sleeve cuff.

Fastening the gown:

7. A theatre assistant will fasten the gown behind you, positioning it over the shoulders by grasping the inside surface of the gown at the shoulder seam. The theatre assistant's hands should only ever be in contact with the inside surface of the gown.
8. The theatre assistant then prepares to secure the gown at the neck and upper back. Gowns differ in how they are secured, but most with have either ties, buttons or velcro tabs.

An assistant should fasten the gown behind you

Gloving

Step 1

Open the inner glove packet that you previously dropped onto your sterile field.

Open the inner glove packet

Step 2

Pick up one glove by the folded cuff edge with your sleeve-covered hand.

Pick up one glove by the folded cuff edge

Step 3

Place the glove on the opposite gown sleeve facing palm down, with the glove fingers pointing towards you. The palm of the hand inside the gown sleeve must be facing upward toward the palm of the glove.

Place the glove's rolled cuff edge at the seam that connects the sleeve to the gown cuff. Grasp the bottom rolled cuff edge of the glove with the thumb and index finger of the hand the glove is on top of.

Place the glove on the opposite gown sleeve facing palm down, with the glove fingers pointing towards you.

Step 4

While holding the glove's cuff edge with one hand, grasp the uppermost edge of the glove's cuff with the opposite hand.

Grasp the uppermost edge of the glove's cuff with the opposite hand.

Step 5

Continuing to grasp the glove, stretch the cuff of the glove over the hand.

Using the opposite sleeve covered hand, grasp both the glove cuff and sleeve cuff seam and pull the glove onto the hand. Pull any excessive amount of glove sleeve from underneath the cuff of the glove.

Pull the glove over the hand.

Step 6

Using the hand that is now gloved put on the second glove in the same manner. Check to make sure that each gown cuff is secured and covered completely by the cuff of the glove.

Pick up the glove, place it on the sleeve, fingers pointing towards you, Pull the gloves over the hand

Step 7

Adjust the fingers of each glove as necessary so that they fit appropriately.
Adjust the gloves to ensure they fit well.

Key points:

- **Keep your hands in your sleeves** so that you do not touch the glove on the outside of the gown with your bare hands.
- **Keep your hands above your waist** and in front of you
- Ensure you **do not touch anything around you that is not sterile** – this includes your **face**, **mask**, and **hat**!

Basic care of Operation Theatres:

Reduction of Microbial counts is important. Very rarely the Microbes reach the operation site, Paying great attention to Floors Using unnecessary, too many chemical not necessary Keep the floor Clean and Dry - Bacteria are reduced, Most Important component of Bacteria is water a dry areas cause's natural death except spores

Frequent cleaning of Walls and Roof of Operation Theatre is not needed:

Frequent cleaning of Walls and Roof of Operation Theatre is not needed Frequent cleaning has little effect. Do not disturb these areas unnecessarily, Floors get contaminated quickly, depend on Number of persons present in the Theatre / Movements they make, has direct relation to increase of bacterial counts

Procedure of Fumigation:

Procedure of Fumigation Thoroughly clean windows, doors, floor, walls and all washable equipments with soap and water. Close windows and ventilators tightly. If any openings found seal it with cellophane tape or other material. Switch off all lights, A/C and other electrical & electronic items Calculate the room size in cubic feet (L×B×H) and calculate the required amount of formaldehyde as given in

Personal care during fumigation:

Personal care during fumigation Adequate care must be taken by wearing cap, mask, foot cover, spectacle, Formaldehyde is irritant to eye & nose; and it has been recognized as a potential carcinogen. So the fumigating employee must be provided with the personal protective equipments.

Creating the Formaldehyde gas:

Creating the Formaldehyde gas Electric Boiler Fumigation Method: For Each 1000 cu.ft of the volume of the operation theatre 500ml of formaldehyde (40% solution) added in 1000ml of water in an electric boiler. Switch on the boiler, leave the room and seal the door. After 45 minutes (variable depending to volume present in the boils apparatus) switch off the boiler without entering in to the room.

Methods on Fumigation:

Methods on Fumigation In principle we have to generate Formaldehyde gas. Can be done by Most easier way to mix the needed quantity of Formalin to water and heating at lower temperatures at 800c – 900c Can done also with addition of Formalin to potassium permanganate

Adding Potassium Permanganate to formaldehyde:

Potassium Permanganate Method: For every 1000 cubic feet add 450gm of Potassium permanganate (KMnO4) to 500 ml of formaldehyde (40% solution). Take about 5 to 8 bowels (heat resistant; place it in various locations) with equally divided parts of formaldehyde and add equally divided KMnO4 to each bowel. This will cause auto boiling and generate fume. After the initiation of formaldehyde vapor, immediately leave the room and seal it for at least 48 hours.

Fumigation to be neutralized:

Fumigation to be neutralized Neutralize Residual formalin gas with Ammonia by exposing 250 ml of Ammonia per liter of Formaldehyde used. Place the ammonia solution in the centre of the room and leave it for 3 hours to neutralize the formalin vapor

Guidelines to be considered constructing safe operation theatres:

Guidelines to be considered constructing safe operation theatres Construction, carpentry, plumbing, electrical, cleaning and other works should be completed before the initiation of fumigation procedure. If exhaust fan is used (instead of A/C) its exterior level fins should be closed. Rooms allotted for operation (as shown in the plan) should not be used for other purposes. The Construction must have Separate dressing room for medical officer and staff nurses Patient waiting room Operation room Veranda

Care of the self and surroundings:

Care of the self and surroundings Theatre dress (includes head cap, mask, apron, chapel, should be made available for all persons who are entering into the operation theatre (surgeons, anaesthetist, microbiologist team, nurses, theatre assistants& helper). Surroundings should be clean and free from garbage, open drainage, bushes, shrubs, wastes, donot keep any material which are necessary for operation theatre procedures Operation theatre should be cleaned and

fumigated as the prevailing conditions of working and work load, Depends on septic cases handled in the theatre

Which hand wash solution is best? :

Which hand wash solution is best? 1 Alcohol with Chlorhexidine. 2. Alchool without Chlorhexidine. 3 Chlorhexidine 2 % 4 Chlorhexidine 4 % 5 Povidone with Iodine 7.5 % 6 Triclosan 1 % or Anything NEW

Sterilization and Disinfection policies:

Create your own Infection control team which suits your Hospital, Infection control team decides the policies. Educate the staff on Methods and policies in Hospital safety and Hygiene Educate the staff on few useful option, many theoretical ideas confuse. To many Chemicals – Costly need not be effective.

5.b. Suture Needles Drains, Catheters and Instruments

Suture:

Introduction: Suture is simply any strand of material used for ligating or maintains approximation of body tissues until healing has occurred. It is a medical device used to hold body tissues together after an injury or surgery. Application generally involves using a needle with an attached length of thread.

Functions of Suture:

- To approximate tissue structures which have been divided or severed as a part of surgical intervention
- To ligate (tie off) blood vessels in order to prevent bleeding
- To approximate body or tissue with an implant in order to keep the implant in the correct position e.g. grafts, lens
- To clearly identify and separate specific structures during surgery in order to assist with the surgical procedure by acting as a marker
- To allow gentle retraction of specific structure during surgery in order to improve vision and access for the surgeon

Ideal Suture Material:

- Can be used in any tissue
- Easy to handle
- Good knot security
- Minimal tissue reaction
- Unfriendly to bacteria
- Strong yet small
- Won't tear through tissues
- Cheap

Selection criteria of suture materials:

- Comfortable and natural healing.
- Minimal tissues reaction.
- Not creating a suitable environment for bacterial growth.
- Secure knot holding.
- Easy to use.

– Safety for the surgical team as well as patient.
– Absorbable and Non absorbable
– Natural and Synthetic.
– Monofilament and Multifilament.
– Absorption rate.
– Needle point and type
– Function of suture and each stage.
– Healing abilities.
– Healing rate.
– Strength of tissue to be approximately.

Care and storage of sutures materials:

– Keep dry and dust free area of the theatre.
– Easily visible.
– Easily transferable to other operating theatre.
– Stored efficiently in each operative theatre.
– Expiry date/ time
– Manufacture company.
– Types of materials.

Knot

A suture knot has three components:

1. The loop created by the knot
2. The knot itself, which is composed of a number of tight "throws", each throw represents a weave of the two stands
3. The ears, which are the cut ends of the suture

Classification of Suture Materials:

1. Absorption characteristic

– Absorbable
– Non-absorbable

2. Origin of material used

– Natural
– Synthetic

3. Structure

– Monofilament
– Multifilament

Absorbable suture:

- **Catgut: -** Prepared from submucosa of the small intestine that government inspected of sheep and bovine intestine. (Sterilized by gamma irradiation)
- **Chronic Catgut:** The terms chronic indicate that the ribbons have been treated with chromic salt, which increased material strength and reduce tissue irritation. This type of catgut is use in Peritoneum cavity, Muscles, facia, uterine tube.
- **Collagen: -** Like catgut these are prepared as plain or chromic catgut.

– Absorbed by the body at varying durations following surgery, ranging from 7 days to 6 months
– Therefore, used in the areas of the body that will heal sufficiently to maintain tissue approximation within these time span once the suture has been absorbed.
– E.g. Plain catgut, chromic catgut, Vicryl
– Suture absorbed or designed by the body tissue after a certain period of time.
– These are sterile strand prepared from collagen derived from healthy mammals
– Either the serosal layer of beef (bovine) or the sub-mucosal fibrous layer of sheep intestines
– Also from some synthetic polymers
– Sutures are absorbed in the body by any one of the two processes:
i. Enzymatic and phagocytic action ii. Hydrolysis

Uses

– To suture mucous membrane of lips, tongues superficial laceration of the genital area.
– They are easily absorbed within one week.
– Usually absorbed within 30 – 45 days

Non-absorbable Suture:

- **Linen**: used in GI Surgery.
- **Silk:** Silk can be used for skin suture, Opthalmic and oral surgery.
- **Polyester**: Use vascular, orthropaedic Surgery.
- **Stainless steel:** These materials used for tendon and for suturing of chest, ortho.
- **Other non-absorbable materials**

– Non absorbable sutures are made of materials which are not metabolized by the body
– They are used either on skin wound closure, where the sutures can be removed after a few weeks, or in some inner tissues in which absorbable sutures are not adequate.
– For example, in the heart and in blood vessels, whose rhythmic movement requires a suture which stays longer than three weeks, to give the wound enough time to close.
– There are several materials used for non absorbable sutures.

– The most common is a natural fiber, silk, which undergoes a special manufacturing process to make it adequate for its use in surgery.
– Other non-absorbable sutures are made of artificial fibers, like polypropylene, polyester or nylon; these may or may not have coatings to enhance their performance characteristics.
– Finally, stainless steel wires are commonly used in orthopedic surgery and for sternal closure in cardiac surgery.

Uses of Non-absorbable materials

– It is most commonly used to close and suture skin after surgery or trauma to the skin.
– They are very strong
– Suture nerve, tendon or blood vessels

Natural

– Made from materials that originate from animal or plant source
– Suture materials that originate from animals are generally termed catgut which can be defined as a sterile strand prepared from collagen derived from healthy mammals.
– They are made from the sub mucosal layer of sheep intestine or the serosal layer of beef intestine and are packaged in spirit solution.
– Plant source of suture material include linen and cotton.
– Although it is the oldest suture material, its use is diminishing with modern materials which produce less local tissue reaction being preferred.

Synthetic

– These are made from wide variety of polymers.
– They give a more uniform and predictable performance than natural materials and cause less reaction in surrounding tissue.
– Examples: Prolene, Vicryl

Monofilament

– These sutures are made from a single strand or filament of material.
– They are all synthetic materials apart from catgut and collagen.
– E.g Prolene, Nylon

Poly-filament

– Made up of several strands or filaments of materials, either braided or twisted together to form one thread e.g. Vicryl, Silk

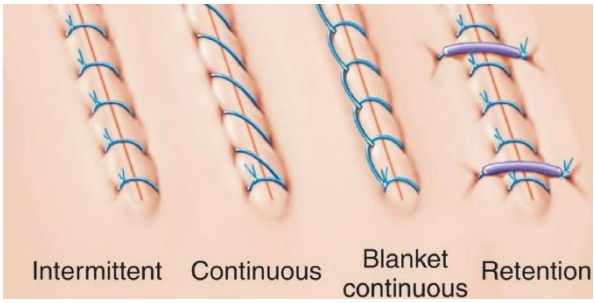
Size and Strength of Suture Material:

– The size of suture material is measured by its width or diameter and is vital to proper wound closure.
– Each suture size has specific knot pull abilities and specific diameter limits.
– The smaller the size of thread the less tensile strength the material has.

Size and Strength of Suture Material:

– 1/0and 2/0: Used for high stress areas requiring strong retention, i.e. deep fascia repair
– 3/0: Used in areas requiring good retention, i.e. scalp, torso, and hands
– 4/0: Used in areas requiring minimal retention, i.e. extremities. Is the most common size utilized for superficial wound closure.
– 5/0: Used for areas involving the face, nose, ears, eyebrows, and eyelids.
– 6/0: Used on areas requiring little or no retention. Primarily used for cosmetic effects.

Suturing Techniques: When suturing the edges of a wound together, it is important to evert the skin edges that is, to get the underlying dermis from both sides of the wound to touch. For the wound to heal, the dermal elements must meet and heal together. If the edges are inverted (the epidermis turns in and touches the epidermis of the other side), the wound will not heal as quickly or as well as you would like. The suture technique that you choose is important to achieve optimal wound healing.



Suture Removal:

These sutures are normally removed after:

– Face and head - 5 days
– Legs and abdomen - 7 – 10 days
– Back and soles - 10 – 14 days

Surgical Needles:

Types of Needle:

- Round – bodies needles
- Cutting needles

- Reverse cutting needles.
- Blunt needles.

Needle Shapes:

- Quarter – circle
- Three- eight circle
- Half- circle.
- Five – eight – circle
- J- shaped
- Straight.

– Needles can be cutting, reverse-cutting or round-body, but the sizes may vary.
– There are two basic configurations for curved needles:
  - **Cutting:** cutting edge can cut through tough tissue, such as skin
  - **Tapered:** no cutting edge, for softer tissue inside the body

Round-bodied needles

– Designed to separate body tissues and fibers rather than cut them.
– The design allows for the point to penetrate the tissue followed by the shaft of the needle which has a 'round body' giving the smallest possible hole size.
– This allows the tissue to close tightly around the suture material, forming a leak proof suture line. E.g. in intestinal, cardiac and vascular surgery

Needles Size:

Smallest: 6/0, 5/0, 4/0, 3/0, 2/0, 0, 1, 2 or more large

Surgical Staples

– Surgeon can join many tissues with staples.
– This involves inserting stainless steel or titanium staples through tissues with a stapler.
– The stapling device can be classified as:
  - Reusable Staplers
  - Disposable Staplers
– **Reusable Staplers:** Reusable staple applicators have been used for many years in thyroid and gynaecological surgeries. Their use is declining as disposable devices have become more popular.
– **Disposable Staplers:** Disposable staple applicators are used in many operations for both internal tissues and skin. They are preloaded, light weight and easy to use.

Advantages of using Staples:

– The time saved, as compared with suturing technique, reduces blood loss and total operating and anesthesia time for the patient.
– Wound healing may be accelerated because of minimal trauma and non reactive nature of metallic staples.
– Staple produces an even surface and an airtight, leak proof closure.
– Staple can be placed through an endoscope.

Surgical Instruments:

General Uses of Instruments:

- Grasping and Clamping
- Retracting
- Cutting and Dissecting
- Probing and Dilating

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Appendix-1: Surgical Instruments

- Perform surgical procedures
- Chosen based on action
- **These tools are used for**
  - Holding
  - Pulling
  - Clamping
  - Cutting
  - Crushing
  - Closing a wound

GENERAL SURGERY PACK

Scissors

- Four different types
  - Utility
  - Suture
  - Surgical
  - Dissecting

SCISSORS

TYPES- ACCORDING TO CURVATURE- straight, curved or angled
" " **USE** - Dressing, stitch removal, tissue
" " **the Tip** - sharp or blunt

Surgical Instruments I

- **Forceps:** for compressing or grasping tissue. Thumb forceps and hemostats are typical forceps. Hemostats aid in compressing tissue, especially blood vessels, to stop bleeding (hemostasis).
- **Needle holders:** hemostat-like devices that hold needles used to suture wounds closed.
- **Needles:** permanently attached suture material = swaged-on. Tip may be blunt, tapered, sharp, cutting, or some other configuration
- **Scalpel handle and blades:** size 10 blade most popular, 11 has a straight edge and a sharp point.15 has a very small cutting edge, used for fine, delicate surgery(e.g. eye). 20 is similar to 10 but larger.

- Utility
  - Cut material that may dull the blade

Surgical Instruments II

- **Scissors:** blunt-blunt, blunt-sharp, or sharp-sharp. They may also be straight or curved. Some scissors are serrated for cutting thick bandages or cartilage.
- **Retractors:** pull overlying tissue away from the surgical site. Hand-held retractors and self-retaining
- **Suture materials:** thickest suture is given the number 6.
  - <6 = smaller diameter.
  - Sutures having smaller diameter indicated by 0 ("aught") smallest suture is designated 12-0 (twelve-aught).
  - Synthetic = nylon, or natural = silk or gut.
  - Some absorbed by the body during the healing process, nylon removed after wound heals, usually in 7–10 days.
- **Gauze pads:** sponges used for soaking up blood and other fluids from the surgical site.

- Suture
  - Remove sutures
  - Type of utility

- Operating
  - Surgical
  - Cut soft tissue
  - Different sizes
  - Blade can be straight, curved, blunt or pointed

- Thumb forceps
  - Used for
    - Grasping
    - Compressing
    - Cutting
    - Pulling tissue

- Dissecting
  - Separate and differentiate tissues

- Clamping forceps
  - Hemostats
  - Control blood flow

Forceps

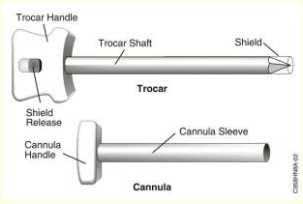
- Three Types
  - Thumb forceps
  - Clamping forceps
  - Needle holders
- Look like tweezers

- Needle holders
  - Locking forceps
  - Similar to hemostats
  - Holds suture needles when installing stitches

Scalpels

- Very sharp knife
- Handle and blade are packaged separately
- Used to make surgical cuts called incisions
- Different sizes and styles
- Tenotome- dissecting scalpel used for fine dissection and cutting or dividing tendons

- Trocar
  - Release fluid or gas build-ups
  - Sharp stylet inside cannula



KNIVES

Interchangeable handles and blades

No 3 handle for # 15 blade – for small incisions
And #11 blade – i& d of abscesses
N04 handle for #24 etc for larger incisions

- Catheters
  - Either metal or rubber
  - Inserted into body structures

Tubes

- Cannula
- Wound healing
- Different lengths
- Types
  - Trocar
  - Catheters

Scalpels

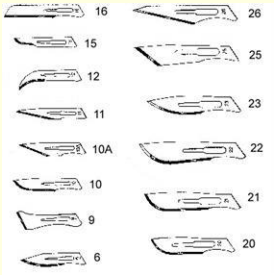
- #3

Scalpels

- #7

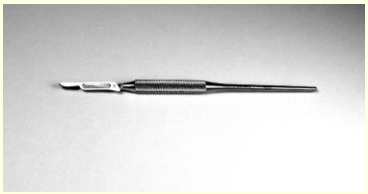
Scalpels

- Blades:



Scalpels

- #9



Scissors

- Mayo
  - Curved:

  - Straight:

Scalpels

- #4

Scissors

- Metzenbaum
  - Curved:

  - Straight:

Scissors

- Suture Scissors:

Thumb Forceps

- Adson-Brown:

Scissors

- Lister Bandage Scissors:

Thumb Forceps

- DeBakey:

Thumb Forceps

- Adson:

Thumb Forceps

- Russian:

Needle Holders

- Mayo-Hagar:

Hemostatic Forceps

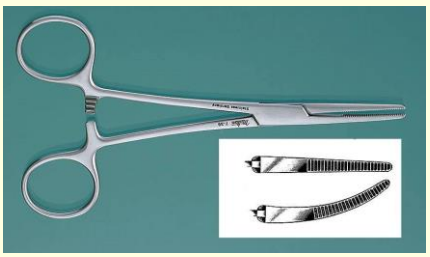
- Halsted Mosquito:

Needle Holders

- Olsen-Hagar:

Hemostatic Forceps

- Kelly:

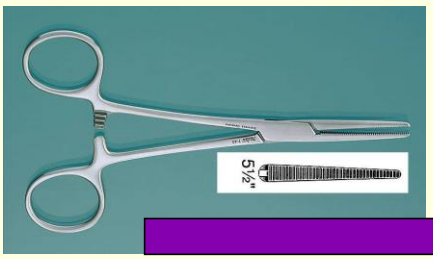


Needle Holders

- Castroviejo:

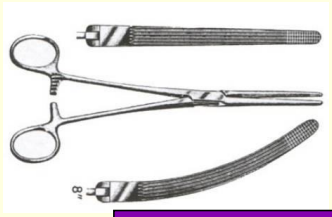
Hemostatic Forceps

- Crile:



Hemostatic Forceps

- Rochester-Carmalt:

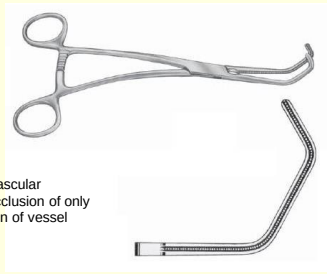


Tissue Forceps

- Allis:

Hemostatic Forceps

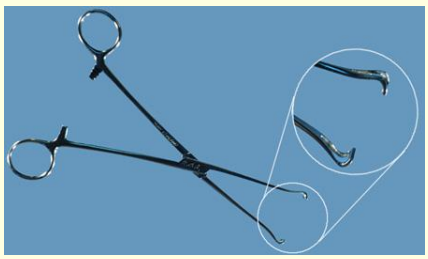
- Satinsky:



- cardiovascular
- allow occlusion of only a portion of vessel

Tissue Forceps

- Babcock:

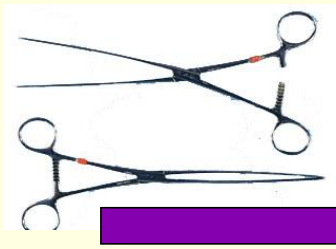


Hemostatic Forceps

- Oschner:

Tissue Forceps

- Doyen: Intestinal



Forceps

- Vulsellum:

Towel Clamps

- Backhaus:

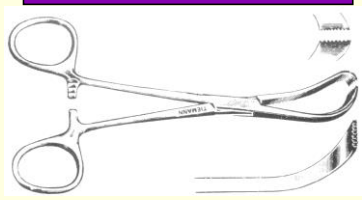
Drape to skin

Forceps

- Alligator:

Towel Clamps

- Edna:



Nonpenetrating towel clamp
Attach drape to drape or instruments to drapes (suction, cautery)

Forceps

- Serrefine (Bulldog Clamp):

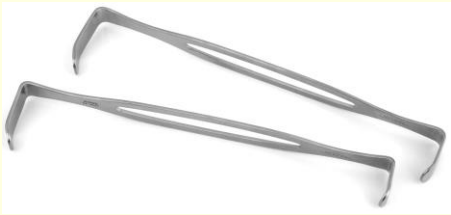
Used for temporary occlusion of medium sized vessels

Hand-held Retractors

- Senn:

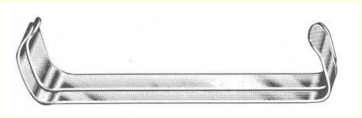
Hand-held Retractors

- Army-Navy:



Hand-held Retractors

- Farabeuf:

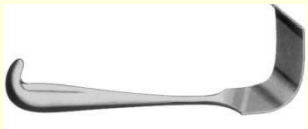


Hand-held Retractors

- Ribbon (Malleable):

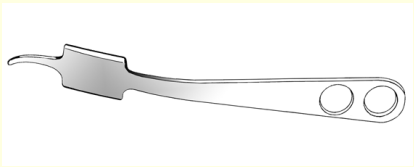
Hand-held Retractors

- Meyerding:



Hand-held Retractors

- Hohmann:



Self-Retaining Retractors

- Gelpi:

Self-Retaining Retractors

- Weitlaner:

Self-Retaining Retractors

- Meyerding:

Self-Retaining Retractors

- Balfour: Abdominal retractor

Ovariohysterectomy Hooks

- Snook:

Self-Retaining Retractors

- Finochietto: Rib retractor

Suction Tips

- Poole:

Suction Tips

- Yankauer:

Rongeurs

- Kerrison:

Suction Tips

- Frazier:

- Rumen (Bloat) Trocar

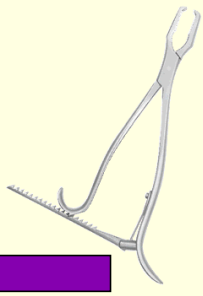
65

Rongeurs

- Lempert:

Bone-Holding Forceps

- Kern:



Bone-Holding Forceps

- Serrated Reduction:

- Jacob Chuck

70

- Galt Trephine

68

- Duckbill Rongeurs

71

- Osteotome

69

Bone Rasp

- Tap Handle

72

Retracting and Exposing Instruments

- A **Deaver** retractor (manual) is used to retract deep abdominal or chest incisions. Available in various widths.

EXPOSING & RETRACTING

- GELPI Perineal Retractor

EXPOSING & RETRACTING

- BALFOUR ABDOMINAL RETRACTOR

EXPOSING & RETRACTING

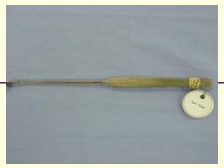
- Weitlaner Retractor

EXPOSING & RETRACTING

- ARMY NAVY

FARABEUF Retractor

- Senn Retractors



EXPOSING & RETRACTING

- Finochietto Retractor

nursinglectures.blogspot.com

Retracting and Exposing Instruments

- A **goulet** (manual) is used to retract shallow or superficial incisions.

Retracting and Exposing Instruments

- A **Richardson** retractor (manual) is used to retract deep abdominal or chest incisions

Retracting and Exposing Instruments

- A **malleable or ribbon** retractor (manual) is used to retract deep wounds. May be bent to various shapes.

Retracting and Exposing Instruments

- An **Army-Navy retractor** (manual) is used to retract shallow or superficial incisions. Other names: USA, US Army.

Retracting and Exposing Instruments

- A **Weitlaner** retractor (self-retaining) is used to retract shallow incisions.

Retracting and Exposing Instruments

- A **Balfour with bladder blade** (self-retaining) is used to retract wound edges during deep abdominal procedures.

VIEWING

- Speculums
- Endoscopes
- Hollow Endoscopes
- Lensed Endoscopes

INITIAL Incision is made by a **SCALPEL**

Doubling the current increases the heat produced fourfold

ARGON Enhanced ESU Tip is held at 60 degree angle, causing LESS Tissue Damage

BUZZING – the process of coagulating the VESSELS

BUZZ should not exceed more than **3 SECONDS**

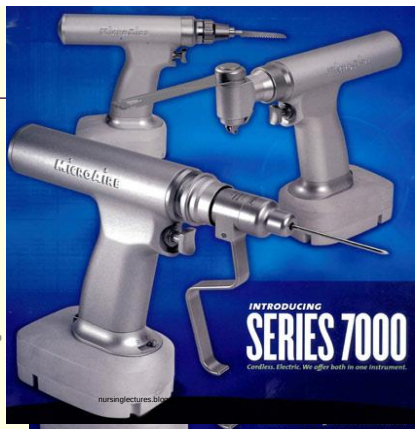
ELECTROSURGERY

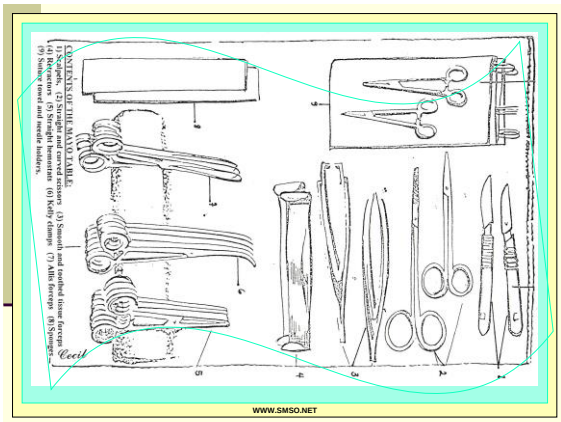
LASER SURGERY

- Light amplification by stimulated emission of radiation (LASER)
- Types of LASES = ARGON, CARBON DIOXIDE, HOLMIUM, KRYPTON, NEODYMIUM, PHOSPHATE, RUBY/XENON

DRILL
BURR
BLADE
REAMER
ABRADER

AIR-POWERED
ELECTRICALLY POWERED





Drains Tubes Catheters

Drains and tubes

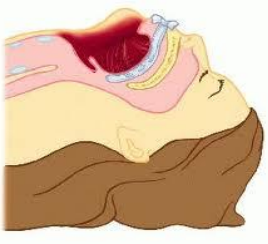
- Are devices used to drain fluid from the body when excessive drainage is expected .

A- Respiratory Tubes

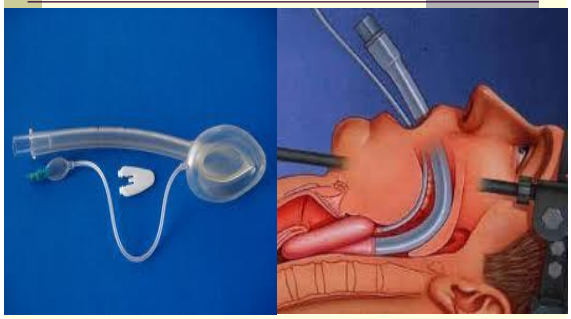
Catheters

- Are used for evacuating or injecting fluids.
- Catheters are sized on a french scale according to the diameter of the lumen .

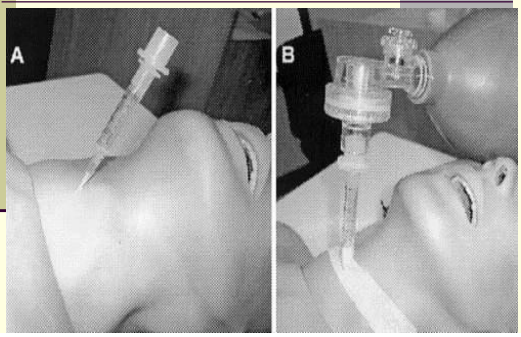
A- Respiratory Tubes
A-1- Airway



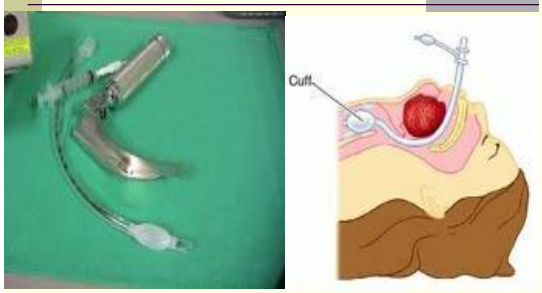
A-2- Laryngeal tube



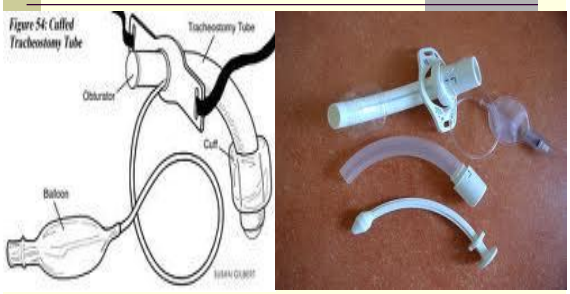
Cricothyroidotomy



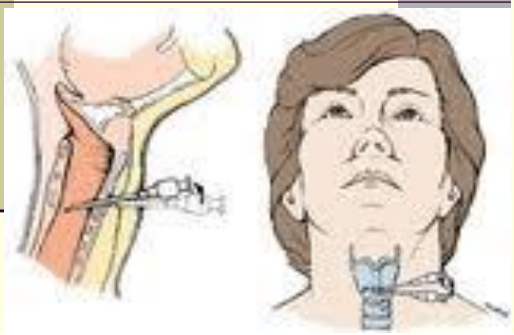
A-3-Endotracheal intubation



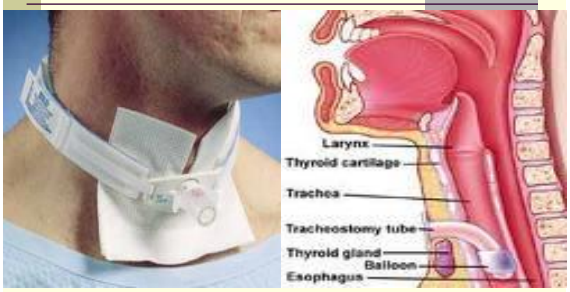
A-5- Tracheostomy tube



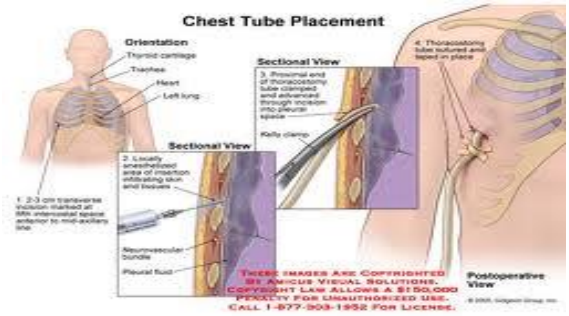
A-4- Cricothyroidotomy



A-5- Tracheostomy tube



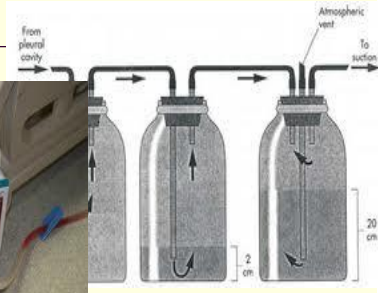
A-6- Chest Tube



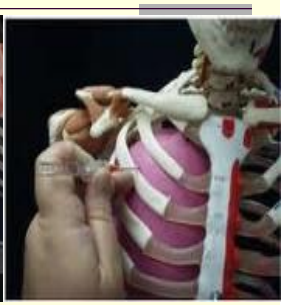
The Trocar Catheter

- With a large trocar needle is used for a closed thoracostomy .

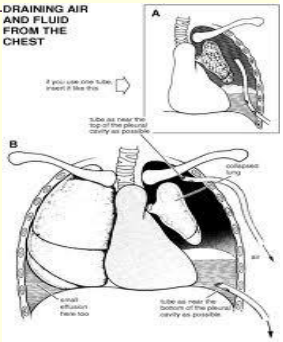
Collection Unit

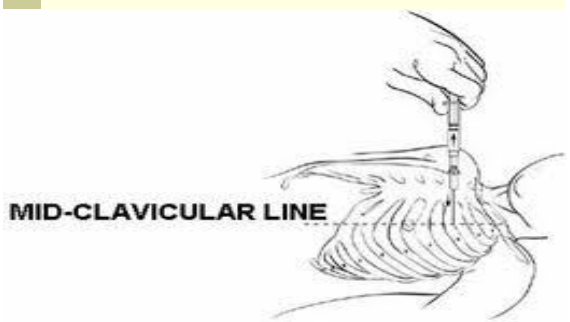


A-7- Thoracentesis needle

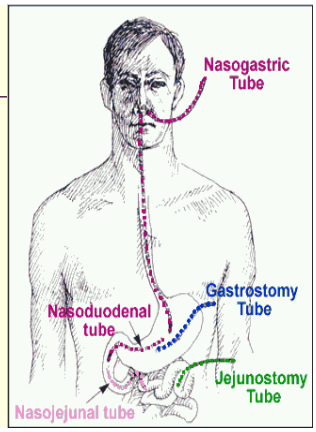


Thoracic catheters

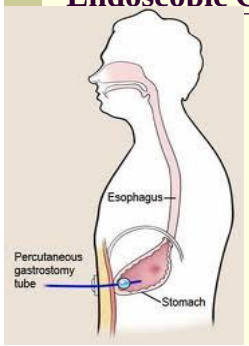


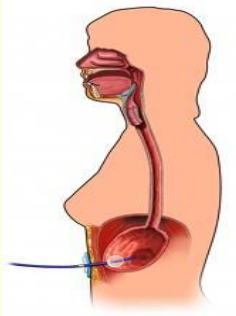


B-
Gastrointestinal
Tubes

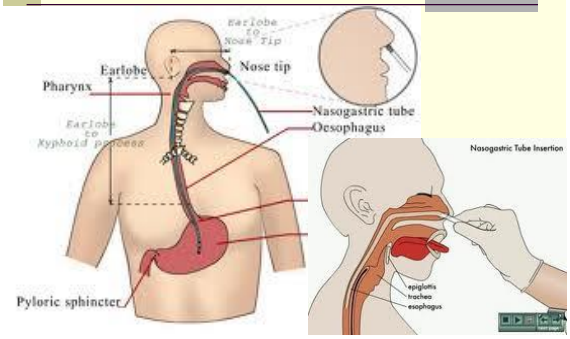


B-2- P.E.G. (Percutaneous Endoscopic Gastrostomy)

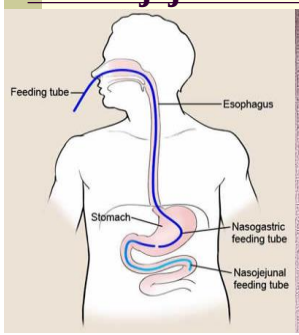


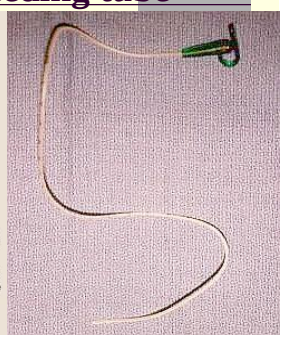


B-1- Nasogastric Tube



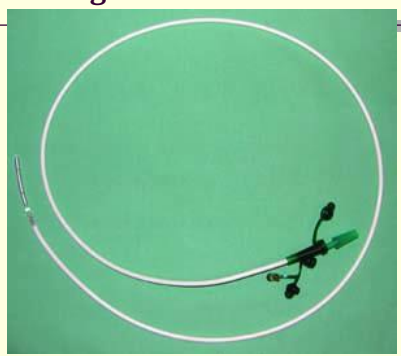
B-3- Nasogastric and nasojejunal feeding tube



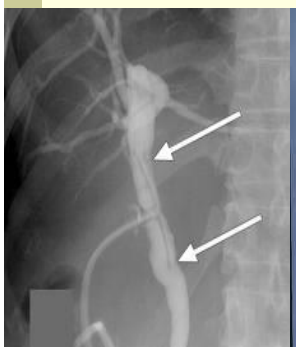


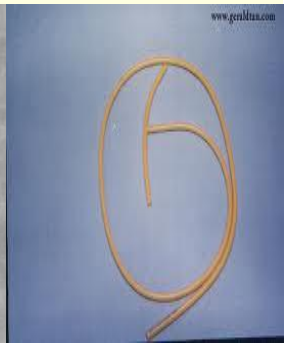
Ryle's Tube

Feeding NGT



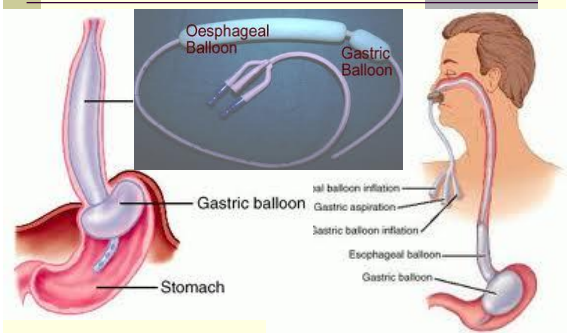
B-4- Rectal Tube





A Rectal Tube

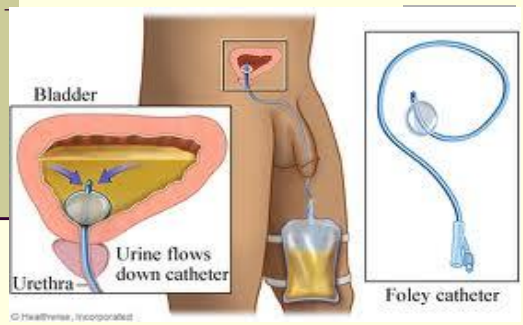
B-6- Blackemore Sengstaken Tube



B-5- T Tube- Kehr's T-tube

C- Genitourinary Tubes &Catheter

C-1- Catheters



2Way Foley Catheters

- To drain the bladder
- An inflatable balloon near the tip which holds the catheter in place

- **-Rubber**
- **-Plastic**
- **-Silicone**

2-ways foley
3-ways foley

3 Way Foley

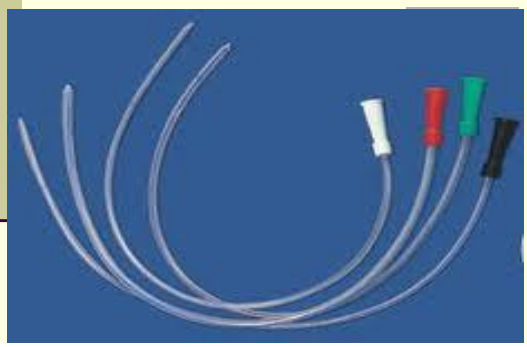
Has an inlet for irrigation .

A. Robinson one-way catheter ("straight cath")
B. Robinson two-way catheter, silicon
C. Coude two-way catheter, latex
D. Robinson three-way catheter, latex

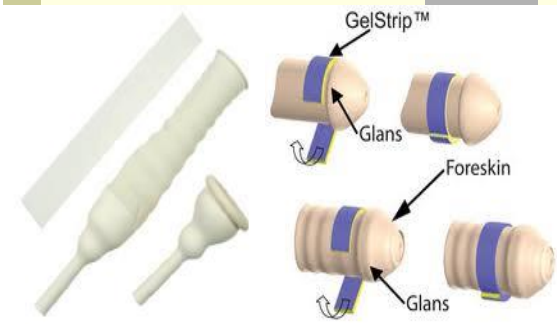
Robinson Catheter

Straight Drainage Of The Bladder.

Nilatone (straight) catheter

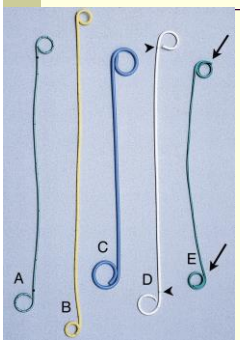


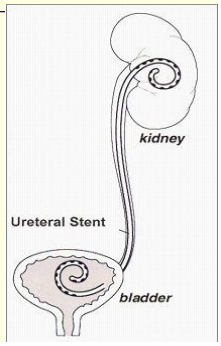
C-2- Condom Catheter



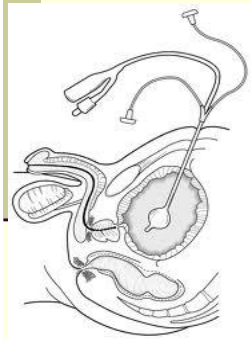
Silicone Catheter

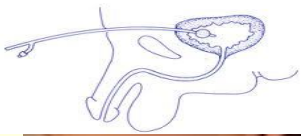
C-3 Double J Catheter





suprapubic catheter

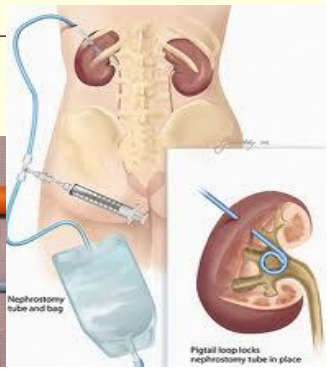




C-4- Nephrostomy Tubes

Malecot

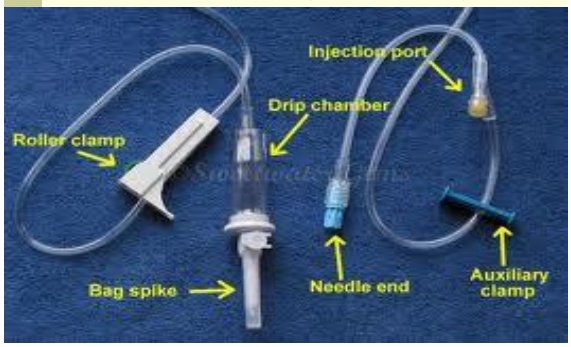
Pigtail



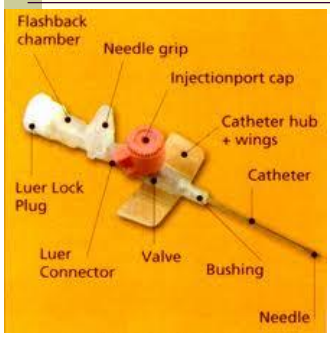
D-vascular Tube

D-1- Butterfly Needle

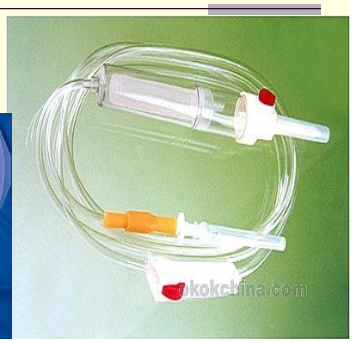
D-4- IV set (venoset)



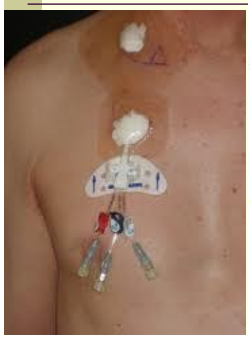
D-2- IV Cannula

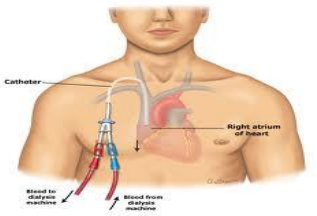


D-5- BT (blood transfusion) set



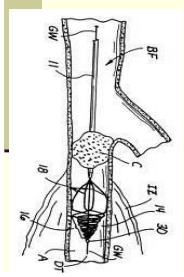
D-3- Venous Catheter

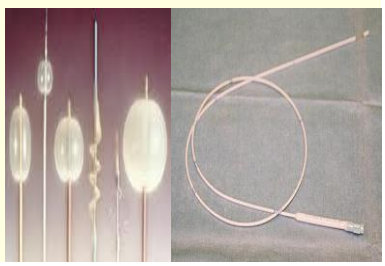




D-6- Fogarty Catheter

- Arterial embolectomy catheter is used to remove blood clots from an artery .

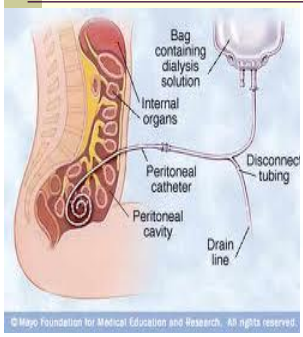




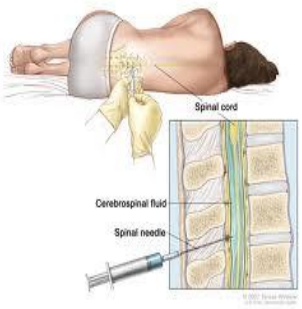
Differentiate vascular tubes from;

- -spinal needle or catheter
- -peritoneal catheter

Peritoneal Catheter



Spinal Needle



IMPORTANT TERMS

- Atraumatic
- Dilation
- Dissection
- Grasping
- Retraction
- Sharp
- Traumatic
- Trocar

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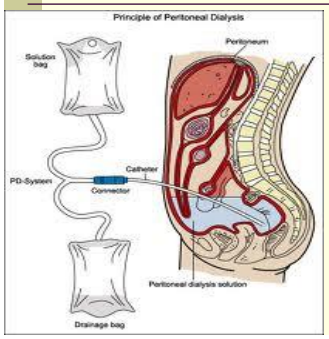
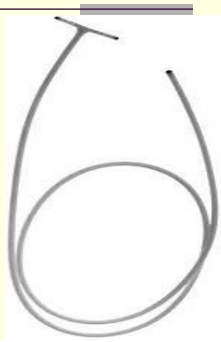
Peritoneal Catheter





CLASSIFICATION OF INSTRUMENTS

- Cutting and Dissecting
- Grasping and Holding
- Clamping and Occluding
- Exposing and Retracting
- Suturing and Stapling
- Viewing
- Suctioning and Aspirating
- Dilating and Probing
- Measuring
- Accessory Instruments
- Microinstrumentation

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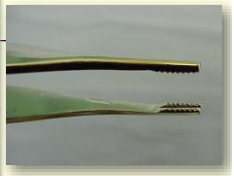
CUTTING AND DISSECTING

CUTTING AND DISSECTING

- **Suture Scissors**
  (Blunt /Blunt)

CUTTING AND DISSECTING

- **Bone Curette**

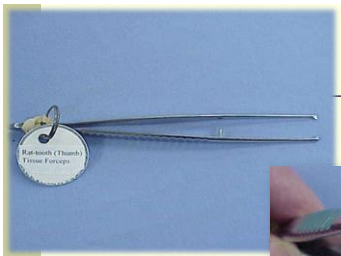


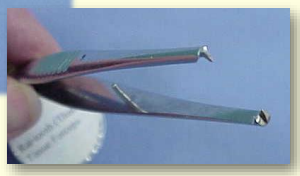
GRASPING & HOLDING

Tissue Forceps
Smooth Forceps
Toothed Forceps
Allis Forceps
Babcock Forceps
Glove Forceps
Tenaculums
Bone Holders

CUTTING AND DISSECTING

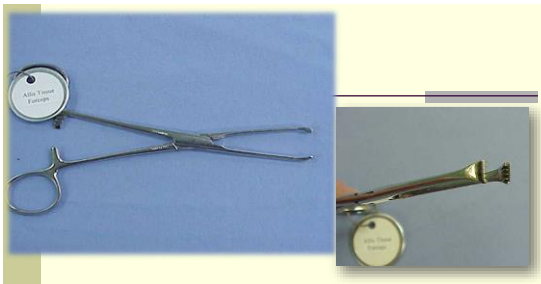
- **Mayo Scissors**
- **Metzenbaum Scissors**





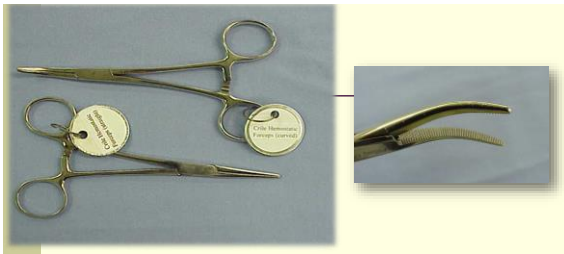
GRASPING & HOLDING

- **Rat-Toothed Tissue Forceps**



GRASPING & HOLDING

- **Allis Tissue Forceps**



CLAMPING & OCCLUDING

- Hemostatic Forceps
- Hemostats
- Crushing Clamps
- Noncrushing Vascular Clamps

GRASPING & HOLDING

- **Babcock Intestinal Forceps**

CLAMPING & OCCLUDING

- Hemostatic Forceps
- Hemostats
- Crushing Clamps
- Noncrushing Vascular Clamps- used to occlude peripheral or major blood vessels

GRASPING & HOLDING

- **Backhaus Towel Clamps**

CLAMPING & OCCLUDING

- Pean Intestinal forceps

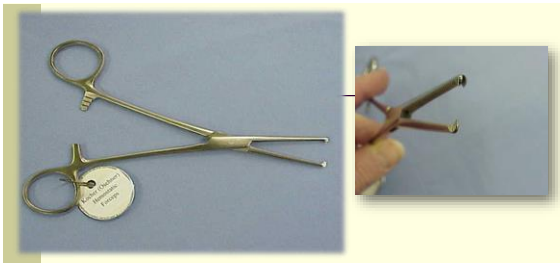
CLAMPING & OCCLUDING

- Hemostatic Forceps
- Hemostats
- Crushing Clamps
- Noncrushing Vascular Clamps

EXPOSING & RETRACTING

- ARMY NAVY

FARABEUF Retractor



CLAMPING & OCCLUDING

- Hemostatic Forceps
- Hemostats
- Crushing Clamps
- Noncrushing Vascular Clamps

EXPOSING & RETRACTING

- GELPI Perineal Retractor

EXPOSING & RETRACTING

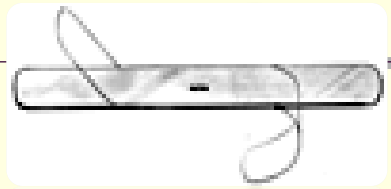
- BALFOUR ABDOMINAL RETRACTOR

EXPOSING & RETRACTING

- Weitlaner Retractor

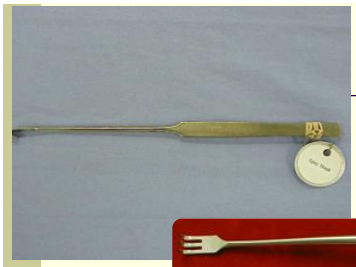
- Spay Hook

EXPOSING & RETRACTING



EXPOSING & RETRACTING

- Ribbon Retractor

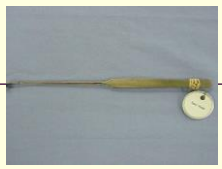


EXPOSING & RETRACTING

- Senn Retractors

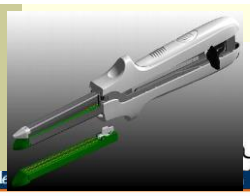
SUTURING & STAPLING

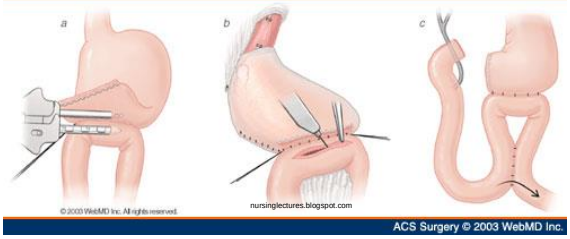
- Needle Holders
- Tungsten Carbide Jaws
- Crosshatched Serrations
- Smooth Jaws
- Staplers
- Clip Appliers



EXPOSING & RETRACTING

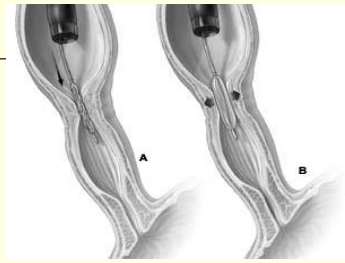
- Finochietto Retractor





VIEWING

- Speculums
- Endoscopes
- Hollow Endoscopes
- Lensed Endoscopes



DILATING & PROBING

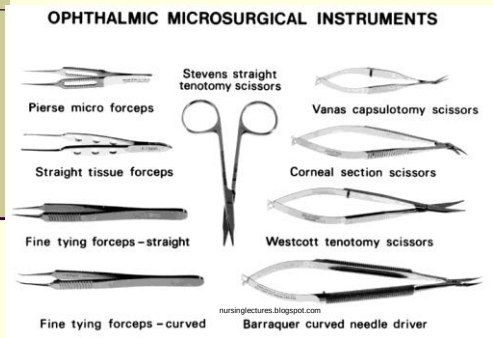
SUCTIONING & ASPIRATING

- Suction
- Poole Abdominal Tip
- Frazier Tip
- Yankeur Tip
- Autotransfusion
- Aspiration
- Trocar
- Cannula

MEASURING

SUCTIONING & ASPIRATING

- Suction
- Poole Abdominal Tip
- Frazier Tip
- Yankeur Tip
- Trocar
- Cannula



Handling INSTRUMENTS during SURGERY

- Know the **NAME** and **USE**
- Handle **INDIVIDUALLY**
- Use for the **INTENDED** purpose
- Use of **HAND SIGNALS**
- Short **INSTRUMENTS** = Superficial Work
- **LONG** Instruments = **DEEP**
- **PASS** instruments **DECISIVELY** and **FIRMLY**
- **FREE-HAND TECHNIQUE**
- Watch the sterile field for **LOOSE** instruments
- With a **MOIST, SPONGE** wipe blood and organic debris from instruments using a **DEMINERALIZED STERILE, DISTILLED H20**

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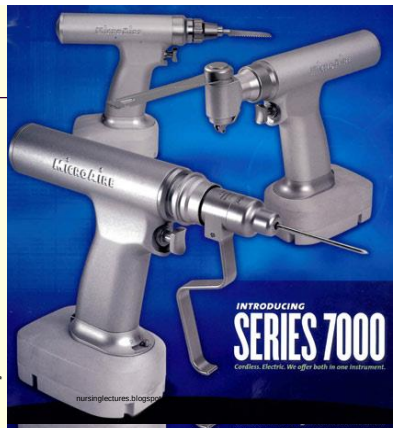

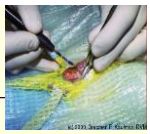

- **INITIAL** Incision is made by a **SCALPEL**
- Doubling the current increases the heat produced fourfold
- **ARGON** Enhanced ESU Tip is held at 60 degree angle, causing LESS Tissue Damage
- **BUZZING** – the process of coagulating the VESSELS
- **BUZZ** should not exceed more than **3 SECONDS**

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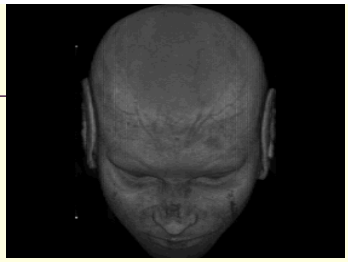
ELECTROSURGERY

- Standardized **BASIC** sets
- Scrub Person **counts ALL** instruments, sharp and sponges with the CIRCULATOR
- Handle **Loose** Instruments **SEPARATELY**
- Sort by **CLASSIFICATION**
- **PROTECT** Sharps



HANDLING INSTRUMENTS

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LASER SURGERY

- Light amplification by stimulated emission of radiation (LASER)
- Types of LASES = ARGON, CARBON DIOXIDE, HOLMIUM, KRYPTON, NEODYMIUM, PHOSPHATE, RUBY/XENON

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PATIENT SAFETY in LASERS

- Eyes and Eyelids should be adequately protected (aluminum foil, moist pads)
- Antiseptics must be NONFlammable
- Rectum should be packed with a MOISTENED sponge to prevent escape of METHANE gas
- Anesthetic Agents should be NONCombustible
- Flexible metallic or insulated silicone endotracheal tubes
- Wear high filtration MASKS for CO2 laser ablation such as condylomata (Venereal warts)

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BASIC SURGICAL INSTRUMENTS

- Basic laparotomy instruments are essential to accomplish most types of general surgery. Each instrument can be placed into one of the four following basic categories:
  - Retracting and Occluding Instruments
  - Cutting and Dissecting Instruments
  - Clamping and Occluding Instruments
  - Grasping and Holding Instruments

Advantages of LASERS

- Precise CONTROL = ACCURATE incision
- Access to HARD to REACH areas (endoscopes, rhodium reflector mirrors)
- Unobstructed view of the surgical site
- Minimal TRAUMA to tissues
- DRY, Bloodless SURGICAL Field
- Minimal THERMAL effect
- Reduced RISK for INFECTION
- Prompt Healing
- Reduced OPERATING Time

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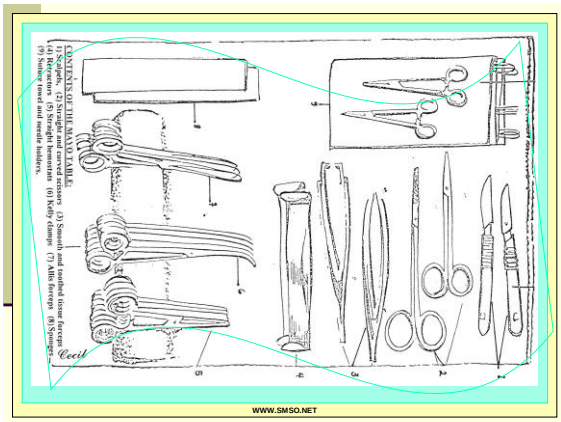
Retracting and Exposing Instruments

- used to hold back or retract organs or tissue to gain exposure to the operative site. They are either "self-retaining" (stay open on their own) or "manual" (held by hand). When identifying retractors, look at the blade, not the handle.



Retracting and Exposing Instruments

- A **Deaver** retractor (manual) is used to retract deep abdominal or chest incisions. Available in various widths.

Retracting and Exposing Instruments

- A **Richardson** retractor (manual) is used to retract deep abdominal or chest incisions

Retracting and Exposing Instruments

- A **malleable or ribbon** retractor (manual) is used to retract deep wounds. May be bent to various shapes.

Retracting and Exposing Instruments

- An **Army-Navy retractor** (manual) is used to retract shallow or superficial incisions. Other names: USA, US Army.

Retracting and Exposing Instruments

- A **Weitlaner** retractor (self-retaining) is used to retract shallow incisions.

Retracting and Exposing Instruments

- A **goulet** (manual) is used to retract shallow or superficial incisions.

Retracting and Exposing Instruments

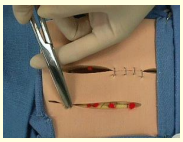
- A **Gelpi** retractor (self-retaining) is used to retract shallow incisions.

Retracting and Exposing Instruments

- A **Balfour with bladder blade** (self-retaining) is used to retract wound edges during deep abdominal procedures.

Cutting and Dissecting Instruments

- **Straight Mayo scissors** - Used to cut suture and supplies. Also known as: Suture scissors.



EX: Straight Mayo scissors being used to cut suture.

Cutting and Dissecting Instruments

- are sharp and are used to cut body tissue or surgical supplies.

Knife Handle, Scissors
(left to right)

Cutting and Dissecting Instruments

- **Curved Mayo scissors** - Used to cut heavy tissue (fascia, muscle, uterus, breast). Available in regular and long sizes.

Cutting and Dissecting Instruments

- **7 handle with 15 blade (deep knife)** - Used to cut deep, delicate tissue.
- **3 handle with 10 blade (inside knife**) – Used to cut superficial tissue.
- **4 handle with 20 blade (skin knife) -** Used to cut skin.

#7, #3, #4
(left to right)

Cutting and Dissecting Instruments

- **Metzenbaum scissors** - Used to cut delicate tissue. Available in regular and long sizes.

Clamping and Occluding Instruments

- are used to compress blood vessels or hollow organs for hemostasis or to prevent spillage of contents.

Clamping and Occluding Instruments

- A **Kelly** is used to clamp larger vessels and tissue. Available in short and long sizes. Other names: Rochester Pean.

Kelly, hemostat, mosquito (left to right)

Clamping and Occluding Instruments

- A **hemostat** is used to clamp blood vessels or tag sutures. Its jaws may be straight or curved. Other names: crile, snap or stat.

Clamping and Occluding Instruments

- A **burlisher** is used to clamp deep blood vessels. Burlishers have two closed finger rings. Burlishers with an open finger ring are called tonsil hemostats. Other names: Schnidt tonsil forcep, Adson forcep.

Clamping and Occluding Instruments

- A **mosquito** is used to clamp small blood vessels. Its jaws may be straight or curved.

hemostat, mosquito (left to right)

Clamping and Occluding Instruments

- A **right angle** is used to clamp hard-to-reach vessels and to place sutures behind or around a vessel. A right angle with a suture attached is called a "tie on a passer." Other names: Mixter.

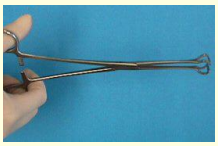
Clamping and Occluding Instruments

- A **hemoclip applier with hemoclips** applies metal clips onto blood vessels and ducts which will remain occluded.

hemoclip applier with hemoclips

Grasping and Holding Instruments

- A **Babcock** is used to grasp delicate tissue (intestine, fallopian tube, ovary). Available in short and long sizes.



Grasping and Holding Instruments

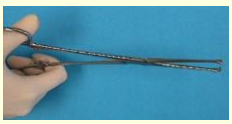
- are used to hold tissue, drapes or sponges.

Grasping and Holding Instruments

- A **Kocher** is used to grasp heavy tissue. May also be used as a clamp. The jaws may be straight or curved. Other names: Ochsner.

Grasping and Holding Instruments

- An **Allis** is used to grasp tissue. Available in short and long sizes. A "Judd-Allis" holds intestinal tissue; a "heavy allis" holds breast tissue.



Grasping and Holding Instruments

- A **Foerster sponge stick** is used to grasp sponges. Other names: sponge forcep.

Foerster sponge stick

EX: Sponge sticks holding a 4 X 4 and probang.

Grasping and Holding Instruments

- A **dissector** is used to hold a peanut.

dissector

EX: Dissector holding a peanut.

Grasping and Holding Instruments

- **Russian tissue forceps** are used to grasp tissue.

Grasping and Holding Instruments

- A **Backhaus towel clip** is used to hold towels and drapes in place. Other name: towel clip.

Backhaus towel clip

Large & small towel clips

Grasping and Holding Instruments

- **Adson pick ups** are either smooth: used to grasp delicate tissue; or with teeth: used to grasp the skin. Other names: Dura forceps.

Grasping and Holding Instruments

- **Pick ups, thumb forceps and tissue forceps** are available in various lengths, with or without teeth, and smooth or serrated jaws.

Grasping and Holding Instruments

- Long smooth pick-ups are called **dressing forceps.** Short smooth pick-ups are used to grasp delicate tissue.

Grasping and Holding Instruments

- **DeBakey forceps** are used to grasp delicate tissue, particularly in cardiovascular surgery.

Grasping and Holding Instruments

- **Thumb forceps** are used to grasp tough tissue (fascia, breast). Forceps may either have many teeth or a single tooth. Single tooth forceps are also called "rat tooth forceps."

single tooth forceps, many teeth forceps
(top to bottom)

Grasping and Holding Instruments

- **Mayo-Hegar needle holders** are used to hold needles when suturing. They may also be placed in the sewing category.

short, medium & long
(top to bottom)

EX: Needle holder with suture.

The End: Thank-you