1.1 **VISION**

Our vision is to develop a nationally and internationally recognized Critical Care Unit of excellence in patient care, education, research and leadership.

1.2 **MISSION**

The mission of the Department of Critical Care is to provide quality health care services with a compassionate and caring spirit to all.

To achieve this goal, we will:
- Strive for excellence in our care.
- Efficiently and effectively use our resources.
- Use our innovation to continuously improve our processes.
- Consider the total being under our care: physical, mental and spiritual.
- Upgrade our skills and education on a continuous basis.
- Work as a team to meet the needs of all.

1.3 **VALUES**

1.3.1 Care is based on continuous healing relationships.

1.3.2 Care is according to patient needs and values.

1.3.3 The patient is the source of control.

1.3.4 Knowledge is shared.

1.3.5 Decision making is evidence-based.

1.3.6 Safety is a system property.

1.3.7 Transparency is necessary.

1.3.8 Needs are anticipated.

1.3.9 Waste is continuously decreased.

1.3.10 Cooperation among clinicians is a priority.
1.4 **Scope of Service**

1.4.1 **Clinical Services**

- The Intensive Care Unit is a 23 bed multidisciplinary care unit located in the 2nd and 3rd floor of the Critical Care building.

- It specializes in the comprehensive care of all critically ill adult patients with single and multiple system failure to save their lives and function. These include those experiencing complex pulmonary, renal, neurological, hematological problems. In addition to trauma and post surgical patients who require advanced medical, nursing or respiratory care.

1.4.1.1 The services will be provided through:

1.4.1.1.1 **Emergency Room Consultations** will be provided to patients 24 hours a day 7 days a week by the on-call Senior Registrar/consultant.

1.4.1.1.2 **In-Patient Care** the exceedingly qualified staff in Critical Care Department will provide high quality care to admitted patients.

1.4.1.1.3 **Medical Wards Consultation** will be provided to patients 24 hours a day 7 days a week by the on-call Senior Registrar/consultants.

1.4.2 **Administrative Services**

1.4.2.1 **Patient Care**

1.4.2.1.1 Provision of emergency medical interventions and resuscitation.

1.4.2.1.2 Assessment, diagnosis, treatment and planning.

1.4.2.1.3 Provision of close observation continuous telemetry and hemodynamic monitoring.

1.4.2.1.4 Provision of mechanical ventilation for patients with respiratory failure.

1.4.2.2 **Medical Education**

1.4.2.2.1 The Critical Care department is recognized as a training center by the Saudi Council of Medical Specialties therefore, it provides high standard continuous education to both under and post graduates by highly qualified medical staff.

1.4.2.3 **Research Activities**

1.4.2.3.1 The Intensive Critical Care Unit will be committed to active participation in research activities. All staff will be encouraged to publish and participate in all educational activities related to research.
1.5 **CLIENT AND SUPPLIER**

1.5.1 **CLIENT**

- 1.5.1.1 Patients
- 1.5.1.2 Families
- 1.5.1.3 Other departments and physicians (for consultation)

1.5.2 **SUPPLIER**

- 1.5.2.1 Information Technology
- 1.5.2.2 Medical Supply
- 1.5.2.3 Other departments (provide consultation)
- 1.5.2.4 Clinical Supportive Services (Lab, Radiology, Pharmacy)

1.6 **GOALS AND OBJECTIVES**

1.6.1 **The goals of the Intensive Care Unit are to:**

1.6.1.1 Provide multidisciplinary patient care on a concentrated and continuous basis.

1.6.1.2 Provide a multidisciplinary approach/plan to patient care which includes input from all relevant healthcare professionals.

1.6.1.3 Provide quality nursing care based upon the nursing process of assessment that includes biophysical, environmental, educational and psychological needs of the patient and family, planning intervention and evaluation.

1.6.1.4 Recruit, orient, assign and maintain a highly qualified, professional staff, competent to provide individualized, concentrated care and to provide for the continuity of care.

1.6.1.5 Provide an environment conducive to the continuous quality improvement of the medical, nursing and other healthcare professional staff.

1.6.1.6 Ensure that the standards for professional medical and nursing practice are implemented, evaluated and monitored.

1.6.1.7 Provide an environment conducive to the education needs of the medical, nursing and other healthcare professional staff, students from healthcare institutions, patients and families.

1.6.1.8 Provide for and participate in relevant research that investigates problems and provides opportunities to improve patient care.

1.6.1.9 Participate in programs that enhance healthcare education and research within the community.

1.6.1.10 Affect a system of collaborative, multidisciplinary approach to unit management that places responsibility and accountability of interdepartmental functions on the unit team members.
1.6.2 The Intensive Care Unit will maintain the quality of patient care and achieve their goals by accomplishing the following OBJECTIVES:

1.6.2.1 Written guidelines of nursing care that are reviewed on an annual basis and enforced by the nursing and medical staff. Such standards are kept current by annual review.

1.6.2.2 Written policies and procedures that is standardized and is available to the staff as a reference. They are updated by annual review.

1.6.2.3 A planned, on-going system of monitoring and evaluation of medical, nursing, patient care quality will be performed through the continuous Improving Organizational Performance Program.

1.6.2.4 Job description is kept current. Staff performance is evaluated on an annual basis and mutual goal for continued development will be set to maintain competency.

1.6.2.5 Recertification is kept updated as required and records are kept in the unit. These include:

   1.6.2.5.1 Skills checklist
   1.6.2.5.2 Emergency Standing Orders
   1.6.2.5.3 Basic Life support (BLS)
   1.6.2.5.4 Advanced Cardiac Life Support (ACLS)

1.6.2.6 Continuous education is mandatory and will be maintained.

1.6.2.7 Students of other healthcare institutions are directly supervised by appropriate staff members.

1.6.2.8 Research is encouraged in the unit.

1.6.2.9 Selected staff members participate in community educational and research programs through the hospital and/or community professional organizations.

1.7 ORGANIZATIONAL CHART

See attached appendix.

1.8 STAFFING PLAN

1.8.1 Daily ward rounds with Consultant, Registrar and Senior Registrars along with nursing staff and health care professionals from other disciplines takes place between 7:30AM to 4:30PM. This include patient assessment, discussion, management plan, X-ray meeting, diagnostic and therapeutic interventions.

1.8.2 On-call service is provided round the clock 24 hours a day, 7 days a week.
1.8.3 On-call schedule is prepared monthly by Head of the Department and circulated to all the relevant department in hospital. The on-call schedule contains the details of the on-call doctors including Registrar/Senior Registrar and Consultant.

1.8.4 The on-call Senior Registrar attends referrals in wards and emergency room. Senior Registrar is available through bleep.

1.8.5 On-call consultant is available for any clinical or administrative need through his/her bleep.

1.8.6 After working hours (i.e. between 4:30PM to 7:30AM) the ICU inpatient service is covered by Registrars/Residents from within the site/ICU.

1.8.7 The on-call Registrar/Resident in ICU can contact the Senior Registrar and Consultant anytime if needed.

1.8.8 Any changes in the on-call after being typed and approved by the Head of Department should be by agreement between those who wants to change, and to inform the secretary to change the rota.

1.8.9 During vacation consultants provides coverage to each other during the vacation period. At least one consultant will be available all the time in the department.

1.8.10 Senior Registrar/Registrars will be covered by their colleague Senior Registrar/Registrars during vacation.

1.8.11 During Eid and Hajj holiday. Separate on-call schedule is made for Registrar/Senior Registrar and Consultant.

1.8.11.1 Arrangements will be in rotation between Consultants and Senior Registrars. A record will be kept in the department secretary office and a copy will be circulated to all departments in the hospital.

1.8.12 Except for Emergency Leave, all annual leave should be arranged and discussed and approved by the Head of the Department in advance at least 3 months prior to starting day of leave.

1.8.13 In case of overlapping of leave such as in a summer, then the whole members of the department should meet and discuss the situation and come to agreement.

1.8.14 Emergency leave will be approved by the Head of the Department then the applier should arrange his on-call and his OPD clinic with his colleague to cover him.
1.9 **COMMUNICATION AND REPORTING**

1.9.1 Only Arabic and English languages are to be spoken in the hospital.

1.9.2 Physicians’ are encouraged to learn as much Arabic as possible relative to their clinical area.

1.9.3 **Within the department**

1.9.3.1 It is the policy of the Critical Care department to improve the care provided to patients thru an effective communication system among all personnel working in the department. Meetings are convened regularly in order to discuss about provided care and all problems encountered aiming to improve service.

1.9.3.2 Regular department meetings are conducted at the conference room every *Wednesday*, chaired by Head of the Department or his designee, attended by ICU doctors and Head Nurse. Others will be invited if needed.

1.9.3.3 The agenda of the meeting will include specific points related to improving the service provided, as well as special concerns of the staff and any problems encountered during course of patient care.

1.9.3.4 In the meeting all points included in the agenda will be discussed. Further points will be suggested by attendants for discussion in the next meeting.

1.9.3.5 Plan for suggested action to sort out problems and improve quality will be approved and duties will be assigned.

1.9.3.6 Summary of the minutes of the meeting, suggested plan and assignment of duties will be finalized and included in the appropriate logbook.

1.9.3.7 All such meeting will be recorded in the appropriate logbook.

1.9.3.8 All unusual incidences will be reported by filling up the incident report form and will be communicated to the appropriate authority.

1.9.4 **Communication with patients/family/community**

1.9.4.1 Family members are continuously informed by ICU Registrars/Consultant regarding the condition and prognosis of the patient. This is documented in the Physicians progress note.

1.9.4.2 Where matters of importance need to be communicated it is advisable to obtain an Arabic speaker, eg. Translator to ensure that the patient receives the correct message.
1.9.5 Communication with other departments

1.9.5.1 Referral forms are forwarded from and to the ICU department from other department. A copy of the referral form is kept in the patient’s file.

1.9.5.2 Meetings are held with the members of other department as dictated by the patient’s condition.
Organizational Chart

Head of the Department

MICU Unit Head

MICU Consultant

Senior Registrar

Registrar

Resident

SICU Unit Head

SICU Consultant

Senior Registrar

Registrar

Resident
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To establish guideline in providing favorable environment to patients.

3.0 POLICY:

3.1 All Registered Nurses are responsible and accountable to give proper orientation to all patients admitted in the ICU (when applicable).

3.2 KNOWLEDGE AND EXPERTISE:
3.2.1 Nursing staff will meet the expected level of performance as defined in their job description or have an action plan to meet expectations.

3.2.2 Clinical practice will be based upon following of standards of care and hospital based policies and procedures

3.3 EFFICIENCY:

3.3.1 Nurses will remain with assigned patient following shift report.

3.3.2 Staff will organize work to maximize time available for responding to patient needs. Organization is demonstrated by:
3.3.2.1 Coordinating information and organizing supplies to minimize travel time on and off the unit.
3.3.2.2 Concise and prompt documentation.
3.3.2.3 Ability to communicate important information to unit staff quickly at shift change.
3.3.2.4 Completing duties within assigned shift.
3.4 **PROFESSIONALISM:**

3.4.1 Staff will act in a manner that maintains a professional environment. 

**Guidelines include:**

3.4.1.1 Reasonable noise and light levels. Night shift noise levels will be subdued and quiet.

3.4.1.2 Keep personal conversations to non-patient care areas.

3.4.1.3 Keep discussions of job related problems/issues to non-patient care area.

3.4.1.4 Staff work load will not be discussed with patients.

3.4.1.5 Neat professional attire will be worn that identifies for patients and visitors that staffs are part of the unit. Proper name tags and ID will be clearly visible at all times.

3.4.1.6 Staff will consistently demonstrate a willingness to assist patients and visitors in all hospital areas who appear to need assistance.

4.0 **PROCEDURE:**

4.1 Patients/family will be greeted by a nurse upon arrival to the unit.

4.2 All patients/family will receive an orientation to the unit upon arrival by their assigned nurse. If that nurse is unavailable, a nurse colleague will assure completion of the orientation.

4.3 The environmental orientation will include:

4.3.1 Orientation to the following

4.3.1.1 Patient room

4.3.1.2 Patient services

4.3.1.3 Telephone numbers of ICU

4.3.2 Description of daily routines including meals, physician rounds and visiting guidelines.

4.3.3 Description and/or tour of the unit layout including location of patient care personnel and visitor areas.

4.3.4 Description of general hospital facilities, visitor accommodations.

4.4 Nursing staff will introduce themselves to patients and identify their titles at the beginning of each shift.

4.5 Patient/family will be provided information and encouraged to make informed decisions regarding their plan of care.

4.6 Patient/family will be involved in daily planning by 9:00 AM (or following rounds) regarding procedures and treatments for that day. Information and discussion will include the reason for and when/where procedures will be performed.

4.7 Staff will follow up with physicians when patients/family have questions regarding care.
4.8 Patient communication will be in a friendly and courteous manner as demonstrated by such behaviors as:

4.8.1 Calm manner and pleasant tone of voice.
4.8.2 Body language that suggests staff interest and understanding of feedback from the patient and frequent eye contact.
4.8.3 Verbal communication that is responsive to patient questions or comments.
4.8.4 Attentiveness: which is a commitment of adequate time with the patient to provide explanations and answer questions. If the nurse does not have adequate time when questions arise, the patient will be told the nurse will return to the patient's room as soon as possible or at least before leaving work at the end of the shift to complete the discussion.
4.8.5 The timely use of translators to communicate with non-English speaking patient/family.

4.9 Information will be communicated in terms the patient/family can understand. Nurses will elicit feedback by asking questions to validate patient/family understanding.

4.10 Every effort will be made to involve patients in planning and to explain care as it is being provided.

4.11 The patient's nurse will inform patient/family when they leave the unit for breaks and meals and tell them who will respond to their needs.

4.12 All communication with patient/family relating to the patient's case and/or treatment will be treated confidentially and not disclosed to others unless such disclosure is needed for patient care. Discussion of all patient information to other staff will occur in a setting and volume that cannot be overheard by other patients or visitors and documented in Nurses Progress Notes.

5.0 REFERENCE:

1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective regulation and control of verbal orders.

3.0 POLICY:

3.1 All Registered Nurses are responsible and accountable to ensure safe and effective control of verbal orders.

3.2 Verbal orders shall only be taken by a ICU Nurse.

3.3 Verbal orders should only be used in emergency situations, but not limited to code blue.

3.4 Medications used in an emergency must be written by the ICU Physician immediately following the emergency.

3.5 Medications used in an emergency must be checked and signed by the ICU Nurse immediately following the emergency.

4.0 PROCEDURES:

4.1 The ICU Nurse should repeat the order to the prescribing doctor to ensure that the details are correct before administration.

4.2 Medication used in an emergency must be counter checked and signed by two (2) ICU Nurses before administering.

4.3 Any doubtful order that needs to be clarified by the ICU Nurse should seek clarification from the prescribing ICU Physician to ensure safe administration of medication in accordance with KKUH medication administration policy.

4.4 When the emergency situation is over the verbal order must be written, signed, timed and dated by the prescribing Physician soon after the emergency.
4.5 Administration of oxygen therapy without prescription is appropriate while waiting for medical assistance.

5.0 **REFERENCE:**


5.3 Health Practitioners Competence Assurance ACT 2003.
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective equipment and supplies are available to support the critically ill patients.

3.0 POLICY:
All Registered Nurses are responsible and accountable to ensure availability and efficiency of unit equipments.

4.0 PROCEDURES:
4.1 Check all the equipments in each shift.
4.2 Faulty equipments to be reported immediately to the engineering/maintenance department and follow up.
4.3 Ensure enough supply of consumable items are available.

5.0 FORMS AND ATTACHMENTS:
List of Unit Equipments

6.0 REFERENCE:
1.0 CONDITIONS:
All ICU Registered Nurses.

2.0 PURPOSE:
To ensure safe and effective procedure on admission to ICU’s is followed.

3.0 POLICY:
3.1 All ICU Registered Nurses are responsible and accountable to ensure safe and effective admission of patients to ICU’s.
3.2 All admissions from DEM, other hospitals, and transfers from other units should be accepted by the ICU Consultant.
3.3 All admission in the ICU, a baseline septic screening as infection control guidelines must be done. (See ICU Admission Protocol).

4.0 PROCEDURE:
4.1 Pre Admission
4.1.1 Assigned nurse, prepare the bed and the bedside area, get the patients details and get ready for the paper works.
4.1.2 Check the following for readiness of use:
4.1.2.1 Oxygen and suction unit.
4.1.2.2 Ambu bag, mask and airway.
4.1.2.3 Bedside trolley with necessary items.
4.1.2.4 Bedside monitor and accessories.
4.1.2.5 Crash Cart
4.1.2.6 If the Physician ordered for any procedure like arterial line, swan-ganz or CVP Line insertion or intubation etc. needed items can be prepared in advance.
4.1.2.7 Prepare ventilator as required.
4.2 On Admission

4.2.1 The admitting Nurse with another Nurse will receive the patient to transfer to bed, hook to cardiac monitor, if ventilated hook to ventilator, and IV fluids must be transferred to IV pumps.

4.2.2 Perform quick physical assessment by system wise. Examine patient’s skin condition in front of the accompanying Nurse.

4.2.3 Before shifting to bed observe the condition of the patient and report to the Physician for any deterioration and needs immediate care.

4.2.4 The admitting nurse will check the yellow file, addressograph, Physician’s order for admission, investigation and procedure reports.

4.2.5 All IV lines, ETT, tracheostomy tube, NGT and catheters must be checked for dates of insertion.

4.2.6 All IV infusions should be checked by both Nurses as to rate, drug name and volume concentration, current treatments and nutrition.

4.2.7 Check for valuables list, ID band and patient eligibility.

4.2.8 Check reportable cases are notified to infection control or Ministry of Health.

4.2.9 Get the contact numbers from the relatives.

4.2.10 Check previous Physician’s order.

4.2.11 Routine blood works or other investigation to be done as per unit admission protocol or Physician’s order. (See ICU Admission Protocol).

4.2.12 Check Physician’s order for:
   4.2.12.1 DVT and PUD prophylaxis
   4.2.12.2 Nutrition

4.2.13 Carry out Physician’s order.

4.2.14 If ventilated, ETCO₂ to be connected.

4.2.15 Maintain patient’s privacy at all times.

4.2.16 Make sure computer, log book, diet and pharmacy are updated.

4.2.17 Document clearly in the Nurses Progress Notes.

4.2.18 The Charge Nurse will inform supervisor / ADON for the admission.

5.0 FORMS AND ATTACHMENTS:

5.1 ICU Admission Protocol.

5.2 Nursing Admission Assessment Checklist.

6.0 REFERENCE:

ICU ADMISSION PROTOCOL
(PROTOCOL 004 -A)

1.0 ROUTINE ADMISSION BLOOD WORKS:
1.0 CBC, Diff. count
1.1 U/E, RBS, S. Osmol., S. Cal+, Mg, PO4, Cardiac Enzymes, Lactic Acid, LFT, Lipid Profile.
1.2 PT, APTT, FIB, INR, D Dimer
1.3 Baseline screening:
   • C/S nostril, axilla, groin swab.
   • Swab from wound, bedsore and invasive line sites.
1.4 Cultures:
   • Sputum - with tracheostomy / ETT
   • Blood - possible Infection
   • Urine - with foley’s catheter
   • If temperature is above 38°C do the blood C/S two (2) times in different site.
1.5 ET aspirate/sputum for fungal smear, C/S and gram stain
1.6 HBsAG, HCV
1.7 ABG, CXR, ECG
1.8 Urine dipstick, Gluco check

2.0 DAILY ROUTINE BLOOD WORKS:
2.1 U/E, RBS, S. Osmolality
2.2 Calcium, Albumin to be added in surgical patients.
2.3 CBC, Diff. Count
2.4 PT, APPT, FIB, INR
2.5 Chest X-ray

3.0 TUESDAY AND SATURDAY BLOOD WORKS:
3.1 U/E, RBS, S. Osmol, Ca+ Mg, PO4, Cardiac Enzymes, LFT,
3.2 PT, APPT, FIB, INR, D Dimer.
3.3 CBC, Diff. Count
3.4 Serum amylase (for abdominal injury patients).
# Nursing Admission Assessment Checklist

**Protocol 004-B**

## 1 Integumentary System:
- Assess skin and mucous membrane for integrity, turgor, moisture and general appearance.
- Assess skin for color venous pattern purities dryness.
- Assess wounds and incision for healing or drainage.
- Assess risk and/or presence of pressure sores or ulcers.
- Palpate as indicated for changes from normal such as pain edema altered temperature.
- Assess for presence of rash and skin lesions.
- Note any alterations in skin integrity such as scars, rashes, sores, lesions, bruises, hematoma, lacerations and discoloration that is suggestive of ABUSE.

## 2 Central Nervous System:
- Assess level of consciousness orientation (time, place and person.)
- Assess mental status.
- Assess for comfort or presence of pain. (Location, duration, type, and any treatment).
- Assess sensory function and determine if normal or impaired.
- Assess for occurrence of numbness, tingling or burning sensations.
- Assess motor function including hand grips, foot strength movement and posture.
- Assess for presence of seizures or tremors.
- Assess for speech function.

## 3 Respiratory System
- Assess general appearance and adequacy of respiration. Note patients breathing if regular, irregular, labored or non-labored.
- Assess rate, rhythm and quality.
- Inspect for clubbing fingers.
- Use of accessory muscles, size of thorax and spinal deformities.
- Palpate for tracheal position, presence of subcutaneous emphysema and respiratory distress.
- Auscultate the chest for breath sounds, Presence of adventitia (wheezes -crackles).
- Assess for cough (duration, frequency and occurrence). If productive note character and amount of secretions.

## 4 Cardiovascular System
- Assess pulse for rate, rhythm, quality, and presence of pulse deficit.
- Assess blood pressure, equality and pulse pressure.
- Inspect neck veins.
- Assess temperature.
- Palpate to determine presence of heaves or lifts.
- Auscultate heart sounds for presence of S1 and S2 murmurs and rubs.
- Inspect and observe for cyanosis or flushing.
**5 Gastrointestinal System:**

- Inspect appearance, size, contour, any visible pulsations and skin integrity. Note for any localized distention, irregular contours, rashes, dilated veins and scars.
- Auscultate for bowel sounds.
- Palpate the abdomen to determine if it is soft, hard, and distended.
- Presence of masses or ascites.
- Assess for nausea or vomiting.
- Assess diet for: type, amount, tolerance and dietary restriction.
- Assess for recent change in weight.
- Assess for change in appetite and ability to swallow.
- Inspect the ileostomy or colostomy. Check for function, condition of stoma and skin.
- Assess the elimination patterns and characteristics of stool.

**6 Urinary System:**

- Assess usual pattern of urinary output (amount, color, sediment and clarity).
- Assess complaints of frequency, urgency, hesitation. Dysuria and hematuria.
- Palpate the bladder for distention and tenderness.
- Inspect urostomy (condition of skin and stoma).
- Inspect inguinal or femoral areas for any bulges.
- Assess the genital systems by looking for ulcers, scars, nodules, masses, signs of inflammation and inspect for discharge.

**7 Musculoskeletal System:**

- Assess limb movement (full range of motion, strength and equality).
- Assess muscle pain, cramps and spasms.
- Assess for joint pain or stiffness.
- Assess ability to sit, turn, stand and walk.
- Assess posture and gait.
- Determine assistance or ambulatory aids requirement.

**8 Psychological System:**

- Assess feeling about health and any concern.
- Assess for anxiety, mood changes or depression.
- Assess the adequacy of patient support system.
1.0 CONDITIONS:
All Registered Nurses (ICU)

2.0 PURPOSE:
To ensure safe and effective care of critically ill patients in ICU.

3.0 POLICY:
All Registered Nurses are responsible and accountable to ensure safe and effective nursing care for patients in ICU.

4.0 PROCEDURE:
4.1 All patients admitted to ICU must meet these needs by following each protocols:
   4.1.1 Eye Care
   4.1.2 Mouth Care
   4.1.3 Perineal/Catheter Care
   4.1.4 Skin Integrity
   4.1.5 Nutrition

4.2 Bed Bath and Hair Wash to be done every other day and PRN by night shift.
4.3 Invasive Line dressing must be check and change every 72 hours as per protocol.

5.0 FORMS AND ATTACHMENT:
5.1 Eye Care Protocol
5.2 Mouth Care Protocol
5.3 Perineal / Catheter Care Protocol
5.4 Skin Integrity Protocol
5.5 Invasive Line Dressing Changes Protocol
5.6 Nutrition Protocol
6.0 **REFERENCE:**

6.1 www.medicineau.net.au

1.0 Equipment:

1.1 Sterile Cotton balls
1.2 NS
1.3 Sterile gloves
1.4 Sterile container
1.5 Kidney Basin
1.6 Eye pads/ Film/ Shield
1.7 Tape
1.8 Eye lubricant (Natural tears, Refresh) Lacrilube ointment.

2.0 Procedure:

2.1 Wash hands and wear gloves.
2.2 Clean the eyes with wet (NS) cotton balls.
2.3 Wipe gently from inner to outer cantus of the eyes.
   • Repeat if needed, remember to note the reaction of the pupils.
   • Observe for:
     ➢ Redness
     ➢ Bleeding
     ➢ Edema
     ➢ Discharges.
     ➢ Refer to ICU Physician for any deviation from normal.

2.4 After two (2) hours alternate with application of eye lubricant (Lacrilube ointment), close the eyelid. Apply the eye pads or eye shield and tape it. (See attachment on “Application of Lubricating Ointment to the Eye”).

2.5 Document observation and information pertinent to the procedure.
1.0 **Equipment:**

1.1 Mouth wash solution (Chlorosept)
1.2 Kidney Basin x 2
1.3 Wooden spatula
1.4 Sterile 4 x 4 gauze
1.5 50 ml syringe
1.6 Blue pad
1.7 Suction catheter
1.8 Gloves and masks
1.9 Lemon glycerin swab
1.10 Lips moisturizer (vaseline)

2.0 **Procedure:**

2.1 Gather all the equipment needed.
2.2 Ensure privacy and explain the procedure when applicable to the patient.
2.3 Place patient in a semi-fowlers position (if not contraindicated).
2.4 Place blue pads on top of the patient’s chest.
2.5 Wash hands thoroughly and wear gloves afterwards.
2.6 Pour undiluted mouth wash solution (chlorasept) in the kidney basin.
2.7 Aspirate enough amount of chlorasept in the 50 ml syringe.
2.8 Administer the mouth wash solution slowly inside the mouth and suction. Repeat procedure if necessary.
2.9 If oral thrush is noted. Wrap the spatula with the sterile 4x4 gauze soaked with chlorasept and clean in between tongue, gums, teeth and repeat procedures as necessary.
2.10 Refer to ICU Physician any unusual finding. i.e. oral thrush, ulcers, bleeding and loose dentures.
2.11 Finally, apply glycerin swab stick for fresher smell.
2.12 Discard used materials to appropriate waste bin.
2.13 Wash hands after the procedure.
2.14 Document the unusual findings (if any).
PERIPHERAL LINE - INSERTION PROTOCOL
(PROTOCOL-012 D)

1.0 INSERTION

1.1 Equipment:

- Gloves, Yellow gown, and Mask (if necessary)
- Tourniquet
- Sterile gauze 4 x 4
- Intravenous Cannula (appropriate size)
- Locking leur male adapter plug small extension
- 5cc syringe with saline
- Transparent IV dressing
- IV cannula label
- Sharp container
- Kidney basin

1.2 Procedure:

- Identify the patient by ID band and name.
- Explain the procedure to the patient if conscious.
- Wash hands and put on gloves.
- Select suitable vein and cannula.
- Apply tourniquet tightly 4-6 inches above the selected area.
- Instruct the patient to clench and unclench fist.
- Clean the skin with alcohol swabs and allow to dry.
- Hold the device at a 30 degree angle alongside the wall of the vein in the direction of and near intended site of injection, pierce skin.
- Decrease angle of needle until it is nearly parallel with the skin and slightly to one side of the vein. Apply pressure in same direction as puncture and enter the vein.
- If there is a backflow of blood through the needle the vein has been entered, decrease angle of needle to 10 degrees and advance cannula.
• Release tourniquet.

• Connect adapter plug or extension to catheter hub and flush with saline.

• Clean the area and put the label with date, time size of cannula and the name of person who insert cannula.

• Apply transparent dressing wash hands and documentation.
1.0 Procedure:

1.1 All patients will have skin integrity risk assessment calculated using the Norton Score system:
   • On admission to the unit
   • Following any change in their condition.

1.2 For all at risk patients, pressure relieving devices must be used. If not available, can be ordered from the central store with a Physician’s order.

1.3 Treatment of pressure sores as per Physician’s order.

1.4 Regular evaluation of the skin and grading of pressure sore and documentation must be done.

1.5 Turn patients regularly every two (2) hours.

1.6 Back rubbing to be done every two (2) hours, even if side lying position is contraindicated.

1.7 Pay more attention and care to the different skin folds of the body.
1.0 All Invasive line dressings will be changed every 72 hours and as needed.

2.0 Equipment:
   2.1 Alcohol
   2.2 Povidone 10% /Chlorhexedine 2%
   2.3 OpSite/tape
   2.4 Sterile gauze 2 x 2
   2.5 Gloves (2 pairs sterile gloves)
   2.6 Dressing set

3.0 Procedure:
   3.1 Identify patient by ID band and name.
   3.2 Explain procedure to patient, if applicable.
   3.3 Wash hands and put on gloves.
   3.4 Remove old dressing and discard appropriately.
   3.5 Reassess insertion site.
   3.6 Remove gloves and wash hands. Put on sterile gloves.
   3.7 Clean insertion site to periphery (2 inches from site) in a circular motion. Repeat three (3) times with Povidone 10% or Chlorhexedine 2%.
   3.8 Allow skin to air dry.
   3.9 Apply sterile 2 x 2 gauze over the site.
   3.10 Place OpSite over dressing site.
   3.11 Remove gloves and discard to appropriate waste bin.
   3.12 Documentation:
       • Date and time dressing changed.
       • Appearance of insertion site.
       • Nurse’s signature.
**NUTRITION PROTOCOL**

**(PROTOCOL-005 F)**

**PARENTERAL NUTRITION**

1.0 Parenteral Nutrition to be administered as per physician’s order.

**ENTERAL NUTRITION**

1.0 **Equipment:**

1.1 Prescribed enteral formula.
1.2 Feeding bag with administering set.
1.3 Feeding pump
1.4 50ml syringe
1.5 Tape
1.6 Stethoscope
1.7 Kidney basin
1.8 Gloves

2.0 **Procedure:**

2.1 Gather all equipment and supplies.
2.2 Explain the procedure to the patient (if applicable).
2.3 Review Physician’s order.
2.4 Perform proper hand washing.
2.5 Wear gloves.
2.6 Check placement of feeding tube.
2.7 Elevate the head according to protocol.
2.8 Close clamp in the enteral feeding bag and pour formula for the four (4) hours feed.
2.9 Hang the feeding bag on an IV pole and prime the tubing by purging the system. Load administration set into the enteral feeding pump.
2.10 Check for gastric residual before starting the feeding.
2.11 Remove gloves and wash hands.
2.12 Follow protocol on Enteral Feeding.
2.13 Document observation and information pertinent to the procedure.

3.0 **Routine Nursing Evaluation:**
   3.1 Keep patient head elevated by 30-45 degree.
   3.2 Record admission height & daily weights.
   3.3 Document stool frequency.
   3.4 Flush feeding tubes every 4-6 hr with 20-30 ml of water as well as whenever administration.
   3.5 For clogged feeding tube, flush with 20-30 ml warm water.

4.0 **Aspiration Precautions:**
   4.1 For gastric tubes, check residual volumes (RV) every 4 hours and document in chart.
   4.2 For RV < 150 ml, return the aspirate & increased feeding 10 ml/hr every 4 hour.
   4.3 For RV > 150ml, hold feeding for 2 hr & resume feeding at previous rate.
   4.4 Re-check residual after 4 hours.
   4.5 If > 150 again, hold feeding for 2 hr & resume feeding at 50 % of the previous rate.
   4.6 If residual volume remains high call physician (Consider Prokinetic agents, or post-pyloric type tube).
   4.7 For patients with post-pyloric tubes, do not routinely check residuals. However, if the patients develops abdominal distention, ileus or vomiting, attempt aspiration through the feeding tube. If failed, place another nasogastric tube and follow steps 2-5.

5.0 **Feeding Interruptions:**
   5.1 Do not stop tube feeds for diagnostic tests, usual nursing care, or routine bedside procedures unless specially order by the physician.
   5.2 If feeding had to be stopped, resume feeding at the same rate preceded by the interruption.

6.0 **Pro Kinetic Agents:**
   6.1 Metoclopramide 10mg IV q 8 hours.
   6.2 Erythromycin 200mg IV /PO q 8 hours.
   6.3 Combination may consider.
1.0 CONDITIONS:

All Registered Nurses (ICU).

2.0 PURPOSE:

2.1 To ensure safe and effective transfer of patients from:
   2.1.1 ICU to ICU
   2.1.2 ICU to general ward

3.0 POLICY:

3.1 All Registered Nurses are responsible and accountable to ensure safe transfer of patient from:
   3.1.1 ICU to ICU
   3.1.2 ICU to general ward

4.0 PROCEDURE:

4.1 Obtain Physician’s order.

4.2 Confirm the bed availability in the ward or other ICU.

4.3 Explain to the patient or relative.

4.4 Inform to the receiving area about the lines, condition of patient, any positive cultures any equipments to be prepared (oxygen, low suction, IV pump, etc.)

4.5 Establish a good peripheral line (20 or 22G IV cannula), If required.

4.6 Remove invasive lines and drains as per Physician’s order.

4.7 Complete interdepartmental transfer check list.

4.8 Check ID band.
4.9 Send blue file, yellow file, addressograph, x-ray or CDs from other hospital, medicines, spirometer, nebulizer kit and oxygen administration devices with patient.

4.10 Transfer the patient on bed/stretcher/wheelchair.

4.11 Transfer the patient to other bed and make him comfortable.

4.12 Give detailed endorsement to ward Registered Nurses including skin integrity and valuables.

4.13 Get receiving nurse’s signature on interdepartmental transfer check list.

4.14 If patient has any valuable (eye glasses, dentures etc.) must be checked by two (2) Nurses (transferring and receiving Nurse) and sign the concerned form by the two Nurses.

4.15 Transfer patient from HIS to concerned ward and discharge from central monitor right from the time the patient leave the unit.

4.16 Log out patient from the register book.

4.17 Discard used disposable items from bedside and clean the area according to infection control guidelines.

4.18 Replace all necessary items at bedside for new admission.

4.19 **Transfer to other ICU:**

4.19.1 Monitor HR, ABP and SpO₂ during transportation.

4.19.2 Keep the invasive lines according to Physician’s order.

4.19.3 Check and reconfirm bed availability just before transfer.

4.19.4 Transfer the patient with the presence of a Physician.

5.0 **REFERENCES:**

1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective intubation process.

3.0 DEFINITIONS:
Intubation is the insertion of an endotracheal tube through the oral/nasal to permit mechanical ventilation and to facilitate secretion removal.

4.0 POLICY:

4.1 All Registered Nurses are responsible and accountable to ensure safe and effective intubation process by providing assistance to physician.

4.2 It is the responsibility of ICU Nurse to prepare all required equipment to assist in intubation.

5.0 EQUIPMENT:

5.1 Endotracheal tubes of the estimated size needed, one-half size larger, and one-half size smaller:
   
   5.1.1 The formula for estimating tube size in paediatric patients up to age 12 is (age in years + 16)/4.

5.2 Sterile gloves
5.3 10 cc syringe
5.4 Cardiac monitor
5.5 Endotracheal tube fixation device or tape
5.6 ETCO₂ Monitor
5.7 Laryngoscope and blades with functional bulbs.
5.8 Manual resuscitator and appropriate size mask.
5.9 Oral airways
5.10 Pulse oximeter
5.11 Stethoscope
5.12 Stylet
5.13 Yankeur suction
5.14 KY jelly
5.15 For difficult intubation:
  5.15.1 Boogie
  5.15.2 Laryngeal Mask Airway with different sizes.
  5.15.3 Video laryngoscope

6.0 PROCEDURE:

6.1 Gather, prepare and test the equipments:
  6.1.1 Initiate cardiac monitoring, pulse oximetry and ETCO₂ monitoring.
  6.1.2 Prepare the Sedative drugs or Paralytic agent as ordered.
  6.1.3 Connect the manual resuscitator and mask to oxygen.
  6.1.4 Test the pilot balloon on the endotracheal tube, insert the stylet, and lubricate the tube.
  6.1.5 Test and tighten the laryngoscope blades' bulbs.

6.2 Wear PPE.

6.3 Position the patient appropriately.

6.4 Hyper oxygenate the patient with resuscitation bag, mask and 100% oxygen.

6.5 Assist the physician as needed during the intubation with:
  6.5.1 Suctioning
  6.5.2 Patient repositioning
  6.5.3 Cricoids pressure
  6.5.4 Bag/mask ventilation
  6.5.5 Supplies needed

6.6 Monitor the oxygen saturation using the pulse oximeter and notify the physician if saturation falls below 90%. Assist with re-oxygenation.

6.7 Once endotracheal tube is inserted, place ETCO₂ adapter between the endotracheal tube and the resuscitation bag.

6.8 After proper placement has been confirmed, connect the ET to the ventilator, note the "cm" marking on the tube at the position of the lip, and secure the tube.

7.0 REFERENCE:

7.1 Fundamental of Respiratory Care EGAN'S. 2003.

7.2 American Association for Respiratory Care Clinical Practice Guideline "Intubation Assistance".
1.0 **CONDITIONS:**
All Registered Nurses (ICU).

2.0 **PURPOSE:**
To ensure safe and effective care and management of ventilated patients in ICU.

3.0 **POLICY:**
All Registered Nurses are responsible and accountable to ensure safe and effective care and management of ventilated patients in ICU.

4.0 **PROCEDURE:**

4.1 Perform proper assessment of patients on mechanical ventilator and report any deviation and document any pertinent findings.

4.2 Perform the following as per protocol:

4.2.1 Airway Suctioning
4.2.2 Endotracheal Tube Care and Maintenance
4.2.3 Humidification
4.2.4 Cuff Pressure Monitoring
4.2.5 ETCO₂ Monitoring

5.0 **FORMS AND ATTACHMENT:**

5.1 Airway Suctioning Protocol
5.2 Endotracheal Tube Care and Maintenance Protocol
5.3 Humidification Protocol
5.4 Cuff Pressure Monitoring Protocol
5.5 ETCO₂ Monitoring Protocol

6.0 **REFERENCES:**
American Association for Respiratory Care 2005.
AIRWAY SUCTIONING PROTOCOL
(PROTOCOL-008 A)

1.0 Equipments:

1.1 Appropriate different size of sterile suction catheter:
- ID Tube (Size)/patient Catheter size
  - 8.0-9.5/avg. adult 14 French
  - 5.0-7.5/child, sm. adult 10 French
  - 4.0-4.5/ infant, sm. Child 8 French
  - 2.5-3.5/infant 6 French

1.2 Appropriate size of in-line suction catheter (closed tracheal suction system):
- ID Tube (Size)/patient Catheter size:
  - 6.0-6.5/lg. child 12 French
  - 7.0-9.5/adult 14 French
- Suction source that is capable of generating up to 300-600 mm Hg vacuum pressure with connecting tubing:
  - Vacuum pressure for:
    - Adults = 100-120 mm Hg
    - Children = 80-100 mm Hg
    - Infants = 60-80 mm Hg

- Sterile/non-sterile gloves, as appropriate.
- Manual resuscitator and mask (with PEEP valve, if appropriate) and oxygen source for intubated patients; supplemental blow-by oxygen for non-intubated patients.
- Soluble lubricant for Nasotracheal suctioning of the non-intubated patient.
- Sterile water for clearing clogged catheter.
- Universal precautions attire.
- Sterile specimens trap (if indicated).
- 0.9% NaCl for lavage, if indicated by inspected secretions
2.0 Procedure:

2.1 Gather equipment, and wash hands.

2.2 Assess the patient by inspection and auscultation.

2.3 Inform the patient of the procedure (if applicable).

2.4 Use Personal Protective Equipment.

2.5 Turn on the vacuum regulator and adjust the pressure as appropriate.

2.6 Pre-oxygenate the patient with 100% oxygen.

2.7 Routine Nasotracheal Suctioning or Suctioning of Artificial Airways:

- Open the catheter kit and use the gloves while maintaining sterility.
- Lubricate the catheter at this time, if appropriate.
- Connect the catheter to the vacuum tubing.
- Suctioning the airway:
  - For intubated patients, insert the catheter into the airway until an obstruction is met, or the patient coughs then withdraw about one cm.
  - For very young patients, the catheter need only be withdrawn approximately ½ cm at this point.
  - For Nasotracheal suctioning of non-intubated patients, blowing of the nose and use of an antiseptic mouthwash prior to the procedure may minimize the risk of tracheal infection.
  - Positions the head so that the neck is mildly hyper extended, and insert the lubricated catheter into one of the nares. Advance the catheter slowly during inspiration.
  - Except in the most obtunded patient, vigorous coughing will result when the catheter passes into the trachea. Pass the catheter until resistance is met, and then pull back about one (1) cm, or ½ cm in very young patients.
  - Alternatively, measure the depth of insertion by summing the length of the airway adaptor and the distance to the tip of the endotracheal or tracheostomy tube. Insert the suction catheter only to this depth.

- Suction should not be applied for more than fifteen (15) seconds, and ventilation and oxygenation should not be interrupted for more than twenty (20) seconds in adults.

- For pediatric patients, suction should be applied for no more than five (5) seconds, and the total interruption to ventilation and oxygenation should not exceed ten (10) seconds.
- **Re-oxygenate and hyperventilate** the patient prior to performing another suction maneuver.

- Ensure stable vital signs prior to reinsertion of the catheter.

- Repeat the suctioning procedure up to **three (3) times**.

- For **Nasotracheal suctioning**, it may be helpful to withdraw the catheter into the airway above the epiglottis, without completely removing it, between suction passes.

- If the patient has tenacious secretions, sterile 0.9% NaCl is instilled prior to suctioning to facilitate loosening and removal of the secretions, as necessary.

- Ventilation of the patient with a manual resuscitator immediately following instillation.

**2.8 Use of the Closed Tracheal Suction System:**

- Place the 24 hour change out sticker over the suction valve on the in-line suction catheter. Closed suction catheter.

  - Catheters must be **changed every 24 hours or as per manufacturers’ instructions and PRN**.

  Attach wall suction tubing to the control valve.

- Insert the T-piece between the endotracheal/tracheostomy tube and the ventilator circuit.

- Open the irrigation port, and attach a 0.9% NaCl syringe.

- For **sputum collection**, connect specimen trap inline between the suction control valve and the suction tubing. Suction patient as described below.

  - Collection of sputum through closed catheters is only completely free of contaminants when first used.

- Pre-oxygenate the patient with 100% oxygen.

- Grasp the T-piece with one hand and advance the catheter using the thumb and forefinger of the opposite hand.

- If **opting to lavage**: Advance the catheter approximately four (4) inches for endotracheal tube and two (2) inches for tracheostomy tube. Install 3-5 ml of 0.9% NaCl from the vial during inspiration and immediately advance the catheter down the tube to the desired depth. For pediatric patients instill only 0.3 – 0.5mL.

- Withdraw the catheter slowly while depressing the suction control valve. Do not remove the catheter until the valve is fully depressed. Stabilize the T-piece with your non-dominant hand while withdrawing the catheter.

- Withdraw the catheter to its full extent (black line must be visible within bag).

- Pre-oxygenate the patient prior to performing another suction maneuver. Ensure stable vital signs prior to reinsertion of the catheter.
• Repeat the suctioning procedure until secretions is cleared from the airway and breath sounds are improved.

2.9 Post Procedure:

• Rinse the suction tubing in water after the procedure to prevent clogging of the vacuum apparatus.
• Assure that the patient is comfortable, and that vital signs are stable before leaving the bedside.
• Immediately discard the dirty catheter and gloves appropriately.

2.10 For use of the closed tracheal suction system:

• Instill at least 5 ml of 0.9% NaCl while applying continuous suction via the suction control valve to clean the catheter. For pediatric patients 0.5 – 1 mL.
• Do not allow secretions to remain in the catheter or suction line after suctioning, since these may dry and harden, reducing line suction efficiency.
• Cap the lavage port after removing the normal saline vial. Discard the empty vial.
• Rotate and lock the suction control valve.
ENDOTRACHEAL TUBE CARE AND MANAGEMENT PROTOCOL
(PROTOCOL-008 B)

1.0 Equipments:

1.1 ETT Inflator
1.2 ETT tie
1.3 Gloves
1.4 ETT level marker
1.5 Sterile 4 x 4 gauze
1.6 Stethoscope
1.7 Adhesive tape (urgoderm)
1.8 Benzoin and cotton tip applicators.

2.0 Procedure:

2.1 FOR ADULT PATIENTS:

- Secure ETT using securing device.
- Tie is doubled and the loop end placed near the ETT. The two ends of the tape are then passed around the tube and through the loop forming an initial knot that is tied firmly. A reef knot is then tied over this.
- The end of the tie are then passed around the patient’s neck and tied at the side of the neck using a reef knot and keep 2 pieces of folded 4 x 4 gauze in each cheek.
- The tie should be tight enough to prevent migration of the tube but must allow one finger to be placed under it at any point.
- Chest x-ray must be done daily to confirm position of ETT.

2.2 FOR PEDIATRIC PATIENTS:

- Tear two (2) pieces of adhesive tape to the appropriate length for the size of child.
- Tear each piece of tape in half lengthwise with at least one (1) inch left whole at the end.
• Paint upper lip, cheek and lower lip with adhesive skin preparation (Tincture Benzoin).

• When the preparation dries to a sticky consistency apply tape, starting on one side of the face, apply the whole end of tape to cover the prepared skin and spiral top half of the split tape securely around the tube. Leave a piece of tape turned over at the end to aid in removal.

• Secure bottom half of the split tape across the top lip of child, with extension to opposite cheek and into the prepared skin. Repeat these steps to opposite side of the face as well.

• Document observation and information pertinent to the procedure.
HUMIDIFICATION PROTOCOL
(PROTOCOL-008 C)

1.0 Equipments:

1.1 Sterile water
1.2 Heated humidifier
1.3 Heat and Moisture Exchanger with sensor

2.0 Procedure:

2.1 Pour water to the humidifier chamber until the marked line and ambu bagging must be done while refilling.
2.2 Set the recommended humidification temperature to reach the proximal airway temperature 37°C.
2.3 Water level should be always maintained on the mark level:
   • For manual set-up of temperature.
     ▶ Adult = -2/39°C.
     ▶ Pediatrics = -2/38°C.
2.4 Periodically check the temperature by holding or feeling of the respiratory circuit.
2.5 If malfunction of the device is suspected:
   • Remove the device from the patient and ensure appropriate oxygenation and ventilation.
   • Do not reinstitute mechanical ventilation with the device until troubleshooting maneuvers validate proper function.

3.0 Precaution:
3.1 HMEs should be inspected with each patient ventilator system check and replaced if secretions have contaminated the filter.
3.2 Condensate in the patient circuit is considered infectious waste and should not be drained back into the humidifier reservoir and trachea.
3.3 Ventilated tubing’s should be lower than the Endotracheal Tube to prevent aspiration of condensate.

4.0 Adverse Reactions and Interventions:
4.1 An active humidifier should replace a HME if secretions become copious or appear increasingly tenacious.
CUFF PRESSURE MONITORING PROTOCOL
(PROTOCOL-008 D)

1.0 Equipments:

1.1 Portex-Cuff Inflator
1.2 Suction materials
1.3 5cc syringe

2.0 Procedure:

2.1 Prior to measure cuff pressure, suction ET tube/tracheostomy tube and oropharynx thoroughly.
2.2 If possible, position the patient in the supine position, if tolerated.
2.3 Attach a 5ml syringe to the pilot cuff, auscultation at the base of the patient’s trachea and aspirate just enough air to create a small leak at the peak of a positive pressure breath, and then add air until the leak disappears.
2.4 Remove the syringe from the pilot cuff.
2.5 Attach the Portex-Cuff inflator to the pilot cuff valve.
2.6 Read the centimeters of water pressure (cmH₂O) on the portex manometer at the peak of positive pressure and record.
2.7 Should a small leak occur during measurement, squeeze the bulb of the Portex Cuff inflator. This will inject air into the cuff, thus maintaining the centimeters of water pressure recorded.
2.8 Document cuff pressure on the ventilator sheet.
2.9 Portex manometers must be wiped down between patients with aseptic solution.
2.10 Maintain the cuff pressure in the green zone at all time.
ETCO₂ MONITORING PROTOCOL  
(PROTOCOL-008 E)

1.0 Principles:  
1.1 It represents PaCO₂ of all the ventilated alveoli.  
1.2 ETCO₂ concentration is 1-5 mmHg lower than the PaCO₂ value. Any condition that reduced pulmonary perfusion increases the difference between these two.

2.0 Equipment:  
2.1 End tidal CO₂ module on the monitor  
2.2 Cable and ETCO₂ adaptor

3.0 Procedure:  
3.1 Assemble equipment and assess proper functioning of it.  
3.2 Wash hands.  
3.3 Connect capnometer adaptor (side stream or mainstream) between ETT and Y-piece of ventilator circuit.  
3.4 Connect the cable to the module on the monitor and calibrate it (if indicated).  
3.5 Observe waveform for confirmation of airway patency.  
3.6 Observe waveform for poor plateau.  
3.7 Set age appropriate alarms for high and low ETCO₂ reading.  
3.8 Wash hands and document reading.
1.0 CONDITIONS:
   All Registered Nurses (ICU).

2.0 PURPOSE:
   To ensure safe and effective care of patient on HFOV.

3.0 POLICY:
   All Registered Nurses are responsible and accountable to ensure safe and effective care of patients on HFOV.

4.0 PROCEDURE:
   4.1 Suction child’s ETT before initiation of therapy.
   4.2 Prepare appropriate medication dose for sedation and neuromuscular blockage as per Physician’s order.
   4.3 Calibrate circuit and complete performance verification.
   4.4 Initiate ventilator settings after review of Physician’s order.
      4.4.1 Bias flow
      4.4.2 PaW
      4.4.3 Frequency
      4.4.4 ΔP (amplitude)
      4.4.5 Inspiratory time
      4.4.6 FiO₂
   4.5 Set manual piston centering.
   4.6 Set humidification to achieve proximal airway temperature of 36°C.
   4.7 Set ventilator alarms
   4.8 Position child and circuit to prevent pulling on tube and kinking.
4.9 Closed suction circuit should be used unless contraindicated to avoid disconnection of ventilator.

4.10 Reposition child as indicated and avoid pressure sores.

4.11 Both ears have to be plugged with cotton.

4.12 Eyes have to be protected with lubricant and eye pad.

4.13 Check train of four for the depth of paralysis every four (4) hours.

4.14 Vital signs monitoring as per policy.

4.15 Perform minimal handling.

4.16 Document the following:
   4.16.1 Date and time of HFOV initiated.
   4.16.2 Ventilator settings.

5.0 REFERENCES:
AACN Procedure Manual of Pediatric Critical Care.
1.0 CONDITIONS:
   All Registered Nurses (ICU).

2.0 PURPOSE:
   To ensure safe and effective extubation process.

3.0 DEFINITIONS:
   The ability of patient to ventilate and maintain normal breathing without the artificial airways.

4.0 POLICY:

4.1 All Registered Nurses are responsible and accountable to ensure safe and effective process of extubation and monitoring.

4.2 The Registered Nurse will document the following parameters on the ventilator flow sheet as part of the pre and post extubation assessment:
   4.2.1 O₂ saturation
   4.2.2 Heart rate
   4.2.3 f/Vt or respiratory rate
   4.2.4 Respiratory pattern
   4.2.5 Breath sounds

4.3 Notify ICU Physician if the following changes occur DURING or AFTER the procedure:
   4.3.1 Changes in O₂ saturation
   4.3.2 Heart rate
   4.3.3 Respiratory rate of greater than 10%
   4.3.4 Presence of a change in respiratory pattern or breath sounds (i.e. stridor, wheezing, etc.)
5.0 **EQUIPMENT:**

5.1 10cc Syringe
5.2 Suction apparatus with Catheter / Yankeur
5.3 Ambu bag
5.4 4 x 4 Gauze
5.5 Scissor
5.6 Blue pad
5.7 Intubation Tray
5.8 O₂ via Simple Face Mask /Venturi mask/Non-rebreathing mask.
5.9 Personal Protective Equipment
5.10 Adhesive Tape Remover

6.0 **PROCEDURE:**

6.1 Put the patient on **NPO** at least **six (6) hours before extubation**. Emergency intubation set should be ready before the extubation. If less than six (6) hours, aspirate nasogastric tube.

6.2 Set up the O₂ delivery system that will be utilized post-extubation.
   
   6.2.1 Ensure a functioning bag-mask system is connected to a flow meter is ready at the bedside for use.

6.3 Explain the procedure to the patient. Instruct the patient as to the importance of deep breathing, coughing, and about any systems that will be applied post extubations such as the O₂ delivery device or incentive spirometer.

6.4 Place the patient in **High Fowler’s position**.

6.5 Hyperoxygenate the patients at 100% for at least 60 seconds.

6.6 Prepare suction equipment.

6.7 Utilize a new suction catheter and insert the catheter just beyond the distal tip of the ET tube.

6.8 Remove tie from patient’s face while holding ETT in place.

6.9 Apply suction while totally deflating the ET cuff. The patient will likely be stimulated to cough at which time the ET tube as a unit with the suction catheter should be withdrawn while applying suction. The clinician that is deflating the cuff should pull the tube as they will have a better perspective of when the air is totally evacuated from the cuff.

6.10 **Extubation must be done by the Physician.**

6.11 Administer O₂ 10% higher than the previous oxygenation.

6.12 Reassure patient and for close observation.

6.13 Post Extubation:
6.13.1 Document date and time of extubation.
   6.13.1.1 Continue to monitor vital signs and airway assessment.
   6.13.1.2 Presence of Stridor
   6.13.1.3 Work of breathing (agonal and paradoxical)
   6.13.1.4 Observer for retraction.
   6.13.1.5 Auscultate breath sounds.

6.13.2 If the post extubation saturation falls below 92%, or the saturation limit specified by the physician, notify the physician.

6.13.3 Obtain ABG 30 minutes post extubation.

6.13.4 Encourage deep breathing.

6.13.5 Obtain a chest X-ray, if indicated.

6.13.6 Leave ventilator at the bedside at least for 24 hours.

7.0 FORMS AND ATTACHMENT:

7.1 Oxygen Administration Protocol
7.2 Incentive Spirometry Protocol
7.3 Continuous Aerosol Administration Protocol
7.4 Cleaning and Disinfection of Respiratory Equipment Protocol

8.0 REFERENCE:


8.3 Egan’s Fundamentals of Respiratory Care Scanlon, Spearman and Sheldon, 8th edition, Mosby publishing, pgs 612-14.
INTERNAL POLICIES AND PROCEDURES
CONCURRENCE / NON-CONCURRENCE FORM

To be completed by initiating department/person.

From: ___________________________(department/person) Tel. Extension No.:______ Date: _____________

Name of Policy and Procedure: _____________________________________ Number: _________________

☐ New Document  ☐ Revised Document  ☐ Reviewed Document (no changes done)

Comments: (a brief summary of purpose of the document or changes made)
______________________________________________________________________________________
______________________________________________________________________________________
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To be completed by the reviewers (affected departments).

You are requested to review the attached document(s) as there could be an effect or impact upon your
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* Non-concurrence must forward written comments to the originating department/person.
1.0 Equipments:

1.1 Oxygen Delivery Device LPM FiO₂ Comments:

<table>
<thead>
<tr>
<th>Device</th>
<th>Oxygen Flow</th>
<th>FiO₂</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Nasal Cannula</td>
<td>1-4 lpm</td>
<td>0.24-0.44</td>
<td>Approx. 4%/liter flow</td>
</tr>
<tr>
<td>Simple Mask</td>
<td>5-8 lpm</td>
<td>0.35-0.55</td>
<td>Approx. 4%/liter flow</td>
</tr>
<tr>
<td>Venturi Mask</td>
<td>Variable*</td>
<td>0.24-0.50</td>
<td></td>
</tr>
<tr>
<td>Partial Rebreather</td>
<td>10-15 lpm</td>
<td>0.50-0.70</td>
<td></td>
</tr>
<tr>
<td>Nonrebreather</td>
<td>10-15 lpm</td>
<td>0.70-1.0</td>
<td></td>
</tr>
</tbody>
</table>

1.2 Humidifier

1.3 Oxygen flow meter

1.4 Nipple adapter

2.0 Procedure:

2.1 Assemble the appropriate equipments.

2.2 Wash your hands thoroughly.

2.3 Introduce yourself and explain the procedure to the patient.

2.4 Assemble the device and connect it to the flow meter.

2.5 Adjust the oxygen flow rate appropriately:

- When using a Venturi system, adjust the flow to the rate which corresponds to the Venturi jet device being used. Refer to the literature for further instructions.
- When using the partial/non-rebreather system, adjust the flow to that level which maintains an inflated reservoir bag during inspiration.

2.6 Place the device on the patient’s face.

- Masks should fit snugly on the face to ensure an adequate FiO₂ delivery.

2.7 Assure patient comfort and tolerance of the device.

2.8 For transport of patients on oxygen therapy:
• Obtain a transport cylinder and verify its contents.

• Remove the seal of the cylinder.

• Tighten the regulator onto the cylinder; open the valve one turn and verify the pressure.

• Attach the delivery device for transport.

• **Post transport:**

  ➢ Return the cylinder to the safe holding area. Mark empty cylinders. Resume oxygen delivery via piped oxygen system.

2.9 Document observation and information pertinent to the procedure.
INCENTIVE SPIROMETRY PROTOCOL
(PROTOCOL-010 B)

1.0 Procedure:

1.1 Check Physician’s order.

1.2 Wash hands thoroughly.

1.3 Put on gloves.

1.4 Perform a quick physical assessment and document vital signs.

1.5 Educate and instruct the patient on indications and importance of performing incentive spirometry.

1.6 Ask the patient to hold the incentive spirometer and place the mouthpiece in his mouth.

1.7 While the patient is holding the mouthpiece in his mouth, he/she should exhale completely then close his lips tightly around the mouthpiece.

1.8 Then Inhale slowly keeping the small yellow coach floating in the middle as long as he can. Patient should inhale deeply as she / he can.

1.9 When the patient cannot inhale any more, he/she should hold his breath for six (6) seconds and note the highest level the top of the yellow piston reach.

1.10 Repeat 10-15 times, two (2) hours interval.

1.11 For Pediatric patients, blowing of balloons are also acceptable.
CONTINUOUS AEROSOL ADMINISTRATION PROTOCOL
(PROTOCOL-010 C)

1.0 Equipment:

1.1 Aerosol mask
1.2 Tracheostomy collar
1.3 Corrugated tubing.
1.4 Oxygen and/or air source gas with flow meter(s) or blender (Aerosol Bottle).
1.5 Sterile Water
1.6 Water drainage bag.

2.0 Procedure:

2.1 Collect the appropriate equipment.
2.2 Introduce yourself and explain the procedure to the patient.
2.3 Wash hands thoroughly and assemble the equipment.
2.4 Check equipment for proper function to ensure there is adequate delivery of flow and aerosol to the patient.
2.5 Position the patient application device appropriately.
2.6 Ensure that the patient is reasonably comfortable and tolerating the aerosol device before leaving the bedside.

2.7 Post Procedure:

• Monitor the patient for adverse reactions throughout the therapy as described in Adverse Reactions and Interventions.

• Monitor the patient for the effectiveness of therapy as evidenced by improvements in Stridor, secretion clearance, work of breathing, and breathe sounds.

• Change equipment weekly as needed.

2.8 Document observations and information pertinent to the procedure.
CLEANING AND DISINFECTION OF RESPIRATORY EQUIPMENT PROTOCOL
(PROTOCOL-010 D)

1.0 Equipment:

1.1 Ventilator
1.2 Humidifier
1.3 Suction Canister
1.4 Nebulizer cup and accessories
1.5 Ambu bag/Mask
1.6 Peakflow Device
1.7 Temperature probe (Humidifier)

2.0 Procedure:

2.1 All reusable equipment must be cleaned and/or disinfected as per manufacturer’s recommendations.
2.2 All disposable equipment must be discarded between patients.
2.3 Unused portions of sterile water should be discarded every 24 hours.
2.4 Medication Delivery System (Nebulization Kit):
   • Change Nebulization set every seven (7) days.
   • At the end of the treatment:
     ➢ Empty residual solution from the nebulizer cup.
     ➢ Rinse with sterile water and dry with a clean paper towel.
     ➢ Rinse the mouthpiece or mask with warm water and then dry it with a clean paper towel.
   • Keep the delivery system device with the patient throughout the treatment phase. When not in use cover the device with a plastic bag after it has thoroughly dried.
   • When therapy is discontinued.
     ➢ Dispose of all disposable items properly.
     ➢ All non-disposable equipment will be wiped with Combispray.

2.5 Bubble through Humidifiers/Nasal Cannula
   • Change the patient set-up (i.e. prefilled bubbled humidifiers and cannula) every seven (7) days or when visibly soiled. Wash with chlorhexidine soap, water. Rinse and dry.
• Change nasal cannula when visibly soiled or every seven (7) days.

2.6 Aerosol Delivery Devices (Tracheal mask, Aerosol mask, Corrugated Tubing’s)

• The entire set-up must be changed every seven (7) days and PRN.

2.7 Mechanical Ventilation

• Change the ventilator with Humidifier including circuit tubes, ambu bag every seven (7) days or when visibly soiled.

• Breathing circuits should be checked and changed when an excess of blood, mucous, etc is noted.

• During use the machine and all its parts (support arm, electrical cord, high pressure hoses, alarm and wheels) should be wiped down with combispray when visibly soiled.

• Do not discard the inspiratory peak filter because it will be changed by BioMed.

• Replace external filters with if they are visibly soiled or every 24 hours to assure proper ventilator function.

• Nebulizer Cups and accessories:
  ➢ Empty the residual medication from the nebulizer cup when each treatment is finished.
  ➢ Rinse the cup with sterile water.
  ➢ Dry with a clean paper towel and store it in a clean plastic bag at the bedside.
  ➢ Change the nebulizer sets every 72 hours and label with the date changed.

• Ambu bag:
  ➢ External surface to spray with combispray disinfectant and air dry.
  ➢ Remove valve case. Wash with:
    ➢ Chlorhexidine and water. Rinse and dry.
    ➢ Send to CSSD.

• Steps in Ventilator Cleaning:
  ➢ Discard disposable equipment in the soiled utility room or in an orange biohazard bag in the patient’s room.
  ➢ Spray the exterior of ventilators with combispray, let stand for two (2) minutes, and wipe dry.
  ➢ Once the ventilator is disinfected, send to ventilator room in ICU for calibration and fixation of new ventilator circuits.
  ➢ Wipe all non-disposable spirometers and peak flow device combispray.
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective application and monitoring of non invasive mechanical ventilation (BiPAP).

3.0 DEFINITIONS:
BiPAP is the application of a user selected level of IPAP (Inspiratory Positive Airway Pressure) and EPAP (Expiratory Positive Airway Pressure) to the patient's airway via a nasal mask, face mask or Helmet. BiPAP should not be considered a method of continuous ventilator support. It is not a "life support" system and is only intended to augment the patient’s spontaneous ventilation.

4.0 POLICY:
All Registered Nurses are responsible and accountable to ensure safe and effective application and monitoring of non invasive mechanical ventilation (BiPAP).

5.0 EQUIPMENT:
5.1 BiPAP Machine
5.2 Different sizes of mask.
5.3 Soft sponge
5.4 Head gear and chin strap

6.0 PROCEDURE:
6.1 Check Physician’s order for BiPAP which includes:
   6.1.1 Mode of BiPAP
   6.1.2 IPAP level
   6.1.3 EPAP level
   6.1.4 $O_2$ saturation goal
   6.1.5 Specified $O_2$ flow rate or $FiO_2$ setting.
   6.1.6 Duration/circumstances of use.
6.2 Assemble equipment and check machine.
6.3 Explain procedure as to:
   6.3.1 The device and its purpose.
   6.3.2 How the mask is applied and how to remove.
   6.3.3 That the patient may or may not be able to speak.
   6.3.4 Duration of use.

6.4 Select appropriate mask size.

6.5 Applying the appropriate mask:
   6.5.1 The nasal mask should fit from the superior bridge of the nose to just below the nares above the upper lip.
   6.5.2 The facemask should cover the nose and the mouth and extend from the superior bridge of the nose to beneath the lower lip.
   6.5.3 The head strap should be snug enough to keep the mask in place without significant leaks.
   6.5.4 Apply soft sponge to protect the nasal bridge.

6.6 Observe and closely monitoring patient for the 1st four (4) hours.

6.7 Any deviations of patient conditions and parameters must be reported immediately to the ICU Physician.
   6.7.1 Neuro status
   6.7.2 Tidal Volume
   6.7.3 Heart rate
   6.7.4 Respiratory Assessment (RR, respiratory pattern, secretions, etc.)
   6.7.5 BiPAP mode
   6.7.6 IPAP in H₂O
   6.7.7 EPAP in H₂O
   6.7.8 Liter flow or FIO₂
   6.7.9 ABG after 1 hour.
   6.7.10 pHPaO₂
   6.7.11 PaCO₂
   6.7.12 Adverse reactions
   6.7.13 Skin Integrity

6.8 The flow sheet will remain at the bedside for immediate reference.

6.9 The BiPAP circuit will be changed weekly and when soiled.

6.10 Document observation and information pertinent to the procedure.

7.0 REFERENCE:

American Association for Respiratory Care 2004.
1.0 CONDITIONS:

All Registered Nurses (ICU).

2.0 PURPOSE:

To ensure safe and effective care and management of Invasive Catheter’s.

3.0 DEFINITION:

3.1 **ARTERIAL CANNULA INSERTION** is the insertion of an indwelling cannula into the radial, ulnar, brachial, femoral, and dorsalis pedis artery for blood analysis and for invasive blood pressure monitoring.

3.2 **CENTRAL VENOUS CATHETERIZATION** is the insertion of a long, fine catheter introduced via a large vein into the superior vena cava or right atrium for administration of parenteral fluids or medications or for measurement of central venous pressure. To allow concentrated solutions to be infused with less risk of complications. It permits monitoring of special blood pressures including the central venous pressure, the pulmonary artery pressure, and the pulmonary capillary wedge pressures.

3.3 **PULMONARY ARTERY CATHETERIZATION** is the procedure in which a balloon-tipped catheter (Swan Ganz) is percutaneously inserted though the right side of the heart into the pulmonary artery.

3.4 **CENTRAL VENOUS PRESSURE MONITORING** refers to the measurement of right atrial pressure or the pressure of the great veins within the thorax.

3.4.1 **RIGHT-SIDED CARDIAC FUNCTION** is assessed through the evaluation of the central venous pressure.

3.4.2 **LEFT-SIDED HEART FUNCTION** is less accurately reflected by the evaluation of central venous pressure, but may be useful in assessing chronic right and left heart failure and/or differentiating right and left ventricular infarctions.
4.0 POLICY:

4.1 All ICU Registered Nurses are responsible and accountable to ensure safe and effective care and management of Invasive Catheter’s.

4.2 Invasive Catheters must be removed as follows:
   4.2.1 Arterial Cannula = after 96 hours (4 days)
   4.2.2 Central Venous Catheters =after 14 days.
   4.2.3 Pulmonary Artery Catheter (Swan Ganz) = after 72 hours (3 days).
   4.2.4 Peripheral Lines = after 72 hours (3 days).

4.3 Arterial, Peripheral, and Central Venous Catheters must be removed by the ICU Nurse.

4.4 Intra Aortic Balloon Pump Catheter and Pulmonary Artery Catheter must not be removed by the Nurse.

4.5 All procedures must be done following strict aseptic technique.

5.0 PROCEDURE:

5.1 Ensure coagulation profile is within normal range.

5.2 Follow strict aseptic techniques all throughout the procedure.

5.3 All invasive lines have to be monitored periodically.

5.4 Perform the following as per protocol:
   5.4.1 Arterial Cannula – Insertion assist, monitoring and removal
   5.4.2 Central Venous Catheter – Insertion assist, monitoring, removal and troubleshooting.
   5.4.3 Pulmonary Artery Catheter – Insertion assist, monitoring and removal
   5.4.4 Peripheral Lines – Insertion

5.5 Document all pertinent information’s.

6.0 FORMS AND ATTACHMENT:

6.1 Arterial Cannula – Insertion assist, monitoring and removal protocol.

6.2 Central Venous Catheter – Insertion assist, monitoring, removal and troubleshooting protocol.

6.3 Pulmonary Artery Catheter – Insertion assist, monitoring and removal protocol.

6.4 Peripheral Lines – Insertion protocol.

7.0 REFERENCES:

1.0 INSERTION ASSIST:

1.1 Equipment:

- Sterile gloves, surgical gown, mask (goggles if needed)
- Povidone Iodine 10% solution, alcohol
- Dressing pack, Tegaderm – Small and Big (opsite), Opsite spray
- Local anesthesia, Xylocaine 1% 3ml
- 10ml syringe x 1 with NS flush, 5 ml syringe x 1, Heparinized Syringe
- G-20 needle x 1, G-23 needle x 1
- Small drapes x 2
- Arm board
- Arterial Cannula G20, 3 way stopcock
- Monitoring kit, NS 500ml or NS 250ml with Heparin (if not contraindicated)
- Pressure bag
- Transducer holder
- IV stand / pole
- Carpenter level
- Sterile 4x4 gauze
- Small extension with 3-way stopcock

1.2 Procedure:

- Identify the patient by ID band and name.
- Reassure and explain the procedure to the patient.
- Position the patient according to the site selected.
- Assist the physician with the following steps:
  - Cleaning the area with povidone 10% and alcohol.
  - Anesthetizing the area of insertion with local anesthesia.
  - Insertion of cannula in the selected artery.
- In the presence of a backflow connect the small extension with 3-way stopcock to the cannula.
- Aspirate and flush the line with 10ml saline.
- Anchor catheter with dressing.
2.0 **MONITORING:**

2.1 **Procedure:**

- Attach pressure monitoring line to Heparinized Normal Saline bag. **Before attachment to bag to ensure all leur lock connection are tight** on the monitoring kit.

- Connect to the pressure monitoring set and calibrate the transducer.

- Record arterial pressure and do ABG as baseline.

- Place **heparinized normal saline bag (500 units Heparin in 500cc NS) if not contraindicated in pressure bag and inflate to 300mmHg.**

- Prime pressure monitoring line with Heparinized Normal Saline from infusion bag by pinching butterfly valve together. Ensure sample port is also flushed at this time.

- Ensure 3-way stopcock is turned off to sample port and caps are secured in place.

- Maintain sterility of end of pressure monitoring kit by leaving sterile cap at end of line in place.

- Attach monitoring cable to pressure monitoring kit and to bedside monitor. Label as Arterial on bed monitor.

- Zero pressure monitoring kit to atmospheric pressure by pressing zero label on bedside monitor display. ABP scale at 30mmHg.

- The arterial catheter alarm system will remain activated at all times. **Alarm parameters should be kept at 20 above and 10 below the patient’s normal arterial pressure.**

- **Monitoring equipment** must be **calibrated before insertion of catheter** and then **every 8 hours.**

- Entire **monitoring set up** will be **changed every 72 hours.**

- Observe bedside monitor for appropriate arterial line wave form tracing.

- Observe site for bleeding. Also **check distal and collateral circulation** in the affected hand.

- Label dressing with time and date of change.

- Record date and time of next dressing change on flow chart.

- Document relevant information in the flow sheet.
3.0 **Removal:**

3.1 **Equipment:**

- Dressing pack
- Sterile gloves
- Povidone 10%
- Scalpel blade No. 11
- Sterile gauze 4 x 4
- Band aid
- Sterile drapes

3.2 **Procedure:**

- Obtain order from Physician.

- Explain the procedure to the patient.

- Prepare the necessary equipments.

- Ensure all roller clamps/stopcocks are turned off and the pressure bag is deflated.

- Position the limb in a comfortable and appropriate position with blue sheet underneath.

- Wash hands and remove dressing.

- Put on sterile gloves.

- Clean around the site with antiseptic and cut the suture if present.

- Remove the cannula with smooth motion whilst applying pressure just slightly proximal to the insertion site with sterile gauze.

- Firm pressure must be applied to site for approximately five minutes or until the oozing of blood ceased.

- Clean the site and apply clean dressing.

- Assess site and the peripheral pulse of the affected limb for adequate circulation **every 15 minutes for one (1) hour after removal.**

- Document observation and information pertinent to the procedure.
ARTERIAL CANNULA - INSERTION ASSIST, MONITORING AND REMOVAL PROTOCOL
(PROTOCOL-012 A)

1.0 INSERTION ASSIST

- Equipment:
  - Sterile gloves, surgical gown, mask (goggles if needed)
  - Povidone Iodine 10% solution, alcohol
  - Dressing pack, Tegaderm – Small and Big (opsite), Opsite spray
  - Local anesthesia, Xylocaine 1% 3ml
  - 10ml syringe x 1 with NS flush, 5 ml syringe x 1, Heparinized Syringe
  - G-20 needle x 1, G-23 needle x 1
  - Small drapes x 2
  - Arm board
  - Arterial Cannula G20, 3 way stopcock
  - Monitoring kit, NS 500ml or NS 250ml with Heparin (if not contraindicated)
  - Pressure bag
  - Transducer holder
  - IV stand / pole
  - Carpenter level
  - Sterile 4x4 gauze
  - Small extension with 3-way stopcock

- Procedure:
  - Identify the patient by ID band and name.
  - Reassure and explain the procedure to the patient.
  - Position the patient according to the site selected.
  - Assist the physician with the following steps:
    - Cleaning the area with povidone 10% and alcohol.
    - Anesthetizing the area of insertion with local anesthesia.
    - Insertion of cannula in the selected artery.
    - In the presence of a backflow connect the small extension with 3way stopcock to the cannula.
    - Aspirate and flush the line with 10ml saline.
    - Anchor catheter with dressing.
2.0 **Monitoring**

- **Procedure:**
  - Attach pressure monitoring line to Heparinized Normal Saline bag. **Before attachment to bag to ensure all leur lock connection are tight** on the monitoring kit.
  - Connect to the pressure monitoring set and calibrate the transducer.
  - Record arterial pressure and do ABG as baseline.
  - Place **heparinized normal saline bag** (500 units **Heparin in 500cc NS**) if not contraindicated in pressure bag and **inflate to 300mmHg**.
  - Prime pressure monitoring line with Heparinized Normal Saline from infusion bag by pinching butterfly valve together. Ensure sample port is also flushed at this time.
  - Ensure 3-way stopcock is turned off to sample port and caps are secured in place.
  - Maintain sterility of end of pressure monitoring kit by leaving sterile cap at end of line in place.
  - Attach monitoring cable to pressure monitoring kit and to bedside monitor. Label as Arterial on bed monitor.
  - Zero pressure monitoring kit to atmospheric pressure by pressing zero label on bedside monitor display. ABP scale at 30mmHg.
  - The arterial catheter alarm system will remain activated at all times. **Alarm parameters should be kept at 20 above and 10 below the patient’s normal arterial pressure.**
  - **Monitoring equipment** must be **calibrated before insertion of catheter** and then **every 8 hours**.
  - Entire **monitoring set up** will be **changed every 72 hours**.
  - Observe bedside monitor for appropriate arterial line wave form tracing.
  - Observe site for bleeding. Also **check distal and collateral circulation** in the affected hand.
  - Label dressing with time and date of change.
  - Record date and time of next dressing change on flow chart.
  - Document relevant information in the flow sheet.
3.0 **Removal**

- **Equipment:**
  - Dressing pack
  - Sterile gloves
  - Povidone 10%
  - Scalpel blade No. 11
  - Sterile gauze 4 x 4
  - Band aid
  - Sterile drapes

- **Procedure:**
  1. Obtain order from Physician.
  2. Explain the procedure to the patient.
  3. Prepare the necessary equipments.
  4. Ensure all roller clamps/stopcocks are turned off and the pressure bag is deflated.
  5. Position the limb in a comfortable and appropriate position with blue sheet underneath.
  6. Wash hands and remove dressing.
  7. Put on sterile gloves.
  8. Clean around the site with antiseptic and cut the suture if present.
  9. Remove the cannula with smooth motion whilst applying pressure just slightly proximal to the insertion site with sterile gauze.
  10. Firm pressure must be applied to site for approximately five minutes or until the oozing of blood ceased.
  11. Clean the site and apply clean dressing.
  12. Assess site and the peripheral pulse of the affected limb for adequate circulation **every 15 minutes for one (1) hour after removal.**
  13. Document observation and information pertinent to the procedure.
1.0 **INSERTION ASSIST:**

1.1 **Equipment:**

- 3 way stop cock
- Alcohol – 70%
- Dressing Pack which includes:
  - Cotton balls
  - Forceps
  - 4 x 4 gauze
- Cutdown tray (optional)
- Gowns, masks, caps and sterile gloves
- Normal Saline 500cc with 500 units Heparin
- Hypodermic needles gauge 18 and 23
- Local anesthesia (Lignocaine 1% or 2%)
- Povidone 10%
- Silk sutures with needle (2.0 cutting).
- Tegaderm, Opstie spary, Opstie dressing
- Sterile gauze 4 x 4 (extra)
- Syringe 10cc (2 pcs.) and 5 cc (1 pc.)
- Central Venous (single / multiple lumen catheters)

1.2 **Procedure:**

- **Preparatory Phase:**
  - Evaluate patient’s coagulation profile.
  - Assemble equipment according to sites and use.
  - Identify patient by ID band and name.
  - Explain the procedure to the patient.
  - Position patient appropriately (supine):
    - **Neck veins** - Place patient in Trendelenburg position.
      Trendelenburg position prevents the chance of air emboli.
Place a small rolled towel under shoulders (subclavian approach) / jugular.

- Place the patient under proper lighting (spotlight.)
  - Calibrate/zero transducer and level port with patient’s right atrium.
  - Mark midaxillary line with indelible ink for subsequent readings.
  - Place patient on ECG monitor.

- **Insertion Phase (by physician):**
  - Wash hands, wear mask, gown, and gloves.
  - Assemble equipment on the sterile trolley.
  - Reassure and explain the procedure to the patient.
  - Assist physician to put on gown, cap and mask.
  - Assist patient to remain motionless during insertion. – (circulating nurse.)
  - Monitor for dysrhythmias as catheter is threaded to great vein or right atrium.
  - Clean and place a sterile occlusive dressing over site.
  - Obtain a chest X-ray.
  - After X-ray placement verification, connect primed IV tubing/heparin flush system to catheter.

2.0 **Pressure Monitoring:**

2.1 **Equipment:**

- Transducer set up holder
- Kidney Basin with 250ml saline with 250 units heparin
- Normal Saline 500cc
- Heparin flush system/pressure bag (includes IV pole)
- CVP monitoring kit (drape and chlorhexidine 2% / povidone).

2.2 **Procedure:**

- **To Measure the CVP with Pressure Transducer System:**
  - Attach the transducer set up to central venous catheter. If a triple lumen catheter is in situ (distal port) should be used.
  - A CVP waveform will appear in the monitor when patient cable is attached to the module.
  - Zero transducer to atmosphere.
  - Once “zero” is achieved ensure return to normal waveform on monitor screen.
➢ Place the **patient in Supine position, level the transducer with the right atrium**, i.e. 4th intercostals space, mid axillary line. Mark the position with an “X” to ensure readings are zeroed to the same point.

➢ The end respiratory value will be recorded as the CVP measurement.

➢ Zero the transducer before each reading (especially if the patients position has changed) to ensure accuracy of reading.

➢ Maintain volume in pressure bag by changing flush solution every 72 hours and PRN. Maintain pressure at 300mmHg to ensure patency of line and accurate waveform and measurement.

➢ Pressure bag and transducer set up, administer at 3ml/hr through attached catheter to maintain patency.

➢ Perform **routine CVP measurement six (6) hours and PRN.**

### 3.0 **Removal:**

#### 3.1 Equipment:

- Chlorhexidine 2% + 70% Isopropyl Alcohol or Betadine
- Blood C/S bottles
- Equipment for culture of the catheter tip, if needed.
- Dressing pack
- Sterile gloves
- Sterile 4 x 4 gauze
- Suture removal kit
- Sterile scissors

#### 3.2 Procedure:

- Gather all necessary equipment.
- Establish a peripheral IV access.
- Explain the procedure to the patient.
- Turn off infusions.
- **Place the patient in a flat or Trendelenburg position** to increase intrathoracic pressure which will decrease the chance of air entry into a vessel.
- Wash hands and put on sterile gloves.
- Clean distal part with Chlorhexidine 2% + 70% Isopropyl Alcohol or Betadine.
- Withdraw blood from the port followed by 10cc blood culture and sensitivity, if required.
- Remove sutures.
• Remove the catheter in a smooth motion.
  
  **Note:** Do not force removal if resistance is met. The catheter may be knotted. Secure the catheter and notify the physician.

• After the catheter is removed, quickly apply pressure over the insertion site with sterile gauze. Maintain pressure for approximately **five (5) minutes** or **until the bleeding stops.**

• When the bleeding stops, immediately cover the site with dressing.
• Inspect the catheter to be certain the full length has been removed.
• Cut the catheter tip with sterile scissors and send for C/S.
• Keep the dressing over the site for **24 hours** depending on risk factors.
• Check vital signs before removal and fifteen (15) minutes after.
• Document observation and information pertinent to the procedure.

### 4.0 Troubleshooting:

#### 4.1 Procedure:

• Central Venous Catheter problems and their corresponding interventions:

  ➢ **Unable to Obtain Blood Return:**
    - Change the position according to the catheter site.
    - Try to change catheter alignment by raising the patient’s arm on same side as catheter.
    - Ask the patient to cough, sit up, and take a deep breath.
    - Try infusing 10 mL of normal saline into catheter.

  ➢ **Unable to Inject Fluid or Medication:**
    - Follow above steps (“Unable to obtain blood return”).
    - If unable to inject fluid or obtain blood return, notify the physician.

  ➢ **Air Embolus:** May occur during connections or disconnections of syringes and IV tubing.
    - Clamp central line.
    - Instruct the patient to lie on left side with head down (Trendelenburg position).
    - Notify the physician.
    - Monitor vital signs.
    - Remain with patient.
    - Administer O₂.
    - Initiate peripheral IV.
- **Catheter Dislodgment**: Medication or fluid leaking from catheter or exit site.
  - Note presence or absence of suture in securing subclavian catheter or Dacron cuff protruding from exit site of right arterial catheter.
  - Report finding to physician.
  - Secure catheter and extension tubing with tape.

- **Catheter Migration**: Unable to inject fluid or medication.
  - Notify physician to determine catheter placement.

- **Catheter Occlusion**: Unable to inject fluid or medication.
  - Gently flush catheter with appropriate normal saline flush.
    - Do not use force (catheter may rupture).
  - Flush the catheter with Heparinized NS if not contraindicated.

- **Catheter Sepsis**: Inflamed, reddened, painful catheter exit or port site, purulent exudates and elevated temperature.
  - Culture catheter exit site, port site and extension tubing.
  - Obtain a blood sample from peripheral site.
  - Notify physician.
  - Administer appropriate prescribed antibiotics.

- **Vessel Thrombosis**: May be related to diameter of catheter in relation to patient's vessel size.
  - Do not access an inflamed port site.
  - Notify the physician to determine catheter placement via radiograph.
1.0 Insertion Assist:

1.1 Equipment:

- ECG Monitor and Display Unit
- EKG electrode pads
- Pressure Transducer
- Pressure Transducer Module
- Pressure Transducer Monitoring Kit
- Pressure Bag
- Carpenter Level
- Percutaneous sheath introducer Kit
- Pulmonary artery catheter
- Dressing Set
- Betadine prep solution
- Local Anesthesia (Xylocaine 1% & 2%)
- Sterile drapes/towels
- Sterile gowns and gloves
- Masks and Caps
- Assorted syringes 3x10cc; 2x 5ml
- Needles G#23; #21; #18
- Sterile 4x4 gauze pads
- Scalpel blade
- Sterile basin
- Suture material
- Dressing equipment
- Sterile Normal Saline
- Heparin

1.2 Procedure:

- Preparatory Phase:
  - Place the pressure transducer module into the monitor.
  - Place the pressure transducer cable into the module.
  - Prepare the Flushing System (500IU Heparin in 500 Saline).
  - Assess the patient readiness for cardiac output measurement and explain the procedure to the patient.
Assemble all equipment and open in a sterile trolley maintaining sterility of item opened. Maximum barrier precaution observed.

Flush all port s of PA catheter and attach 3way catheter.

Insert pulmonary artery catheter through sleeves.

Check the integrity of the balloon with packaged 3ml syringe (automatically stops at 1.5 ml).

Maximum Barrier Precaution should be applied to all person in the immediate area.

Position the patient (supine)
- Calibrate /Zero transducer (Mid axillary)
- Check the monitor for scale (30-60mm Hg)

**INSERTION PHASE:**
- Continuous ECG monitoring the whole procedure.
- Position the patient according to the site:
  - For internal jugular (trendelenburg position).
- Wash hand.
- Circulating Nurse assist the physician doing the procedure and assisting nurse to get into sterile gown.
- Assisting Nurse will assist the Physician with the following:
  - Drape the patient
  - Skin preparation
- Aspirating required local anesthetics.
- Insertion of sheath and securing by suturing in the skin
- Circulating Nurse will assist Physician and Assisting nurse while changing their gloves.
- Change patient drape establishing a sterile field.
- Circulating Nurse will attach the PA distal port to Flushing system.
- Assist physician during insertion of Swan Ganz catheter through the arrow sheath.
- Watch the monitor for tracing, once it is the right atrium, inflate the balloon with air.
- Deflate the balloon once in the proper position.
- Document the encounter pressure during the insertion process.
- Once the procedure is complete, fix the catheter with the transparent dressing.
- Obtain chest x-ray to check the position.
- Do complete hemodynamic calculation and inform the physician about the report.
- Document on flow sheet average resistance, cardiac output, cardiac index, systemic vascular and vital signs.
2.0 **MONITORING:**

2.1 **Procedure:**

- Monitor the Pulmonary Artery tracing continuously and to interpret the data obtained as well as to alert medical staff of potential or actual complications.
- Keep the transducer at the level of phlebostatic axis.
- Keep the bed position from flat up to 60 degrees.
- Pulmonary Artery Diastolic Pressure read at end expiration.

3.0 **REMOVAL ASSIST:**

3.1 **Equipment:**
- Dressing pack
- Sterile gloves
- Cleaning solution
- Transparent dressing

3.2 **Procedure:**

- Obtain written order from Physician.
- Identify the patient by ID band and name.
- Reassure and explain the procedure to the patient.
- Disconnect all lines from Pulmonary Artery Catheter except PA distal lumen.
- Wash hands and wear gloves.
- Remove dressing and clean the area.
- Unlock the Pulmonary Artery Catheter from the arrow sheath.
- Deflate the balloon.
- Watch the monitor for tracing and arrhythmia.
- Pull out the Pulmonary Artery Catheter quickly and gently.
- Fix arrow sheath with transparent dressing.
- Document observations and pertinent information.
1.0 Procedure:

1.1 All patients with indwelling catheter must have perineal care twice per shift and PKN.

1.2 Patients’ on complete bed rest must have perineal care three (3) times a day and after each voiding and defecation.

1.3 Patients’ with external flow (condom catheter) to be changed daily and PRN.

1.4 Clean with Chlorhexidine gluconate 0.15% or any appropriate antiseptic solution.
1.0 **INSERTION ASSIST:**

1.1 **Equipment:**

- ECG Monitor and Display Unit
- EKG electrode pads
- Intra Aortic Pump console
- Interpacing cable
- IABP Pressure Transducer
- IABP ECG lead
- Pressure Transducer Monitoring Kit
- Pressure Bag
- Carpenter Level
- IABP Insertion Kit
- Datascop IABP Catheter (according to patients size)
- Dressing Set
- Betadine prep solution
- Local Anesthesia (Xylocaine 1% & 2%)
- Sterile drapes/towels
- Sterile gowns
- Sterile gloves
- Masks
- Caps
- Assorted syringes 3x10cc ; 2x5cc
- Needles g #23 ; #21 ; # 18
- Sterile 4 x 4 gauze pads
- Scalpel blade
- Sterile basin
- Suture material
- Transparent dressing
- Sterile Normal Saline
- Heparin
- Fluoroscope (if needed)
1.2 Procedure:

• Preparatory Phase

- Ensure that the IABP console is in a good working condition with adequate helium supply.
- Test the console using test balloon catheter.
- Have the defibrillator suction set-up emergency medication ready.
- Identify the patient by name and ID band
- Assess the patient readiness for IABP insertion and explain the procedure to the patient
- Prepare the site of insertion. Shave and prep patient from umbilicus and both groin. It should be free of hair.
- Locate the pedal pulses and marked for future evaluation.
- Radiology Department must be notified (if for fluoroscopy)
- Prepare the flushing system (500 unit Heparin in 500ml Normal Saline).
- Assemble all equipment and open in a sterile trolley maintaining sterility of item opened. Maximum barrier precaution observed
- Maximum Barrier Precaution should be applied to all person in the immediate area.

• Insertion Phase

- Continuous ECG monitoring the whole procedure.
- Keep patient in comfortable position.
- Wash hand.
- Circulating Nurse assist the physician doing the procedure and assisting nurse to get into sterile gown and gloves.
- Assisting Nurse will assist the physician
  - Drape the patient
  - Skin preparation
  - Aspirating required local anesthetics
- Circulating Nurse will assist Physician and Assisting nurse while changing their gloves.
- Change patient drape establishing a sterile field
- Assist physician during insertion of sheath into femoral artery
- Assist physician during insertion of IABP catheter.
  - Provide required equipment
  - Remove Intra Aortic catheter from sterile packing
  - Attached the supplied one-way valve to the Lue tip of the distal end of the balloon lumen.
Pull back slowly on the syringe until all air is aspirated.
Disconnect only the syringe.
Lubricate the IAB catheter with sterile saline
The central lumen of the IAB catheter should be flush with heparinized saline before insertion.
Assist with removal of the one-way valve according to the manufacturer’s recommendation.
If a central lumen of a double lumen catheter is used to monitor, attach a 3 way stopcock with continuous heparinized flush and transducer to monitor.

- Circulating nurse observe the cardiac monitor during insertion, monitor physical and emotional status of the patient. Check vital signs throughout the procedure.
- Attach the balloon lumen tubing to the pump console.
- Zero pressure transducer
- Circulating nurse will press and hold the Intra Aortic fill button for 1 second (status message will read auto filling). When message clears, initiate pumping with 1:2 frequency and maximum augmentation.
- Applied dressing to the balloon catheter insertion site using aseptic technique as per hospital protocol.
- Obtain urgent portable x-ray
- Record post-balloon insertion vital sign, locate pedal pulses either by palpation or Doppler and marked.
- Initiate anti-coagulation therapy as per doctor’s order.
- Document IABP parameter.

2.0 Monitoring:

2.1 Procedure:

- Monitor and record augmentation pressure.
- Observe waveform constantly for proper timing of inflation and deflation.
- Assess capillary refill, left radial pulse and pedal pulses by palpation or by Doppler.
- Evaluate the cardiac output within one hour of any change in the assist level.
- Monitor and record temperature of both legs.
- When augmentation volume is reduced for the purpose of weaning, return the pump to full augmentation volume at a ratio of 1:1 for 5 minutes every hour.
- Change dressing daily or PRN by following aseptic technique
- Daily chest x-ray
• Maintain 30-45 degree elevation of head
• Avoid hip flexion, follow log roll or straight lift
• Promote chest clearance by chest physiotherapy.
• Measure urine output hourly
• Perform neurological assessment 2 hourly.
• Assess the adequacy of balloon timing.

3.0 REMOVAL ASSIST:

3.1 Equipment:
• Dressing Set
• Betadine prep solution
• Sterile gloves
• Masks
• Scalpel blade
• Sterile 4 x 4 gauze pads
• Adhesive pressure dressing (Mefix dressing)
• 50 ml syringe
• 3- way stopcock

3.2 Procedure:
• Obtain an order from physician
• Assist the physician in explaining the procedure to the patient, noting that manual pressure will be applied for 30 minutes after removal and bed rest will continue for 24 hours after removal.
• Assess clinical readiness for weaning
• Change assist ratio to 1:2 and monitor patient response for 1 to 6 hours or per physician orders
• If hemodynamic remain satisfactory, further change ratio from 1:2 to 1:3
• Discontinue heparin 4 to 6 hours
• Ensure Privacy
• Use protective underpads
• Turn the IABP to standby
• Disconnect IAB catheter from console and deflate with 50ml syringe and permit the catheter vent to air
• Assist the physician in the removal of suture and IAB catheter maintaining aseptic technique and universal precaution
• IAB catheter and introducer sheath are removed as a unit. Bleeding both proximal and distal to the insertion site is encouraged to expel any potential clots.

• Once the IAB is removed, apply manual pressure for at least 30 minutes until haemostasis has been achieved.

• Assess insertion site for signs of bleeding or hematoma formation before application of sterile pressure dressing

• Apply a pressure dressing over insertion site and sandbag for 6 hours.

• Monitor vital signs and hemodynamic parameters every 15 minutes x 4 every 30 minutes x 2 then every hour as patient condition warrants

• Instruct the patient to alert you to any complaints of pain or wetness around insertion site.

• Assess the quality of perfusion to the decannulated extremity immediately after removal and every 1 hour x 2 then every 2 hours

• Check insertion site every hour for swelling, bleeding or hematoma formation.

• Check pedal and posterior tibial pulses bilaterally every hour for diminished or absent pulses

• Maintain immobility of decannulated extremity and bed rest with head of the bed no greater than 30 degree for 8 hours.

• Record data.

• Apply a sterile occlusive dressing every 24 hours until the wound is healed.

• Document observation and information pertinent to procedure.
1.0 **INSERTION ASSIST:**

1.1 **Equipment:**

- Temporary pacemaker catheter/Introducer kit
- Sterile Pacing cable
- Temporary Demand pacemaker generator/9 volt battery
- Defibrillator/External pacemaker
- Sterile gloves, gowns, sheets, and towels
- Lidocaine Bolus, Atropine Bolus
- 12-lead ECG machine (optional)
- Fluoroscopy table (optional)
- Dressing sets
- Povidone

1.2 **Procedure:**

- Identify the patient by name and ID band.
- Assist the physician in explaining the procedure to patient or relative if available and obtain a sign consent.
- Reassure the patient.
- Appropriate personnel must be notified of the insertion.
- Radiology Department must be notified for fluoroscopy.
- Place patient on fluoro table unless patient condition is such that emergency intervention is necessary (according to physician judgment) it can be done on the bedside using bedside ECG monitoring.
- Administer O₂ as ordered.
- Maintain a patent IV line.
- Prepare the site of insertion.
- Have the defibrillator, suction set up, emergency medication ready.
• Assure properly functioning equipment. Ensure the pacemaker generator is in good working condition with new battery.
• Set pacemaker generator rate, output and sensitivity as ordered.
• Enclose "sterile area" and assist team with preparation of operative field.
• Drape patient, maintaining access to all lines.
• Provide required equipment.
• Assist the physician maintaining strict aseptic technique and universal precaution.
• Ensure privacy.
• Monitor physical/emotional status of patient. Check vital signs throughout the procedure.
• Pacemaker catheter is attached to bridging cable with labelled proximal end of catheter to positive pole of the generator and labelled distal end of catheter to negative pole of generator
• Apply dressing pacemaker insertion site using aseptic technique as per hospital protocol.
• N.P.O post midnight.
• Shaving of mid-clavicular area (right or left).
• Open IV line in left arm following IV cannulation policy.
• Start IV fluids, as per doctor’s order on the day of the procedure.

2.0 **POST PROCEDURE:**

• Check pacemaker site hourly for signs of bleeding.
• Keep dressing dry and intact.
• ECG should be done to check for pacing rhythm.
• Chest X-ray should be done after the insertion to check for the proper placement of the pacemaker.

3.0 **MONITORING:**

3.1 **Procedure:**

• Monitor vital signs every 15 minutes for 1 hour, every 30 minutes for 2 hours, then hourly till stable and record.
• Observe the function of the pacemaker. Watch for pacing and sensing and daily threshold checking.
• Advise patient to avoid movement of the affected arm. Patient should wear arm sling on the affected arm.
• Daily X-ray and check the dressing.
4.0 **Removal Assist:**

4.1 **Equipment:**

- Dressing Set
- Betadine prep solution
- Sterile gloves
- Masks
- Scalpel blade
- Sterile 4 x 4 gauze pads
- Transparent dressing
- 50 ml syringe
- 3-way stopcock

4.2 **Procedure:**

- Obtain an order from Physician.
- Assist the physician in explaining the procedure to the patient.
- Assess clinical readiness for weaning.
- If hemodynamic remain satisfactory, further change ratio from 1:2 to 1:3.
- Discontinue heparin for at least 1 hour.
- Ensure Privacy.
- Assist Physician during removal while observing strict aseptic technique.
- Assess insertion site for signs of bleeding or hematoma formation before application of sterile pressure dressing.
- Apply dressing over insertion site.
- Keep dressing over the site for 24 hours depending on the risk factor.
- Check insertion site every hour for swelling, bleeding or hematoma formation.
- Document observation and information pertinent to procedure.
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective flushing and heparinization of invasive pressure lines.

3.0 POLICY:
All Registered Nurses are responsible and accountable to ensure safe and effective flushing and heparinization of invasive pressure lines.

3.1 Incorporating heparin in normal saline (1:1 ratio) for continuous flushing and should be counter signed by two (2) Registered Nurses.

3.2 Heparinized saline must be changed every 24 hours.

3.3 External tubing must be changed every 72 hours.

3.4 All procedures must be done following strict aseptic technique.

4.0 EQUIPMENT:

4.1 Alcohol swab
4.2 Sterile Gloves
4.3 Heparin 500 units in 500cc NS.
4.4 Syringes (10 mL and 1ml)
4.5 Pressure bags
4.6 Monitoring Kit
4.7 Pressure Transducer
4.8 Transducer holder
4.9 Sticker Tags for labeling pressure bag.
5.0 **PROCEDURE:**

5.1 Wash hands and wear gloves.

5.2 Prepare heparin and saline bag.

5.3 Clean injection port (vial) with alcohol swab for 30 seconds.

5.4 Allow to dry.

5.5 Incorporate 500 IU of heparin to 500cc of saline.

5.6 Connect monitoring set to NS/heparin flush and prime the monitoring set until all air bubbles are expelled.

5.7 Unclamp central line.

5.8 Connect monitoring set to the distal port of the invasive pressure lines.

5.9 Maintain positive pressure with plunger while clamping catheter or when removing syringe from catheter hub to prevent reflux of blood into lumen. Caution must be taken to avoid air embolism.

5.10 Label the heparinized bag that includes the following:

5.10.1 Date and time

5.10.2 Amount of saline and heparin concentration.

5.10.3 Signature of two (2) Registered Nurses.

6.0 **REFERENCE:**

1.0 CONDITIONS:
   All Registered Nurses (ICU).

2.0 PURPOSE:
   To ensure safe and effective collection of blood samples from invasive lines.

3.0 POLICY:
   All Registered Nurses are responsible and accountable to ensure safe and effective collection of blood samples from invasive lines.

4.0 PROCEDURE:

   4.1 All procedures must be done under strict aseptic technique.
   4.2 Aspirate 10-20 ml of blood sample from Central Lines and discard in the orange bag (for pediatric 5-10ml).
   4.3 Aspirate 2-3 ml of blood sample for ABG and 7-10 ml for other blood works from Arterial Lines and discard in the orange bag (for pediatric 3-5ml).
   4.4 Aspirate 5 ml of blood sample from Pulmonary Artery Catheter and discard in the orange bag.
   4.5 Perform the following as per protocol:
      4.5.1 Arterial line /Central line Blood Sampling
      4.5.2 ABG and Mixed Venous Blood Sampling

5.0 FORMS AND ATTACHMENT:

   5.1 Arterial line /Central line Blood Sampling Protocol
   5.2 ABG and Mixed Venous Blood Sampling Protocol

6.0 REFERENCES:

ARTERIAL LINE / CENTRAL LINE BLOOD SAMPLING PROTOCOL  
(PROTOCOL-014 A)

1.0 Equipment:

1.1 Tray with:
   - 2x 10ml syringes (Arterial Line) for pediatrics: 2x 5ml syringes
   - 3x 10ml syringes (Central Line) for pediatrics: 2x 5ml syringes

1.2 Sterile 4x4 gauze
1.3 Alcohol swab
1.4 Sterile gloves
1.5 Goggles (if needed)
1.6 Specimen tube with label
1.7 Sharp container

2.0 Procedure:

2.1 Identify the patient by ID band and name.
2.2 Reassure and explain the procedure to conscious patient.
2.3 Wash hands and wear gloves, goggles (if needed).
2.4 Place 4x4 sterile gauze under the 3 way stopcock and clean the knob with alcohol swab.
2.5 Connect appropriate syringe to stopcock and open towards the patient side.
2.6 Withdraw the recommended amount of blood and close the stopcock three fourth way and remove the syringe.
2.7 Connect another appropriate syringe and withdraw the required amount of blood sample, remove the syringe, close the 3-way stopcock to patient, flush the central line, and cover with a new cap (heplock bung).
2.8 Place the blood sample in the labeled specimen tube.
2.9 Open the 3 way stopcock to patient and flush the line until it becomes clear.
2.10 Discard all used supplies appropriately.
2.11 Remove gloves and wash hands.
ABG AND MIXED VENOUS BLOOD SAMPLING PROTOCOL
(PROTOCOL-014 B)

1.0 Equipment:

1.1 Tray with 3 ml heparinized syringe
1.2 5 ml syringe/3ml for pediatrics
1.3 Sterile 4 x 4 gauze
1.4 Alcohol swab
1.5 Sterile gloves
1.6 Goggles (if needed)
1.7 Specimen tube with label
1.8 Sharp container

2.0 Procedure:

2.1 Identify the patient by ID band and name.
2.2 Reassure and explain the procedure to conscious patient.
2.3 Wash hands and wear gloves, goggles (if needed).
2.4 Place 4 x 4 sterile gauze under the 3 way stopcock and clean the knob with alcohol swab.
2.5 Connect 5 ml syringe to stopcock and open towards the patient side.
2.6 Withdraw the recommended amount of blood and close the stopcock three fourth way and remove the syringe.
2.7 Connect 1 ml heparinized syringe and withdraw 0.5 ml of blood sample, remove the syringe, close the 3-way stopcock to patient, flush the arterial line/ Pulmonary artery catheter and cover with a new cap (heplock bung).
2.8 Recap the syringe.
2.9 Open the 3 way stopcock to patient and flush the line until it becomes clear.
2.10 Discard all used supplies appropriately.
2.11 Remove gloves and wash hands.
1.0 **CONDITIONS:**

All Registered Nurses (ICU).

2.0 **PURPOSE:**

To ensure safe and effective care and management of chest tube.

3.0 **DEFINITION:**

**Chest Tube Insertion (Tube Thoracostomy)** involves placement of a sterile tube into the pleural space to evacuate air or fluid into a closed collection system to restore negative intrathoracic pressure, promote lung expansion, and prevent potentially lethal levels of pressure from developing in the thorax.

4.0 **POLICY:**

4.1 All Registered Nurses are responsible and accountable to ensure safe and effective care and management of chest tube.

4.2 During emergency situation the consultant can sign the consent.

5.0 **PROCEDURE:**

5.1 All procedures must be done under strict aseptic technique.

5.2 A rubber-tipped hemostat will be kept at the patient’s bedside in case of an emergency where the chest tube needs to be clamped off at the chest wall.

5.3 Perform the following as per protocol:

5.3.1 Chest Tube – Insertion and Removal Assist

5.3.2 Chest Tube – Management

6.0 **FORMS AND ATTACHMENT:**

6.1 Chest Tube – Insertion and Removal Assist Protocol

6.2 Chest Tube – Management Protocol

6.3 Proper sizing of chest tube and closed drainage systems
7.0 REFERENCES:

7.2 American Association for Respiratory Care 2004.
CHEST TUBE - INSERTION AND REMOVAL ASSIST PROTOCOL
(PROTOCOL-015 A)

1.0 INSERTION ASSIST

1.1 Equipment:

- Personal Protective Equipment (PPE)/ Sterile gloves and gown (Physician)
- Povidone 10% and Manorapid /Chlorhexidine 2%, 70% Isopropyl alcohol
- Sterile towels and drapes
- Sterile sponges
- Petroleum gauze and 2 in. adhesive tape
- 1% lidocaine without epinephrine (40 mL)
- 3-5ml syringe x 2 and 18-, 21-, and 25-gauge needles
- Kelly clamps x 2
- Mayo scissors
- Standard tissue forceps
- Towel forceps
- Needle holder
- 1-Silk suture with curved cutting needle for adult (For Pediatrics 3-0).
- Scalpel handle and no. 10 or 11 blade.
- Chest tubes (appropriate size)/trocar
- Chest tube drainage system (filled appropriately)
- Suction connection tube
- Adhesive tape (urgoderm)
- Sterile water
- Low suction machine

1.2 Procedure:

- Ensure all necessary equipment are available
- Ensure informed consent has been obtained by Physician.
- With the patient supine and the head of the bed adjusted for comfort, the involved side is elevated slightly with the arm of the same side brought up over the head plus Supplemental oxygen is administered as needed.
- For conscious patient:
  - Have the patient sit up, bend forward and hug a pillow.

- Ensure patient has received pain killer as ordered by the Physician.
- Set up the close drainage system per manufacturer’s recommendation.
- Assist Physician in preparing the site.
- Provide emotional support and coping behavior to the patient throughout the procedure.
- Once the chest tube is placed, remove cap from the end of connection tubing and attach to end of chest tube following the aseptic technique.
- Assist with suturing the chest tube in position.
- Connect chest tube to the ordered amount of negative pressure suction.
- Secure close chest drainage system below chest level.
- Apply occlusive petroleum pressure, cover with dry gauze and secure.
- Observe the insertion site and initial drainage into the close collection system.
- Observe for bubbling and oscillations.
- Dispose used equipments and perform proper hand washing.
- Monitor vital signs and evaluate drainage:
  - Color
  - Amount
  - Consistency

- Documentation:
  - Date and Time.
  - Size of the tube.
  - Amount, Color, Consistency of the drainage.
  - Amount of negative pressure suction
  - Site assessment result.
  - Pain control medication
2.0 **Removal Assist**

2.1 **Equipment:**

- Chlorhexidine 2%, 70% Isopropyl alcohol or povidone-iodine solution.
- Needle holder
- Scalpel handle and no. 10 blade
- Kelly clamp x 2
- Suture set
- Dressing pack – 4 x 4 gauze/mepore tape.
- Petrolatum gauze
- Sterile gowns, gloves, and masks

2.2 **Procedure:**

- Check the necessary equipments are available.
- Patient comfort and safety are paramount.
- Explain simply to the patient the procedure and obtain lateral decubitus CXR. Put the patient in Semi-Fowlers' position (if tolerable).
- Tube removal is often preceded by oral or parenteral analgesia at an appropriate time interval as per Physician's order.
- Under sterile conditions, the area is prepared with povidone10%/chlorhexidine 2% and 70% isopropyl alcohol/manorapid and after allowing it to dry, is draped properly.
- For a pneumothorax, the drainage system is left on suction until the air leak stops. If an air leak persists, brief clamping of the chest tube can be performed to confirm that the leak is from the patient and not the system.
- The suture holding the tube to the skin is cut and removed if knotted or if it is purse-string do not remove but use for closing incision.
- As the patient takes deep breath and holds it, the tube is gently and firmly removed in single motion.
- Apply direct pressure to the hole with dressing for at least **two (2) minutes** or until bleeding or drainage have subsided.
- The hole simultaneously covered with occlusive petrolatum gauze dressing at peak inspiration,
- Properly dispose of the chest tube catheter and other materials.
- A chest radiograph is performed immediately to check for a pneumothorax and is repeated 24 hours later to rule out re-accumulation of air or fluid.
- Document observations and information pertinent to the procedure.
CHEST TUBE – MANAGEMENT PROTOCOL
(PROTOCOL-015 B)

1.0 Equipment:

   1.1 Sterile Water
   1.2 Kelly clamp
   1.3 Hemostat
   1.4 Petroleum gauze

2.0 Procedure:

   2.1 Obtain post procedure CXR to confirm proper site of the chest tube.
   2.2 Avoid kinks and large loops of tubing.
   2.3 Keep sterile petroleum gauze, Kelly clamp and a bottle of sterile water at bedside.
   2.4 Milking the tube gently (as per order for pediatric patients).
   2.5 Keep the system below the level of chest for gravity drainage.
   2.6 Check the collection chamber frequently to monitor the volume and the nature of the drainage and mark it on the bottle with date and time (initially after insertion and every shift).
   2.7 Check water the seal chamber for level of air leak.
   2.8 Check suction control chamber for adequate suction.
   2.9 Documentation:
      • Date and Time.
      • Size of the tube
      • Amount, Color, Consistency of the drainage.
      • Amount of negative pressure suction
      • Site assessment result.
      • Pain control medication
1.0 CONDITIONS:

All Registered Nurses (ICU).

2.0 PURPOSE:

To ensure safe and effective assistance in the process of Percutaneous Tracheostomy.

3.0 DEFINITIONS:

Tracheostomy is the creation of an opening into the trachea through the neck. A tracheostomy tube is then inserted to help facilitate breathing and the removal of secretions.

4.0 POLICY:

All ICU Registered Nurses are responsible and accountable ensure safe and effective assistance in the process of Percutaneous Tracheostomy.

5.0 EQUIPMENT:

5.1 Medications according to anesthetist.
5.2 Fiber optic bronchoscope with its accessories if needed.
5.3 Laryngoscope
5.4 Endotracheal tube and fixing material.
5.5 Ambu bag with oxygen source.
5.6 Suction source with yankauer tubing.
5.7 Positioning material (2 rolled bed sheets covered with white pad and head ring).
5.8 Sterile gown, gloves, mask and cap.
5.9 2x 10 ml Syringe
5.10 18 and 22G needle
5.11 Local Anesthesia
5.12 Sterile gauze
5.13 Tracheostomy kit (according to patient’s size)
6.0 **PROCEDURE:**

6.1 Ensure the informed consent is available.

6.2 Keep **NPO** for **eight (8) hours before procedure**.

6.3 Ensure the patient is well sedated.

6.4 Immediately before starting any procedure, the oral cavity, the endotracheal tube and the trachea are suctioned to clear any secretions and 100% oxygen is applied.

6.5 Place the anesthetized patient on supine position with the neck extended and the shoulders elevated on a small roll.

6.6 Wear mask and cap, wash hands with soap and water, wear gown and gloves with asepsis.

6.7 Assist the Physician in the following procedure:

6.7.1 Cleaning the area with povidone 10% and manorapid and apply drapes.

6.7.2 Palpate the cricoid cartilage and the suprasternal notch. Identify the space between third and fourth tracheal ring. Puncture the space with the 14G Needle with sheath and enter the trachea.

6.7.3 The tracheal air column is then identified by aspirating air into the syringe attached to the catheter introducer needle. The syringe is filled with 3-5 ml. of lidocaine with epinephrine and this is injected into the trachea to abolish the cough reflex.

6.7.4 The outer plastic cannula is advanced into the lumen of the trachea and the inner needle is removed. The J- guide wire is introduced into the trachea and the cannula is removed. Make 1-1.5 cm transverse incision around the guide wire.

6.7.5 A 14-G dilator is passed over the guide wire to start stoma formation in the anterior tracheal wall.

6.7.6 Using single step cone dilatation technique progressively dilates the anterior tracheal wall.

6.7.7 The cone dilator is inserted so that the tracheostomy cannula can be easily introduced into the trachea.

6.7.8 Removing the cone dilator keeping guide wire in place and introduce the tracheostomy tube over the guide wire using the seldinger's technique.

6.7.9 Confirming the position of the tracheostomy tube by auscultating the chest and then remove the ET tube.

6.8 Apply the antiseptic dressing after the procedure and obtain chest X-ray.

6.9 Observe for Complications e.g. bleeding, subcutaneous emphysema, esophageal rupture, misplacement of tube.

6.10 Document observations and any pertinent information.
7.0 REFERENCES:


TRACHEOSTOMY CARE PROTOCOL
(PROTOCOL-016 A)

1.0 Equipment:

1.1 Tracheostomy care tray with drape, gauze, cotton tip applicators, brush, hydrogen Peroxide etc.
1.2 Gloves, mask, gown and goggles if indicated.
1.3 Normal saline
1.4 Suction source with appropriate size of suction catheter
1.5 Sterile split gauze
1.6 Tracheostomy tie

2.0 Procedure:

2.1 Explain the procedure to the patient.
2.2 Wash hands and perform suction under strict aseptic technique.
2.3 Remove soiled dressing from around tube and discard with gloves on removal.
2.4 Assemble the necessary items for tracheostomy care.
2.5 Put patient in a supine position.
2.6 Wash hands and use gloves.
2.7 Clean the stoma under faceplate with hydrogen peroxide swabs.
2.8 Use each applicator only once moving from stoma site outward.
2.9 Rinse the area with cotton swab soaked in normal saline.
2.10 Dry skin gently with swab.
2.11 Slide commercially prepared split gauze under faceplate.
2.12 Change tracheostomy tie.
2.13 Remove gloves and wash hands.
2.14 Document observation and relevant information pertinent to the procedure.
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective care and management of Tracheostomy.

3.0 POLICY:
All ICU Registered Nurses are responsible and accountable to ensure safe and effective care and management of tracheostomy.

4.0 EQUIPMENT:

4.1 Tracheostomy care tray with drape, gauze, cotton tip applicators, brush, hydrogen Peroxide etc.
4.2 Gloves, mask, gown and goggles if indicated.
4.3 Normal saline
4.4 Suction source with appropriate size of suction catheter
4.5 Sterile split gauze
4.6 Tracheostomy tie

5.0 PROCEDURE:

5.1 Explain the procedure to the patient.
5.2 Wash hands and perform suction under strict aseptic technique.
5.3 Remove soiled dressing from around tube and discard with gloves on removal.
5.4 Assemble the necessary items for tracheostomy care.
5.5 Put patient in a supine position.
5.6 Wash hands and use gloves.
5.7 Clean the stoma under faceplate with hydrogen peroxide swabs.
5.8 Use each applicator only once moving from stoma site outward.
5.9 Rinse the area with cotton swab soaked in normal saline.
5.10 Dry skin gently with swab.
5.11 Slide commercially prepared split gauze under faceplate.
5.12 Change tracheostomy tie.
5.13 Remove gloves and wash hands.
5.14 Document observation and relevant information pertinent to the procedure.

6.0 REFERENCES:

1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective monitoring of a patient’s ventilation, oxygenation, cardiopulmonary and hemodynamic status during transport of patient for diagnostic and therapeutic procedures.

3.0 POLICY:
All Registered Nurses are responsible and accountable to ensure safe and effective transport of critically ill patients for diagnostic and therapeutic procedures.

4.0 EQUIPMENTS:

4.1 Emergency airway management supplies.
4.2 Intubation set and Catheter
4.3 Portable suction and catheter.
4.4 Portable ventilator
4.5 Portable oxygen with appropriate oxygen delivery device.
4.6 Manual resuscitator with mask and PEEP valve.
4.7 Pulse Oximeter.
4.8 Cardiopulmonary transport monitor, transducer cables, and modules.
4.9 Emergency pharmacologic agents and sedation.
4.10 Stethoscope
4.11 Personal Protective Equipment

5.0 PROCEDURE:

5.1 PERSONNEL
5.1.1 All mechanically ventilated patients in ICU must be accompanied by an ICU physician and a nurse for diagnostic procedures.
5.1.2 All mechanically ventilated patients in ICU must be accompanied by an anesthesiologist and a nurse for all types of surgical procedures to and from the OR.

5.1.3 The team must be proficient in operation and troubleshooting all of the equipment.

5.2 Gather and assemble all respiratory equipments. Maintain electrical power to portable ventilator prior to departure to ensure the maximum charge of the batteries.

5.3 Set appropriate alarm limits for all parameters.

5.4 All pressure monitoring devices should be sent along with the patient for continuous monitoring.

5.5 Monitor the patient throughout the transport for the adequacy of oxygenation and ventilation, assure hemodynamic stability and tolerance of the procedure, and monitor all mechanical ventilator parameters as indicated to ensure patient safety.

5.6 If ventilatory facilities are available in the procedure room, these can be used to save the oxygen supply and battery of portable ventilator.

5.7 Document the ventilator or oxygen settings prior to departing and upon returning to the unit.

5.8 Post Procedure:

5.8.1 Upon returning to the unit, place the patient on the appropriate bedside monitoring and respiratory equipment. Check and reset all necessary alarm parameters and ensure patient comfort.

5.8.2 Remove all transport equipment from the patient's room, disinfect as appropriate, and store transport ventilator with connection to AC power for recharging of the batteries.

5.8.3 Document any cardiopulmonary or hemodynamic changes that may have occurred during the transport on the "comments" side of the Ventilator flow sheet. Include the occurrence of adverse reactions and interventions that were made. Report this information to the next shift.

6.0 Reference:

American Association for Respiratory Care Clinical Practice Guideline 2004.
1.0 **CONDITIONS:**
All Registered Nurses (ICU).

2.0 **PURPOSE:**
To ensure safe and effective procedure in assisting cardio version.

3.0 **DEFINITION:**
CARDIOVERSION is a procedure in which an electrical shock is delivered to the heart to convert an irregular or fast heart rhythm (called an arrhythmia) to a normal heart rhythm. During cardioversion, doctor uses a cardioverter machine to send electrical energy (or a “shock”) to the heart muscle to restore the normal heart rhythm.

4.0 **POLICY:**
All Registered Nurses are responsible and accountable for safe and effective procedure in assisting cardio version.

5.0 **EQUIPMENT:**

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>5.1</td>
<td>Cardioverter, biphasic defibrillator/monitor</td>
</tr>
<tr>
<td>5.2</td>
<td>Ambu- bag, mask, nasal prongs</td>
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<tr>
<td>5.3</td>
<td>IV sets with 0.9 Normal Saline</td>
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<tr>
<td>5.4</td>
<td>Sedation as prescribed</td>
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<td>5.5</td>
<td>Drugs at bedside</td>
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<tr>
<td>5.5.1</td>
<td>1 Ampoule NaHCO₃</td>
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<tr>
<td>5.5.2</td>
<td>1 mg Atropine Sulphate IV</td>
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<td>5.5.3</td>
<td>100 mg Lidocaine IV</td>
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<tr>
<td>5.5.4</td>
<td>Valium 10mg (in addition to medication observed by anesthesiologist)</td>
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<td>5.6</td>
<td>Resuscitation Cart should be available.</td>
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<tr>
<td>5.7</td>
<td>Suction machine (set-up)</td>
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<td>5.8</td>
<td>Saline sponges</td>
</tr>
</tbody>
</table>
5.9 Oxygen.
5.10 Cardiac monitor.
5.11 Intubation kit

6.0 **PROCEDURE:**

6.1 When an order for cardio version is received on the Medical-Surgical Unit, the nurse in-charge caring for the patient must assure that there is an order for transfer to the ICU/CCU. If an order has been received/written for the transfer, the nurse is to expedite the transfer immediately.

6.2 If there is no order for transfer for the patient who has consented to elective cardio version, the nurse must contact the physician and obtain an order to transfer. The nurse is to expedite the transfer to the ICU/CCU unit immediately.

6.3 Follow Elective Cardioversion Protocol.

6.4 Document the observation and information pertinent to the procedure

7.0 **FORMS AND ATTACHMENT:**
Elective Cardioversion - Assist Protocol

8.0 **REFERENCES:**
1.0 Equipment:

1.1 Cardioverter, biphasic defibrillator/monitor
1.2 Ambu-bag bag, mask, nasal prongs
1.3 IV sets with 0.9 Normal Saline
1.4 Sedation as prescribed
1.5 Resuscitation Cart should be available.
1.6 Emergency Drug Box
1.7 Suction machine (set-up)
1.8 Saline sponges
1.9 Oxygen
1.10 Cardiac monitor
1.11 Intubation kit
1.12 Drugs at bedside:
   • 1 Ampoule NaHCO3
   • 1 mg Atropine Sulphate IV
   • 100 mg Lidocaine IV
   • Valium 10mg (in addition to medication observed by anesthesiologist)

2.0 Procedure:

2.1 Pre-Procedure:

• Identify the patient by ID band and names.
• Hook the patient to cardiac monitor.
• Verify the consent form is sign and in the patient chart.
• Report to the physician when patient received dose of Digoxin (if applicable) and most recent serum electrolytes and digoxin level (if applicable)
• Reinforce physician explanation of the procedure; keep explanation simple but complete/thorough.
• Reassure the patient.
• Ensure privacy.
• Notify Anesthetist and Physician involved in the procedure.
• Assess patient knowledge of procedure.
• Assess patient rhythm and vital sign, cardiac rhythm, peripheral pulses and level of consciousness.
• Obtain 12-lead ECG; determine electrolyte level within normal value.
• Administer supplemental oxygen as ordered.
• Suction set up needs to be at bedside.
• Verify peripheral IV access, ensure patency.
• Start Normal Saline at KVO for flush.
• Keep resuscitation and respiratory support readily available.
• Have ambubag with facemask and defibrillator at bedside.
• Observed NPO 6-12 hours prior to cardioversion.
• Remove dentures and jewelry.

2.2 During Procedure:

• Apply multifunction pads or using paddles apply conductive pads to chest wall.
  ❖ One pad on chest; at 2nd inter costal space below the right mid-clavicular line.
  ❖ 2nd pad to the left of the cardiac apex (5th inter costal space).
• Administer pre- medications.
• Set energy level as ordered by the physician using “Energy Select” button.
• Press “Charge” button (with hard paddles, press the charge button on the handle of the right apex) paddle.
• Assess that patient is adequately sedated to be shocked, call name verbally and tactile stimuli to assess.
• Remove O2 from patient bed prior to discharge through pad or paddles.
• During command to “Stand Clear” ensure everybody is not touching the patient, bed and equipment.
• Monitor and document vital signs and heart rate throughout the procedure.
• Press “Shock” button and hold until unit delivers charge to the patient.
• Assess post cardioversion rhythm.
• Assist in repeat shock as necessary.
• After each shock the Defibrillator defaults back to standard (non-synchronized) defibrillation.
• Always verify that the arrows display over every R wave before deliver a synchronized shock.

• Monitor and record patient oxygen saturation throughout the procedure. Titrate oxygen to maintain SaO2 > 90%.

• Check level of consciousness.

• Document all medication given, the date and time of cardioversion, number of shocks administered and watts/second given.

• Document subsequent rhythm and patient status.

2.3 Post Procedure:

• Continue moderate sedation monitoring per hospital policy.

• Monitor and document vital sign and heart rhythm every 15 minutes for 1 hour, 30 minutes for 1 hour and then hourly till stable.

• Obtain 12 lead EKG post procedure.

• Monitor EKG rhythm for at least 2 hours.

• Administer oxygen as prescribed, monitor and record oxygen saturation until fully awake.

• Assess chest wall for burns.

• Support and orient patient during post sedation period.

• Notify physician of any change in rhythm or any change in vital signs.

• Obtain physician order for diet if patient is fully awake and able to tolerate advancement.

• Document the observation and information pertinent to the procedure.

2.4 Documentation:

• Document the sequence of therapy, including voltage delivered with each attempt.

• EKG rhythm pre- and post- procedure.

• Neurologic, Respiratory and Cardiovascular assessments before and after cardioversion.

• Response of patient.
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and accurate procedure in performing EKG recording.

3.0 DEFINITION:
Electrocardiography (ECG or EKG) is a Trans thoracic interpretation of the electrical activity of the heart over time captured and externally recorded by skin electrodes. It is a non invasive recording produced by an electrocardiographic device.

4.0 POLICY:
All ICU Registered Nurses are responsible and accountable to ensure accurate procedure in performing EKG recording.

5.0 PROCEDURE:
5.1 The Physician provides a written order.
5.2 Request form should be filled up by the physician.
5.3 Inform the department
5.4 Follow EKG Protocol
5.5 Document the observation and information pertinent to the procedure.

6.0 FORMS AND ATTACHMENT:
EKG Protocol

7.0 REFERENCES:
IPP’s EKG Department 2005
1.0 CONDITIONS:
All Registered Nurses (Hemodialysis and ICU’s)

2.0 PURPOSE:
To ensure safe and effective management in performing CRRT through Aquarius Machine.

3.0 DEFINITION:

3.1 Aquarius system is an automated fluid balance monitor designed for use with the following treatments:
   3.1.1 SCUF (Slow Continuous Ultrafiltration)
   3.1.2 CVVH (Continuous Venovenous Hemofiltration)
   3.1.3 CVVHD (Continuous Venovenous Hemodialysis)
   3.1.4 CVVHDF (Continuous Venovenous Hemodialfiltration)

4.0 POLICY:

4.1 All Registered Nurses are responsible and accountable to ensure safe and effective management in performing CRRT through Aquarius Machine.

4.2 Ensure that the following guidelines in preparation and set up of Aquarius machine are followed:

4.2.1 During the system test the operator must wait for the generation of the visual and audible alarm signals.

4.2.2 If there are errors during the initial functional system test, the Aquarius system must not be used. Refer to onscreen help and repeat. Notify the technical support if system test continues to fail.

4.2.3 Do not override the safety controls during the test to ensure patient’s safety on treatment.

4.2.4 Treatment parameters entered in the machine must compared to displayed values and confirm the entered values.
4.2.5 The patient parameters must be entered and adjusted in accordance with physician’s prescription.

4.2.6 Hemofilters and tubing set must be changed after 24 hours of use as per manufacturer’s recommendation.

4.2.7 The tubing set has been tested and it is suggested that it may be used for up to 72 hours.

4.3 Standard precautions must be followed at all times.

5.0 EQUIPMENT:

5.1 Aquarius System

5.2 Blood tubing set
   5.2.1 Aqualine blood tubing set (Adult Standard line set)
   5.2.1.1 Extracorporeal volume = 100 ml
   5.2.2 Aqualine S blood tubing (Pediatric line set)
   5.2.2.1 Extracorporeal volume = 64 ml

5.3 Filtrate empty bags.

5.4 Dialysate or substitution solution.

5.5 Connectors (manifold sets for multibags) for filtrate bag and dialysate.

5.6 Normal Saline 0.9% one liter with 5,000”U” Heparin if indicated.

5.7 Hand crank mounted at the back of the scale system to use to return blood manually in case of power failure.

5.8 Protective barriers (gloves, mask, gown).

5.9 Syringes

6.0 PROCEDURE:

6.1 Prepare the necessary equipments.

6.2 Machine Preparation
   6.2.1 Turn power on for system test to verify the system’s main functions. Do not install the tubing set while machine is on system test.
   6.2.2 On Preparation mode, choose the prescribed therapy (SCUF, CVVH, CVVHD, and CVVHDF).
   6.2.3 Install blood tubing set and hemofilter, follow the color codes.
      6.2.3.1 Access line (arterial) – red
      6.2.3.2 Return line (venous) – blue
      6.2.3.3 Predilution and Post dilution – green
      6.2.3.4 Filtrate or effluent – yellow
   6.2.4 Prime the blood tubing set and hemofilter as per unit protocol and manufacturer’s instruction.
   6.2.5 After priming Clamp and Pressure test must be done, don’t override.
   6.2.6 After a successful test the system will go to Start Connection mode.
6.2.7 If patient is not ready, go to recirculation mode. Patient parameters will be programmed this time, if not be sure that patient parameters are entered before starting the treatment, then go to connection key.

6.2.8 Connection Mode, select the connection option prescribed:

6.2.8.1 Initiate dialysis through vascular access.

6.2.8.1.1 Single connection: Only the access line attached to patient’s access (red) initially, and the blood pump started discard the saline from the circuit up to the air detector. A blood sensor will automatically stop.

6.2.8.1.2 Double connection: both access and return lines are simultaneously attached to the patient’s access and return port. This option is indicated for patients who are hypovolemic and hypotensive.

6.3 Treatment Mode

6.3.1 Monitor the machine parameters.

6.3.2 Ensure that machine pressures are within normal limits.

6.3.2.1 Access, Return and Pre filter pressures monitor the blood site.

6.3.2.2 Filtrate pressure monitors the fluid side.

6.3.3 Respond to machine alarms promptly.

6.3.4 Observe and monitor patient throughout the procedure.

6.4 Disconnecting Patient from Aquarius

6.4.1 Terminate Dialysis.

6.4.2 Disconnecting patient from Aquarius has 2 options:

6.4.2.1 Recirculation mode. This mode allows temporary disconnection for a limited period of time. The filters, lines, bags and solutions all remain on the machine and the blood pump runs in recirculation mode until the patient is ready to be reconnected to the same circuit.

6.4.2.2 End of treatment. This option means patient treatment will end. The filters, lines, solutions must be removed from the machine, and Aquarius machine must be turned off.

6.5 Document observation and information pertinent to the procedure.

7.0 REFERENCES:

1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective management of medical complications that may occur during dialysis.

3.0 POLICY:

3.1 All ICU Registered Nurses are responsible and accountable to ensure safe and effective management of medical complications that occur during dialysis.

4.0 PROCEDURE:

4.1 Perform proper assessment of patient, and refer immediately any untoward findings.

4.2 Ensure that patient is seen by the physician if there is any serious problem prior to initiation of hemodialysis treatment.

4.3 Document any problem or complications noted, actions taken and patient’s response in hemodialysis flow sheet.

4.4 Recognize and manage the following medical complications:

4.4.1 Air Embolism
4.4.2 Arrhythmias
4.4.3 Muscle Cramps
4.4.4 Disequilibrium syndrome
4.4.5 Fluid overload
4.4.6 Hypertension
4.4.7 Hypotension
4.4.8 Seizures
5.0 **FORMS AND ATTACHMENT:**

Hemodialysis – Management of Medical Complications Protocol.

6.0 **REFERENCES:**

6.1 Nissenson, Allen R.; Complications of Chronic Dialysis Therapy pp.212

6.2 Review of Nurses for Nurses and Dialysis Personnel 7th ed Gutierrez; Stoner, Martha H.; Correa, Anna L
HEMODIALYSIS - MANAGEMENT OF MEDICAL COMPLICATIONS PROTOCOL
(PROTOCOL-022 A)

1.0 AIR EMBOLISM

1.1 Signs and Symptoms:
• Depend on the position of patient at time of air entry and amount of air that entered.
  ➢ Lying position
    ▶ blood with air enter lungs
    ▶ Chest pain, dyspnea, cough and cyanosis
    ▶ Diplopia, blindness, acute visual disturbances
    ▶ Confusion, hemi paresis, coma.
  ➢ Sitting position
    ▶ Loss of consciousness, convulsion and even death.
  ➢ Recumbent position
    ▶ Dyspnea, cough and chest tightness.

1.2 Prevention:
• Prime extracorporeal circuit with normal saline solution; ensure circuit is free of air prior to connecting to patient's access.
• Use only IV fluids in plastic bags.
• Ensure air detector is on and functioning and venous tubing is in venous line clamp.
• Ensure venous blood line is free of air or foam before overriding air detector alarm.
• Tighten, secure all connections with adhesive tape after connecting blood lines to patient’s access
• Use of air to return blood to patient at conclusion of dialysis is not allowed.

1.3 Nursing Management:
• Notify physician
• Place patient on left side in Trendelenburg position for 1 hour to trap air in the apex of right ventricle, prevent air entering the pulmonary vein and to prevent movement of air bubbles into other organs.
• Clamp blood lines and stop blood pump.
• Administer oxygen and restart dialysis as ordered by physician.
• Initiate CPR if patient arrest and call for Code Blue.
2.0 ARRHYTHMIAS

2.1 Signs and Symptoms:
- Patient with Arrhythmia may be asymptomatic or may manifest the followings:
  - Dizziness, chest pain, shortness of breath and palpitations.
  - Radial or Apical pulse of irregular rhythm occurring first time.
  - Pulse rate of less than 60 beats/minute
  - Pulse rate over 100 accompanied by above symptoms
  - Unstable blood pressure or hypotension not related to hypovolemia

2.2 Nursing Management:
- Notify physician immediately
- Administer oxygen as ordered
- Put patient on cardiac monitor
- If hypotension is due to hypovolemia, administer normal saline bolus as ordered
- Monitor and record vital signs as ordered
- Decrease blood flow and ultra filtration rate
- Send blood for CBC, calcium, magnesium and electrolytes as ordered.
- Adjust dialysis treatment as ordered by physician
- If patient arrests, initiate CPR and call for Code
- Document observation and information pertinent to procedure in dialysis flow sheet.

3.0 MUSCLE CRAMPS

3.1 Nursing Management:
- Decrease ultra filtration
- Monitor and record vital signs—blood pressure, pulse. Respiration and temperature
- Gently massage affected area, apply pressure to ball of foot against hand or footboard or let patient stand if blood pressure allows.
- Apply warm, moist heat to affected extremity
- Infuse 0.9% normal saline bolus 100-200ml as ordered.
- Administer 50% Dextrose on water 25ml IV push up to 2 doses and or as ordered but not to Diabetic patient
- Severe or recurrent cramps, notify physician for dry weight evaluation and medication intervention.
4.0 Disequilibrium Syndrome

4.1 Signs and Symptoms:
- Nausea, vomiting, headache, backache
- Agitation, twitching, confusion
- Classic grandma seizure

4.2 Nursing Management:
- Notify physician immediately.
- Monitor vital signs—observe changes in blood pressure.
- Observe for increasing or decreasing signs of cerebral irritation (headache, nausea and vomiting, restlessness and irritability, confusion).
- Use less efficient dialyzer when blood urea nitrogen is very high.
- If patient is acutely or severely uremic, use shorter, more frequent dialysis treatments to slow down the change in serum electrolytes or osmolarity.
- Administer medication (manitol, D50%, and anticonvulsant) as ordered.
- Decrease blood flow and ultrafiltration rate and maintain accurate documentation

5.0 Fluid Overload

5.1 Signs and Symptoms:
- Excessive weight gain (> 2kg interdialytic weight gain).
- Shortness of breath, wheezing, rales, crackles on lung auscultation.
- Chest pain
- Edema

5.2 Nursing Management:
- If stable:
  - Discard the saline used for priming the lines and dialyzer.
  - Dialyze using high fluid removal rates
  - Notify physician of fluid overload.
  - Sequential ultrafiltration or extended dialysis may be done if authorized by physician.
  - Instruct patient on proper diet and fluid restriction, and hazards of excessive weight gain. Document on flow sheet.
  - Notify charge nurse and physician if weight at end of dialysis is than 0.5kg over or under drieds weight or if patient continues to have shortness of breath, wheezing or rales.
  - Patient will not leave the dialysis unit unless cleared by the physician.
• If unstable:
  ➢ Administer Oxygen at 2 liters per minute.
  ➢ Notify physician.
  ➢ Do not begin dialysis until physician has assessed the patient.
  ➢ Document observation and information pertinent to procedure in dialysis flow sheet.

6.0 **HYPERTENSION**

6.1 **Signs and Symptoms:**
• Headache
• Agitation
• Change in mentation
• Chest pain
• Shortness of breath

6.2 **Nursing Management:**
• Initiate routine dialysis unless patient is symptomatic (with severe headache, agitation, change in mental status, chest pain, shortness of breath).
• Notify charge nurse and inform physician if hypertension not resolving with fluid removal or blood pressure over 180/110.
• Administer anti hypertensive medications as prescribed.
• Review the weight trends of past dialysis treatment, inform physician to reassess dry weight.
• Review anti hypertensive medications, compliance, dosage patient taking when patient is taking medication. Consult physician for required changes in regimen.
• Patient may be discharged upon physician’s advice.

7.0 **HYPOTENSION**

7.1 **Signs and Symptoms:**
• Patient “ yawning “
• Patient “ feels different ” – “something is wrong”
• Patient becomes restless
• Nausea, vomiting, pallor, cold clammy perspiration
• Early signs may be patient feeling warm and fanning self
• Dizziness on standing post HD
• Tachycardia
• Loss of consciousness (Late)
7.2 **Nursing Management:**
- Lower head of chair or bed or place patient in Trendelenburg position.
- Discontinue or reduce ultrafiltration rate.
- Administer IV Normal Saline (100 – 200cc)
- Maintain blood flow rate, except for those patients who are severely hypertensive, reduction of BFR will not help.
- Administer D50% dextrose – to facilitate movement of water from the interstitial and intracellular compartments into the vascular compartment.
- After hypotension is corrected, reassess dry weight.
- Review medications and refer to physician the changes that may be indicated in the dialysis prescription.
- Document observation and information pertinent to procedure in dialysis flowsheet.

8.0 **Seizures**

8.1 **Nursing Management:**
- Call for help.
- Notify physician immediately.
- Maintain patent airway.
- Administer oxygen.
- Nurse remains with patient to ensure that vascular access and lines are not compromised.
- Place patient in reclining position on the left side in case of air embolism and to prevent aspiration.
- Monitor and record vital signs-blood pressure, pulse, respiration and temperature.
- If hypotensive, administer IV Normal Saline as prescribed.
- Assisting nurse takes patient off the machine leaving arterial and venous lines in place for further dialysis and medication administration.
- Document observation and pertinent information in dialysis flow sheet.
1.0 CONDITIONS:
All Registered Nurses (ICU).

2.0 PURPOSE:
To ensure safe and effective management of technical problems that may occur during hemodialysis.

3.0 POLICY:
All ICU Registered Nurses are responsible and accountable to ensure safe and effective management of technical problems that may occur during dialysis.

4.0 PROCEDURE:

4.1 Dialysis nurses must be trained and/or review operator’s manual prior to operation of any dialysis machine.

4.2 Follow guidelines in operator’s manual to respond to alarms, for trouble shooting and preventive maintenance.

4.3 Dialysis staff must safely and effectively manage the following technical problems:

4.3.1 Bioincompatibility Membranes
4.3.2 Hemolysis
4.3.3 Drug Induced Allergic Reaction
4.3.4 Bleeding (exsanguinations)
4.3.5 Blood leak
4.3.6 Arterial Pressure Alarms
4.3.7 Recirculation of blood in blood circuit
4.3.8 Power Failure

4.4 Report any technical problem to appropriate department, document actions taken, observation and information pertinent to problem resolution in Hemodialysis flow sheet.

4.5 Note blood leaks, dialyzer clotting, machine malfunction.
4.6 Write incident report for; notify Charge nurse, Head nurse and Physician of any technical problem that is detrimental or endangers the patient.

5.0 FORMS AND ATTACHMENT:

6.0 REFERENCES:
   6.1 Nissenson, allen R, Complications of Chronic Dialysis Therapy pp192–212.
   6.2 Review of Nurses for Nurses and Dialysis Personnel 7th ed. Gutch, CF, Stoner Martha H, Correa, Anna L.
KING KHALID UNIVERSITY HOSPITAL
NURSING DEPARTMENT
INTENSIVE CARE UNIT

DIALYSIS - MANAGEMENT OF TECHNICAL PROBLEM PROTOCOL
(PROTOCOL-023 A)

1.0 BIOINCOMPATIBILITY MEMBRANES

1.1 Signs Symptoms:
- Mild reaction: Pruritus, nasal congestion, coughing, flushing
- Severe reaction: Hypotension, dyspnea, wheezing, cyanosis, severe urticaria

1.2 Nursing Management:
- Mild symptoms:
  - If patient has experienced mild symptoms in the past, rinse the dialyzer with 2 liters normal saline, discard priming saline and change to a biocompatible dialyzer.
  - Slowly increase blood flow rate when initiating dialysis.
  - Notify physician and administer prescribed medications.

- Severe reactions:
  - Terminate treatment. Do not return the blood. Clamp lines and recirculate blood (see recirculation policy).
  - For shortness of breath, chest tightness, administer Oxygen as per protocol.
  - Notify physician immediately. Administer medications as prescribed.
  - In severe cases, patient should be dialyzed with a non cuprophane membrane dialyzer.
  - Document observation and information pertinent to procedure in dialysis flowsheet.

2.0 HEMOLYSIS

2.1 Signs Symptoms:
- Chest pain, dyspnea
- Hypotension
- Bright blood in venous blood line.
- Localized burning sensation, pain in access return site (venous needle)
- Complaints of “feeling hot”
• Dysrhythmias from destroyed red blood cells.
• Decrease in hemoglobin.

### 2.2 Nursing Management:
- Stop treatment, leave one needle in place and notify physician
- Do not return blood in dialyzer and tubing.
- Take blood sample in red top for laboratory test to confirm hemolysis.
- Check potassium and hemoglobin level
- Monitor vital signs, observe for dysrhythmias, hypotension, shortness of breath.
- Administer Oxygen as per protocol
- Prepare to restart HD as per physician’s order
- Biomedical Engineer must check machine before return to service.
- Document observation and information pertinent to procedure in hemodialysis flowsheet.

### 3.0 Drug Induced Allergic Reaction

#### 3.1 Signs Symptoms:
- Rash
- Hives
- Fever

#### 3.2 Nursing Management:
- Discontinue drug.
- Notify physician.
- Administer antihistaminic drug as ordered.
- Monitor and record vital signs.
- Document type and describe reaction in dialysis flowsheet.
- Note allergy to drug on patient's chart, file; notify pharmacy, notify ward nurse and educate patient regarding allergy.
- Document observation and information pertinent to procedure in hemodialysis flowsheet.

### 4.0 Bleeding (Exsanguinations)

#### 4.1 Signs Symptoms:
- Obvious source of bleeding.
- If severe, hypotension and tachycardia will occur.
4.2 **Nursing Management:**
- Apply pressure to control and stop bleeding.
- Notify Nephrologist.
- Decrease or stop Heparin administration.
- Reassure patient.
- In case of access bleeding inform Nephrologists and Vascular surgeon.
- Send CBC, PT, APTT, INR, blood group and cross matching if bleeding.
- Administer O2 if blood loss is significant as per protocol.
- Document observation and pertinent information in dialysis flowsheet.

5.0 **Blood Leak**

5.1 **Signs Symptoms:**
- The dialysis machine will continuously alarm and blood leak red light will blink.

5.2 **Nursing Management:**
- When blood leak alarm sounds:
  - Turn off ultrafiltration rate.
  - Turn blood flow rate to 100 ml/minute
  - Hemastix outflow dialysate at drain, air bubbles can cause false alarms.
  - If negative, reset blood leak alarm and re-Hemastix in five (5) minutes.
  - If Hemastix is positive or blood leak is large, DO NOT return blood.
  - If small blood leak, return patient’s blood from saline arm forward. Turn off blood pump.
  - Notify Physician.
  - If dialysis is to be resumed, set up new dialyzer and tubing set as per protocol.
  - Re-initiate dialysis treatment as per protocol.
  - Document observation and pertinent information in dialysis flowsheet

6.0 **Arterial Pressure Alarms**

6.1 **Signs Symptoms:**
- Arterial limit begins to drop and machine continuously alarms.

6.2 **Nursing Management:**
- Stop blood pump, clamp the line.
- Inspect entire line for kinking.
• Check needle position, adjust as needed. The needle may need to be flipped.
• Attach a 10ml syringe to arterial transducer and remove excess air.
• Reposition patient.
• Arterial pressure should not exceed >-250mmHg because it will create recirculation.
• If above interventions do not correct the problem, notify nephrologist.
• Document observation and information pertinent to procedure in Hemodialysis Flowsheet.

7.0 Recirculation of Blood in Blood Circuit

7.1 Equipment:
• Sterile 2 way connector
• Two (2) 10ml sterile syringe filled with saline.
• One (1) bag 500ml Normal Saline
• One (1) IV administration set
• Gloves and mask
• Protecting pad
• Alcohol swabs

7.2 Nursing Management:
• Prepare the necessary equipment.
• Put on mask and gloves
• Place protective pad under the catheter or AVF/AV graft arm
• Note remaining treatment time.
• Turn off blood pump.
• Clamp arterial, venous blood lines or access lines.
• Swab connections with alcohol and disconnect.
• Maintain patency of access by flushing with normal saline and lock or leave the syringe at the end of access lines.
• Connect venous and arterial blood lines together with the sterile recirculator (2 way connector)
• Open the saline as needed to replace fluid lost due to minimal ultrafiltration. Push heparin as needed to prevent clotting.
• Turn on blood pump to 100ml/minute. Continue dialysate flow to dialyzer while recirculating to maintain warmth of blood in circuit.
• To reconnect:
➢ Check the entire circuit for presence of air.
➢ Swab the connection with alcohol before disconnection.
➢ Flush arterial and venous access lines to ensure patency.
➢ Clamp arterial and venous line and the saline line (close to the circuit)
➢ Reconnect blood lines to access lines.
➢ Unclamp and turn on blood pump and gradually increase to desire blood flow rate.
➢ Perform all routine monitoring checks.
➢ Document observation and pertinent information in dialysis Flowsheet.

8.0 Power Failure

8.1 Nursing Management:
➢ Call the Maintenance Department
➢ Notify the Biomedical Services immediately.
➢ Mute alarms on machines, let available personnel hand crank machines for duration of temporary failure. If power failure is not established within 1 minute, rinse back patient’s blood and terminates dialysis treatment.
➢ Turn off the machine until power is reestablished, if within 30 minutes, resume treatment.
➢ Document observation and information pertinent to procedure in hemodialysis flow sheet.
1.0 CONDITIONS:
All Registered Nurses (ICU and Bronchoscopy Nurses).

2.0 PURPOSE:
To ensure safe and effective assistance in bronchoscopy in the Intensive Care Unit.

3.0 POLICY:

3.1 All Registered Nurses are responsible and accountable to ensure safe and effective assistance in bronchoscopy in the Intensive Care Unit.

3.2 Continuous multi-modal physiological monitoring must be continued during and after fibreoptic bronchoscopy.

3.3 Care must be exercised to ensure adequate ventilation and oxygenation is maintained during fibreoptic bronchoscopy via an endotracheal tube.

4.0 EQUIPMENT:

4.1 Required Instruments & Medications:

4.1.1 Sterile gown and gloves and a surgical face mask.
4.1.2 2% Xylocaine solution for local freezing.
4.1.3 2% Xylocaine viscous
4.1.4 10% Xylocaine spray
4.1.5 Tongue depressor
4.1.6 Gauze, cotton and straight magill's forceps
4.1.7 Intravenous Midazolam (5 mg in 5 ml normal saline) for sedation
4.1.8 Normal saline for flushing and broncho-alveolar lavage (BAL)
4.1.9 Oxygen mask/cannula connected to Oxygen source.
4.1.10 Cardiac monitor, BP monitoring device and pulse oximeter.
4.1.11 10 ml syringes for local airways freezing.
4.1.12 20 ml syringe for brancho-alveolar lavage (BAL)
4.1.13 Mouth piece for oral intubation
4.1.14 Bronchial brush
4.1.15 Biopsy forceps
4.1.16 BALtrap
4.1.17 Plastic containers filled with saline for microbiology and cytology specimens.
4.1.18 Plastic container filled with formalin for histo-pathology specimens.
4.1.19 Cold saline (2-8 °C)
4.1.20 Epinephrine 0.1 mg for local injection.
4.1.21 Swivel connector to ET tube.

5.0 **PROCEDURE**:

5.1 **Preparation of CONSCIOUS PATIENT**:

5.1.1 On some circumstances, the oral anticoagulation should be stopped 3-5 days and continue on heparin until the day of the procedure if anticoagulation is necessary.

5.1.2 Administer a single dose of Ventolin nebulizer (5 mg of Ventolin in 3ml saline) over 10 minutes.

5.1.3 Administer a single dose of Xylocaine 2% nebulization (2 ml xylocaine in 3 ml saline).

5.1.4 Check that wall suction is connected and work efficiently.

5.1.5 Start nose preparation as following:

5.1.5.1 Prepare the nose by swabbing the right nostril by 1 % xylocaine solution.

5.1.5.2 Apply xylocaine gel to the right nostril for two minutes and swab it gently.

5.1.6 Spray the mouth and throat by xylocaine 10% spray.

5.1.7 Put the patient flat.

5.1.8 Apply O2 flow (6 L by a face mask or nasal cannula).

5.1.9 Connect the patient to the blood pressure monitor and pulse oximeter to monitor BP, heart rate, cardiac rhythm and O2 saturation continuously during the procedure.

5.1.10 Give Midazolam 1 mg intravenously (up to 5 mg as needed) followed by saline flush.

5.2 **Preparation of VENTILATED PATIENT**:

5.2.1 If the patient is intubated check the size of ET Tube (Preferably should be ≥ 7.5 in adults) and inform the pulmonologist.

5.2.2 On some circumstances, the oral anticoagulation should be stopped 3-5 days and continue on heparin until the day of the procedure if anticoagulation is necessary.

5.2.3 Sedate the patient as per Physician’s order.

5.2.4 Pre-oxygenate 100% as per ICU policy.
5.2.5 A special swivel connector (Portex, Hythe, UK) with a perforated diaphragm, through which the bronchoscope can be inserted, allows continued ventilation and maintenance of PEEP/CPAP.

5.3 Bronchial Alveolar Lavage (BAL) Procedure:
5.3.1 Connect the BAL trap to the suction tube.
5.3.2 Inject 20 cc of normal saline in the tested bronchial segment followed by suction.
5.3.3 Repeat step 5.3.2 until the required volume of bronchial wash is obtained.
5.3.4 Remove the trap and reconnect wall suction.
5.3.5 Send sample for cell count and analysis, microbiology and cytology.

5.4 Brushing Procedure:
5.4.1 Intubate the required bronchial segment.
5.4.2 Introduce and advance the brush catheter (brush in) until the catheter is seen intubating the required bronchial segment.
5.4.3 Advance slowly until a resistance is felt.
5.4.4 Pull back for 2cm and then advance the brush slowly (brush out).
5.4.5 Start brushing slowly and gently, trying to cover as much as you can.
5.4.6 Repeat steps 5.4.2 – 5.4.4 until the required sample is obtained.
5.4.7 Send the sample for cytology (both cytology fluid and slides).

5.5 Trans-Bronchial Procedure:
5.5.1 Intubate the required bronchial segment.
5.5.2 Ask the bronchoscopy nurse to check that the biopsy forceps is functional.
5.5.3 Introduce and advance the forceps until the tip is seen intubating the required bronchial segment.
5.5.4 Advance further slowly until a resistance is felt.
5.5.5 Pull back for 2 cm, and ask the Bronchoscopy Nurse to open the forceps.
5.5.6 Ask the patient to take deep breath, and advance the forceps further until the resistance is felt again.
5.5.7 Ask the patient to exhale slowly.
5.5.8 Ask the technician to close the forceps.
5.5.9 Pull out the forceps sharply, but not forcefully.
5.5.10 Send the sample in Formalin to histopathology or in Saline for culture.

5.6 During Bronchoscopy:
5.6.1 Monitoring:
5.6.1.1 This should include:
5.6.1.1.1 ECG (for heart rate and rhythm).
5.6.1.1.2 Continuous intra-arterial blood pressure or intermittent cuff blood pressure measurement.
5.6.1.1.3 Pulse oximetry (SpO₂).
5.6.1.2 Set appropriate alarm limits for heart rate, blood pressure and SpO₂ and requesting other attendant staff to monitor physiological variables during the bronchoscopy improves safety.

5.6.1.3 Adverse events require immediate withdrawal of the bronchoscope and resuscitation of the patient. The clinician must then weigh the benefits against the risks of proceeding further.

5.6.1.4 Monitoring intracranial pressure (ICP) in head injured patients is essential if sudden rises in ICP are to be avoided due to CO₂ retention or other causes. Monitoring endotracheal CO₂ in such patients may also help to detect falls in minute ventilation caused by the presence of the bronchoscope within the endotracheal tube.

5.6.2 Ventilator Settings.

5.6.2.1 Pre-oxygenation should be achieved by increasing the inspired oxygen concentration to 100%. This should be given during bronchoscopy and in the immediate recovery period.

5.6.2.2 The ventilator should be adjusted to a mandatory setting. Triggered modes such as pressure support or assist control will not reliably maintain ventilation during fiberoptic bronchoscopy.

5.6.2.3 The ventilator pressure limit should be increased to ensure that adequate tidal volumes are delivered during each respiratory cycle and the ventilator rate increased if necessary. Most modern microprocessor controlled ventilators will monitor tidal volume and minute ventilation.

5.7 After Bronchoscopy:

5.7.1 Vital signs and oxygen saturation should be monitored every 15 minutes for the 1st hour post bronchoscopy, then every 30 minutes for the 2nd hour, then hourly thereafter for four (4) hours.

5.7.2 A chest X-ray (preferably expiratory) should be done at least 1 hour after TBBx to exclude a pneumothorax.

5.7.3 ICU Nurse needs to observe for any blood coming from the endotracheal tube (Hemoptysis) and inform ICU Physician immediately.

5.8 Document observations and information pertinent to the procedure.

6.0 Reference:

6.1 British Thoracic Society Guidelines on Diagnostic Flexible Bronchoscopy.


INTERNAL POLICIES AND PROCEDURES
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