Nursing Procedure Standards for Critical Care

Vol. 1 Intensive Care Nursing

Hong Kong
Association of Critical Care Nurses
香港危重病學護士協會

NURSING PROCEDURE STANDARDS FOR CRITICAL CARE
Vol. 1 Intensive Care Nursing

Developed by the

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Preamble

The art and practice of critical care nursing have evolved dramatically in the last two decades. It is now a specialty that requires more than just a casual encounter with technology and treatment modality. The standard of nursing practice with in the critical care environment has been greatly emphasized. We, critical care nurses, perceive that the demonstration of our professional accountability and commitment to quality of nursing care are equally important. Therefore, one of the objectives of the **Hong Kong Association of Critical Care Nurses** is to define and promote the standards of critical care nursing practice since its establishment in 1998.

Our intention is to have a book entitled **NURSING PROCEDURE STANDARDS FOR CRITICAL CARE** developed. With a lot of efforts from our dedicated members in intensive care units, we manage to have the first volume on **Intensive Care Nursing** completed. This volume is divided into several units by using a systems approach. It has been our experience that most critical care nurses use body systems to structure their lines of thinking in their delivery of patient care. It is hoped that this approach facilitates intensive care nurses to have an easy and quick reference to standards of procedures thus enabling them to perform up to the expected criteria of their specialty.

On behalf of the Association, I would like to express my sincere appreciations to all the contributors for their profound knowledge, clinical expertise and valuable time devoted to this volume, without them HKACCN's objective in terms of standard setting would not have been achieved.

Last but not least, I thank our medical counterparts and advisors for their thought-provoking comments and valuable suggestions. Their expertise and analytical behaviour supported our efforts to provide up-to-date, and research-based intensive care nursing practice to the people in Hong Kong.

Ms. Esther Wong
President, HKACCN
February 2002

UNIT 1: THE PULMONARY SYSTEM

1.1 NASAL CANNULA APPLICATION

STANDARD STATEMENT

The patient requiring oxygen via nasal cannula has hypoxaemia corrected.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Nasal Cannula Application" and attend to the following critical elements:
   - 2.1 connect the flowmeter to oxygen source,
   - 2.2 turn on oxygen flowmeter to the prescribed flow prior to applying the cannula,
   - 2.3 insert the nasal prongs into the nares,
   - 2.4 loop the two plastic tubes of the cannula over the ears and under the chin,
   - 2.5 gently adjust the plastic slide until the cannula is secured;
3. observe the patient for any abnormalities in:
   - 3.1 breathing pattern,
   - 3.2 SaO_2/SpO_2) level,
   - 3.3 vital signs and general condition; and
4. document the procedure on patient record.

OUTCOME STANDARD

1. Oxygen is delivered correctly.
2. The patient has improvement in $Pa0_2$ or SaO_2/$Sp0_2$ level.
3. Accurate documentation is maintained.

1.2 OXYGEN MASK APPLICATION

STANDARD STATEMENT

The patient requiring oxygen via oxygen mask has his/her hypoxemia corrected.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Oxygen Mask Application" and attend to the following critical elements:
   - 2.1 connect the flowmeter to oxygen source,
   - 2.2 turn on oxygen flowmeter to the prescribed flow prior to applying the mask,
   - 2.3 fit the mask properly over the patient's mouth and nose,
   - 2.4 gently adjust the elastic band until the mask is secured;
3. observe the patient for any abnormalities in:
   - 3.1 breathing pattern,
   - 3.2 SaO_2/$Sp0_2$ level,
   - 3.3 vital signs and general condition; and
4. document the procedure on patient record.

OUTCOME STANDARD

1. Oxygen is delivered correctly.
2. The patient has improvement in $Pa0_2$ or $Sa0_2$ /$Sp0_2$ level.
3. Accurate documentation is maintained.

1.3 CONTINUOUS PULSE OXIMETRY MONITORING

STANDARD STATEMENT

The patient requiring continuous pulse oximetry monitoring has the arterial oxygen saturation measured accurately to reflect his/her oxygenation status.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Performing Continuous Pulse Oximetry Monitoring" and attend to the following Critical elements:
   - 2.1 select a sensor with the appropriate size,
   - 2.2 apply the sensor to a site with adequate perfusion and change the site regularly,
   - 2.3 observe the quality of waveform for any artifact or low perfusion state;
3. take safety precautions for potential electric hazards;
4. observe and document the oxygenation status and patient's clinical signs; and
5. document the procedure on patient record

OUTCOME STANDARD

1. The patient's arterial oxygen saturation is accurately and continuously monitored.
2. The potential complications are identified early and appropriate actions are taken accordingly.
3. Accurate documentation is maintained.

1.4 INCENTIVE SPIROMETRY TREATMENT

STANDARD STATEMENT

The patient requiring incentive spirometry treatment is able to perform the procedure correctly.

PROCESS STANDARD

The **ICU** nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Performing Incentive Spirometry Treatment" and attend to the following critical elements:
   - 2.1 ensure the incentive spirometer is in good function,
   - 2.2 prop up the patient,
   - 2.3 instruct the patient to use the spirometer properly:
     - 2.3.1 cover the mouthpiece completely by lips,
     - 2.3.2 inhale deeply and slowly, hold it for at least 3 seconds,
     - 2.3.3 increase inspired volume gradually until maximum volume is achieved,
     - 2.3.4 practise this procedure as many times as tolerated,
     - 2.3.5 breathe normal intermittently without the spirometer;
3. observe the patient during the incentive spirometry for any abnormalities in:
   - 3.1 breathing pattern,
   - 3.2 SaO_2/SpO_2Ievel; and
4. document the procedure on patient record.

OUTCOME STANDARD

1. The patient performs the procedure correctly.
2. The patient's lung expansion is promoted.
3. Accurate documentation is maintained.

1.5 VITAL CAPACITY MEASUREMENT

STANDARD STATEMENT

The patient is able to perform vital capacity measurement correctly and accurately to reflect his/ her maximum lung volume.

PROCESS STANDARD

The **ICU** nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Vital Capacity Measurement" and attend to the following critical elements:
   - 2.1 ensure the respirometer is in good function and zeroed,
   - 2.2 prop up the patient,
   - 2.3 instruct the patient to use the device properly:
     - 2.3.1 seal up the mouthpiece completely by lips,
     - 2.3.2 inhale deeply,
     - 2.3.3 exhale as completely as possible,
     - 2.3.4 record the readings;
3. repeat the procedure as needed;
4. observe the patient for any abnormalities in:
   - 4.1 breathing pattern,
   - 4.2 SaO_2/SpO_2Ievel; and
5. document the procedure on patient record.

OUTCOME STANDARD

1. The patient performs the procedure correctly.
2. The patient's maximum lung volume is accurately measured.
3. Accurate documentation is maintained.

1.8 INSERTION OF ORO-PHARYNGEAL AIRWAY

STANDARD STATEMENT

The patient requiring an oro-pharyngeal airway has it inserted safely and effectively for maintaining airway patency.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Insertion of Oro-pharyngeal Airway" and attend to the following critical elements:
   - 2.1 select an appropriate sized oro-pharyngeal airway by measuring the length from patient's angle of mouth to the mid-ear level,
   - 2.2 insert the oro-pharyngeal airway by holding it with the curved end up,
   - 2.3 advance the oro-pharyngeal airway over the base of tongue until 2/3 of the tube has been inserted or until the flange is parallel with patient's nose,
   - 2.4 rotate the airway 180-degree until the tip is pointing down the throat,
   - 2.5 push the rest of the tube into patient's mouth until the biting part of the tube lies between the patient's teeth, and
   - 2.6 secure the oro-pharyngeal airway with strapping;
3. perform ora-pharyngeal suction if needed;
4. observe the patient for any abnormalities in:
   - 4.1 vital signs and general condition,
   - 4.2 breathing pattern,
   - 4.3 characteristics of secretion;
5. document the nursing interventions;
6. reposition the ora-pharyngeal airway 2-hourly or whenever necessary;
7. provide mouth care 4-8 hourly; and
8. change the ora-pharyngeal airway daily.

OUTCOME STANDARD

1. The patient's airway is kept patent and secured.
2. Accurate documentation is maintained.

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1.9 INSERTION OF NASO-PHARYNGEAL AIRWAY

STANDARD STATEMENT

The patient requiring a naso-pharyngeal airway has the airway inserted safely and effectively for maintaining airway patency.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Insertion of Naso-pharyngeal Airway" and attend to the following critical elements:
   - 2.1 select a naso-pharyngeal airway with the appropriate size,
   - 2.2 remove secretions from nares,
   - 2.3 assess the nasal passage to rule out any trauma, foreign body or septal deviation,
   - 2.4 pass the airway along the floor of the nostril with the bevel facing the nasal septum,
   - 2.5 confirm the airway position and patency,
   - 2.6 secure the naso-pharyngeal airway properly;
3. perform endotracheal suction through the naso-pharyngeal airway;
4. reassess the patient's comfort level;
5. observe the patient for any abnormalities in:
   - 5.1 vital signs and general condition,
   - 5.2 breathing pattern,
   - 5.3 characteristics of secretion;
6. document the nursing interventions; and
7. change the naso-pharyngeal airway whenever necessary.

OUTCOME STANDARD

1. The patient's airway is kept patent and secured.
2. Accurate documentation is maintained.

1.10 ENDOTRACHEALINTUBATION

STANDARD STATEMENT

The patient requiring endotracheal intubation has the tube placed correctly and his/ her airway maintained patent.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Insertion of Endotracheal Tube" and attend to the following critical elements:
   - 2.1 prepare an endotracheal tube with appropriate size and test the cuff for leakage,
   - 2.2 ensure proper functioning of the laryngoscope and other necessary instrument,
   - 2.3 remove any dentures from the patient,
   - 2.4 prepare sedative and muscle relaxant as required,
   - 2.5 administer 100% oxygen to the patient,
   - 2.6 position the patient properly,
   - 2.7 apply cricoid pressure if necessary,
   - 2.8 provide continuous Sa02 /SpO2 monitoring;
3. secure the endotracheal tube properly after correct placement is confirmed;
4. perform suction as required;
5. observe the patient's respiratory and haemodynamic status; and
6. document the procedure on patient record.

OUTCOME STANDARD

1. The patient has the endotracheal tube inserted correctly.
2. The patient's airway patency is maintained.
3. No untoward complications are detected, such as aspiration and tracheal damage.
4. Accurate documentation is maintained.

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1.11 ENDOTRACHEAL TUBE CARE

STANDARD STATEMENT

The patient requiring an endotracheal tube has the artificial airway maintained and potential complications minimized.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Endotracheal Tube Care" and attend to the following critical elements:
   - 2.1 assess the position of the endotracheal tube by observing the marking (20-24 cm at the incisor for normal adult) regularly or confirm the position by other appropriate means, such as CXR,
   - 2.2 secure the endotracheal tube with tape or ties to prevent tube displacement,
   - 2.3 perform oropharyngeal and endotracheal suction to clear the airway as required,
   - 2.4 check the cuff pressure regularly and whenever necessary;
3. observe the patient for any abnormalities in:
   - 3.1 breathing pattern,
   - 3.2 SaO)SpO2level,
   - 3.3 characteristics of secretion,
   - 3.4 vital signs and general condition;
4. provide early detection of:
   - 4.1 signs of endotracheal tube complications:
     - 4.1.1 kinking,
     - 4.1.2 blockage,
     - 4.1.3 displacement;
   - 4.2 pressure sore on mouth corner or tongue; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient's airway patency is maintained.
2. The patient experiences minimal untoward complications, such as pressure sore on mouth corner, tube displacement or blockage.
3. Accurate documentation is maintained.

1.10 ENDOTRACHEALINTUBATION

STANDARD STATEMENT

The patient requiring endotracheal intubation has the tube placed correctly and his/ her airway maintained patent.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Insertion of Endotracheal Tube" and attend to the following critical elements:
   - 2.1 prepare an endotracheal tube with appropriate size and test the cuff for leakage,
   - 2.2 ensure proper functioning of the laryngoscope and other necessary instrument,
   - 2.3 remove any dentures from the patient,
   - 2.4 prepare sedative and muscle relaxant as required,
   - 2.5 administer 100% oxygen to the patient,
   - 2.6 position the patient properly,
   - 2.7 apply cricoid pressure if necessary,
   - 2.8 provide continuous $Sa0_2$ /SpO_2 monitoring;
3. secure the endotracheal tube properly after correct placement is confirmed;
4. perform suction as required;
5. observe the patient's respiratory and haemodynamic status; and
6. document the procedure on patient record.

OUTCOME STANDARD

1. The patient has the endotracheal tube inserted correctly.
2. The patient's airway patency is maintained.
3. No untoward complications are detected, such as aspiration and tracheal damage.
4. Accurate documentation is maintained.

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1.11 ENDOTRACHEAL TUBE CARE

STANDARD STATEMENT

The patient requiring an endotracheal tube has the artificial airway maintained and potential complications minimized.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Endotracheal Tube Care" and attend to the following critical elements:
   - 2.1 assess the position of the endotracheal tube by observing the marking (20-24 cm at the incisor for normal adult) regularly or confirm the position by other appropriate means, such as CXR,
   - 2.2 secure the endotracheal tube with tape or ties to prevent tube displacement,
   - 2.3 perform oropharyngeal and endotracheal suction to clear the airway as required,
   - 2.4 check the cuff pressure regularly and whenever necessary;
3. observe the patient for any abnormalities in:
   - 3.1 breathing pattern,
   - 3.2 SaO_2SpO_2 level,
   - 3.3 characteristics of secretion,
   - 3.4 vital signs and general condition;
4. provide early detection of:
   - 4.1 signs of endotracheal tube complications:
   - 4.1.1 kinking,
   - 4.1.2 blockage,
   - 4.1.3 displacement;
   - 4.2 pressure sore on mouth corner or tongue; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient's airway patency is maintained.
2. The patient experiences minimal untoward complications, such as pressure sore on mouth corner, tube displacement or blockage.
3. Accurate documentation is maintained.

1.12 TRACHEOSTOMY

STANDARD STATEMENT

The patient requiring tracheostomy has the tube placed correctly and his/her airway patency maintained.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. obtain a written consent;
3. follow the unit "Guidelines on Performing Tracheostomy" and attend to the following critical elements:
   - 3.1 ensure blood coagulation test results are available,
   - 3.2 position the patient properly,
   - 3.3 administer lOO% oxygen to the patient,
   - 3.4 provide continuous SaO_2/SpO_2 and $ETCO_2$ monitoring;
4. secure the tracheostomy tube in place to reduce the risk of accidental extubation;
5. observe the patient's respiratory and haemodynamic status; and
5. document the procedure on patient record.

OUTCOME STANDARD

1. The patient has the tracheostomy tube inserted correctly.
2. The patient's airway patency is maintained.
3. No untoward complications are detected, such as aspiration or tracheal damage.
4. Accurate documentation is maintained.

1.13 TRACHEAL TUBE CUFF MEASUREMENT

STANDARD STATEMENT

The patient requiring a tracheal tube has the cuff inflated properly.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Provision of Tracheal Tube Cuff Care" and attend to the following critical elements:
   - 2.1 assess patient's condition e.g. SaO_2 /SpO_2, BP and pulse before checking of cuff pressure,
   - 2.2 perform suction via the tracheal tube and pharynx to remove secretion completely,
   - 2.3 use minimal occlusion volume (MOV) technique (or equivalent method) to measure the cuff pressure:
     - 2.3.1 attach a syringe to the filling tube valve,
     - 2.3.2 place a stethoscope over the tracheal area to listen for the changes of bronchial breath sound,
     - 2.3.3 deflate the cuff until an air leak is heard over patient's mouth and nose,
     - 2.3.4 after deflating the cuff, the breath sound should change from silent to harshly rhonchi,
     - 2.3.5 inject air until the harshly rhonchi just ceases;
3. refer to the unit guidelines for necessary nursing interventions, if there is high cuff pressure observed;
4. observe the patient for any abnormalities in:
   - 4.1 breathing pattern,
   - 4.2 SaO_2 /SpO_2 level,
   - 4.3 vital signs and general condition;
5. document the nursing interventions; and
6. check the cuff pressure daily and whenever necessary.

OUTCOME STANDARD

1. The patient experiences minimal discomfort during cuff measurement.
2. The patient experiences no untoward complications, such as air leakage or tracheal necrosis.
3. Accurate documentation is maintained.

1.14 *ORO-PHARYNGEAL AND NASO-PHARYNGEAL SUCTIONING*

STANDARD STATEMENT

The patient requiring oro-pharyngeal and naso-pharyngeal suctioning has the upper airway patency maintained.

PROCESS STANDARD

The ICU nurse should:

1. assess the patient's condition and need for suctioning;
2. explain the reasons, procedure and potential complications of suctioning to the patient/family;
3. ask for patient's cooperation to cough up secretion;
4. follow the unit "Guidelines on Oro-pharyngeal and Naso-pharyngeal Suction Care", and attend to the following critical elements:
   - 4.1 pre-oxygenate the patient as required to prevent suction-induced hypoxaemia,
   - 4.2 maintain moderate suction pressure,
   - 4.3 apply no suction during catheter insertion;
5. stop suction if the patient coughs vigorously;
6. observe the patient for any abnormalities in:
   - 6.1 breathing pattern,
   - 6.2 characteristics of secretion,
   - 6.3 SaO_2/SpO_2 level,
   - 6.4 vital signs and general condition; and
7. document the nursing interventions.

OUTCOME STANDARD

1. The patient's upper airway is clear.
2. Accurate documentation is maintained.

1.15 TRACHEOSTOMY TUBE/ ENDOTRACHEAL TUBE SUCTIONING

(Conventional technique)

STANDARD STATEMENT

The patient requiring tracheal tube suctioning has the airway cleared and the risk of developing complications minimized.

PROCESS STANDARD

The ICU nurse should:

1. assess the patient's condition and need for suctioning;
2. explain the reasons, procedure and potential complications of suctioning to the patient/family;
3. follow the unit "Guidelines on Tracheal Suction Care" and attend to the following critical elements:
   - 3.1 pre-oxygenate the patient as indicated to prevent suction-induced hypoxaemia,
   - 3.2 use suction catheter with appropriate size,
   - 3.3 follow aseptic principle,
   - 3.4 apply no suction during catheter insertion,
   - 3.5 maintain moderate suction pressure,
   - 3.6 keep suction time within 10-15 seconds;
4. observe the patient for any abnormalities in:
   - 4.1 breathing pattern,
   - 4.2 characteristics of secretion,
   - 4.3 SaO2/SpO2 level,
   - 4.4 vital signs and general condition; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient's airway patency is maintained.
2. Accurate documentation is maintained.

1.16 TRACHEOSTOMY TUBE / ENDOTRACHEAL TUBE SUCTIONING

(Closed system technique)

STANDARD STATEMENT

The patient requiring tracheal tube suctioning has the airway cleared and the risk of developing complications minimized.

PROCESS STANDARD

The ICU nurse should:

1. assess the patient's condition and need for suctioning;
2. explain the reasons, procedure and potential complications of suctioning to the patient/family;
3. follow the unit "Guidelines on Close-System Suctioning Care" and attend to the following critical elements:
   - 3.1 pre-oxygenate the patient to prevent suction-induced hypoxaemia,
   - 3.2 advance the catheter to the desired depth and then depress the control valve to apply suction (moderate),
   - 3.3 withdraw the catheter gently until it is seen totally out of the tracheal tube,
   - 3.4 flush the suction catheter:
     - 3.4.1 prepare the irrigation fluid (Normal Saline) in a 10 ml syringe,
     - 3.4.2 connect the syringe to the irrigation port,
     - 3.4.3 introduce irrigation fluid slowly into the irrigation port,
     - 3.4.4 simultaneously depress the control valve,
     - 3.4.5 continue irrigate the catheter until it is clear;
4. observe the patient for any abnormalities in:
   - 4.1 breathing pattern,
   - 4.2 characteristics of secretion,
   - 4.3 SaO_2/SpO_2 level,
   - 4.4 vital signs and general condition; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient's airway patency is maintained.
2. Accurate documentation is maintained.

1.17 MANUAL VENTILATION WITH BAG-VALVE-MASK-UNIT (BVM UNIT)

STANDARD STATEMENT

The patient requiring ventilatory support with bag-valve-mask unit receives adequate ventilation and oxygenation.

PROCESS STANDARD

The ICU nurse should:

1. assess the patient's condition and need for manual ventilation;
2. explain the reasons, procedure and potential complications to the patient! family;
3. follow the unit "Guidelines on Use of Bag-Valve-Mask-Unit" and "Care of Patient Requiring Manual Ventilation", and attend to the following critical elements:
   - 3.1 select a mask with appropriate size and assemble the circuit of the BVM unit properly,
   - 3.2 ensure a patent flow of O_2 supply,
   - 3.3 observe the effectiveness of manual ventilation:
     - 3.3.1 no sound of leaking from BVM unit,
     - 3.3.2 good air entry,
     - 3.3.3 adequate chest movement,
     - 3.3.4 optimum SaO/SpOzlevel;
4. observe the patient for any abnormalities and potential risks such as:
   - 4.1 inadequate ventilation,
   - 4.2 worsening of upper airway foreign body obstruction,
   - 4.3 gastric insufflation,
   - 4.4 regurgitation and pulmonary aspiration;
5. prepare for necessary intubation; and
6. document the nursing interventions.

OUTCOME STANDARD

1 The patient's airway patency is maintained.
2 The patient's oxygenation status is improved.
3 Accurate documentation is maintained.

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1.18 MANAGEMENT OF PATIENT ON INTERMITTENT POSITIVE PRESSURE VENTILATION (IPPV)

STANDARD STATEMENT

The patient requiring intermittent positive pressure ventilation has been adequately ventilated with minimal complications.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Operation of Intermitted Positive Pressure Ventilator" and "Care of the Ventilated Patient", and attend to the following critical elements:
   - 2.1 patient safety:
     - 2.1.1 perform a functional test on the ventilator,
     - 2.1.2 take safety precautions for potential gas, oxygen and electric hazards,
     - 2.1.3 maintain the security of endotracheal tube and ventilator circuit,
     - 2.1.4 set appropriate alarms;
   - 2.2 care of tracheal access:
     - 2.2.1 maintain patent airway,
     - 2.2.2 provide adequate humidification,
     - 2.2.3 ensure correct placement of tracheal tube,
     - 2.2.4 check cuff pressure whenever necessary;
3. follow the "Infection Control Guidelines";
4. observe the patient's vital signs, breathing pattern and efforts, ventilation and oxygenation status;
5. document the ventilator settings and patient's respiratory parameters periodically;
6. observe the patient for any abnormalities such as:
   - 6.1 hypo/hyperventilation,
   - 6.2 haemodynamic instability,
   - 6.3 persistent high peak airway pressure,
   - 6.4 low exhaled tidal volume,
   - 6.5 changes in mental state;
7. look for any mechanical malfunction; and
8. document the nursing interventions.

OUTCOME STANDARD

1. The patient's ventilation and oxygenation status is improved.
2. The patient experiences no untoward complications during intermittent positive pressure ventilation such as hypo/hyperventilation or barotrauma.
3. Accurate documentation is maintained.

1.19 ASSISTING WITH BRONCHOSCOPY

STANDARD STATEMENT

The patient requiring bronchoscopy has the procedure performed safely and effectively.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Assisting with Bronchoscopy" and attend to the following critical elements:
   - 2.1 apply sterile technique in preparation of the bronchoscope and accessories,
   - 2.2 employ universal precautions when handling secretions,
   - 2.3 adjust oxygen concentration as prescribed,
   - 2.4 administer sedative or apply topical anesthetic as prescribed,
   - 2.5 apply a bite block whenever necessary,
   - 2.6 assist the doctor during the course of bronchoscopy;
3. observe for changes in haemodynamic and respiratory status throughout the procedure;
4. disinfect instrument appropriately;
5. label and dispense specimens appropriately if needed; and
6. document the procedure on patient record.

OUTCOME STANDARD

1. The patient has bronchoscopy performed safely and effective.
2. Complications are identified and treated promptly.
3. Accurate documentation is maintained.

1.20 ASSISTING WITH CHEST TUBE PLACEMENT

STANDARD STATEMENT

The patient has the chest tube inserted safely and has the chest drainage system connected properly.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. assess the patient's readiness for cooperation and level of understanding of the procedure;
3. follow the unit "Guidelines on Assisting with Chest Tube Placement" and attend to the following critical elements:
   - 3.1 prepare the insertion site,
   - 3.2 assist the doctor during insertion of the chest drain,
   - 3.3 connect the chest tube to drainage system with aseptic technique,
   - 3.4 connect the chest drainage system to suction if required,
   - 3.5 dress the insertion site;
4. secure the chest tube properly;
5. ensure proper functioning of the chest drainage system;
6. arrange chest X-ray after insertion of the chest tube;
7. observe the patient for any abnormalities in:
   - 7.1 vital signs,
   - 7.2 amount and color of the drainage,
   - 7.3 air leakage; and
8. document the nursing interventions.

OUTCOME STANDARD

1. The patient has the chest tube inserted safely.
2. The chest drainage system is connected properly.
3. The patient experiences no untoward complications throughout the procedure.
4. Accurate documentation is maintained.

1.21 CHEST TUBE TO UNDERWATER SEAL DRAINAGE SYSTEM

STANDARD STATEMENT

The patient requiring an underwater seal chest drainage system has the pleural air/ fluid drained effectively and safely.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family about the importance of maintaining proper functioning of the chest drainage system;
2. follow the unit "Guidelines on Care of Chest Tube to Underwater Seal Drainage" and attend to the following critical elements:
   - 2.1 maintain the chest drainage system in a proper functioning manner and connect to the prescribed suction force if needed,
   - 2.2 properly secure the chest tube to the patient's body,
   - 2.3 maintain a closed underwater seal drainage system;
3. comply with universal precautions in handling blood and body fluid;
4. assist the patient with coughing and deep breathing exercise;
5. assess the patient's pain level and administer analgesic as required;
6. assess the patient's breathing pattern;
7. observe, document and report the amount and characteristics of drainage; and
8. observe for complications and take appropriate interventions.

OUTCOME STANDARD

1. The patient's pleural air/fluid is drained effectively.
2. A closed underwater seal chest drainage system is maintained.
3. Accurate documentation is maintained.

1.22 CHEST TUBE REMOVAL

STANDARD STATEMENT

The patient has the chest tube removed with optimal comfort and safely in an aseptic manner.

PROCESS STANDARD

The **ICU** nurse should:

1. explain the reasons, procedure and potential complications to the patient! family;
2. follow the unit "Guidelines on Removal of Chest Tube" and attend to the following critical elements:
   - 2.1 assess the patient's pain level and administer analgesic as required,
   - 2.2 assist the doctor in removal of chest tube with aseptic technique,
   - 2.3 instruct the patient to exhale and hold breathe immediately before chest tube removal,
   - 2.4 seal insertion site with sterile occlusive dressing;
3. comply with universal precautions in handling body fluids;
4. observe, document and report the condition of the insertion site;
5. record the amount and characteristic of drainage fluid; and
6. observe the patient's vital signs and respiratory status.

OUTCOME STANDARD

1. The patient experiences minimal discomfort throughout the procedure.
2. Complications are identified early and treated promptly.
3. Accurate documentation is maintained.

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UNIT 2 THE CARDIOVASCULAR SYSTEM

2.1 CONTINOUS ECG MONITORING

STANDARD STATEMENT

The patient's cardiac electrical activity is monitored continuously with an electrocardiogram (ECG) monitor to ensure early detection of changes in cardiac rhythm.

PROCESS STANDARD

The ICU nurse should:

1. identify the patient for electrophysiologic monitoring;
2. assess the patient's physical and psychological status;
3. explain the reasons, procedure and potential complications to the patient/ family;
4. follow the unit "Guidelines on Electrophysiologic Monitoring" and attend to the following critical elements:
   - 4.1 shave the skin area of the chest if necessary,
   - 4.2 position the electrodes appropriately on the patient and connect them to the ECG monitor leads,
   - 4.3 ensure alarms are correctly set,
   - 4.4 take safety precautions for potential electric hazards while the ECG monitor is in use,
   - 4.5 check electrode sites and re-apply electrodes if necessary;
5. observe cardiac rhythm continuously and record rhythm strip regularly or as required;
6. implement treatment for life threatening arrhythmia immediately and report to doctor; and
7. document the nursing interventions.

OUTCOME STANDARD

1. The patient's cardiac activity is continuously monitored.
2. No untoward complications are detected, such as irritation/abrasion of the skin at electrode sites.
3. Accurate documentation is maintained.

2.2 12-LEAD ELECTROCARDIOGRAM

STANDARD STATEMENT

The patient's multidirectional cardiac electrical activity is monitored with a l2-lead electrocardiogram (ECG) correctly.

PROCESS STANDARD

The **ICU** nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on 12-lead Electrocardiogram Monitoring" and attend to the following critical elements:
   - 2.1 shave the skin area of the chest if necessary,
   - 2.2 position the electrodes appropriately on the patient and connect them to the 12-leadECG monitor,
   - 2.3 ensure proper contact between the skin and the electrodes,
   - 2.4 take safety precautions for potential electric hazards;
3. record cardiac rhythm from leads that best demonstrate the cardiac pathology;
4. report abnormal rhythms and provide immediate interventions for life threatening arrhythmia accordingly; and
5. document nursing interventions.

OUTCOME STANDARD

1. A clear 12-lead electrocardiogram is recorded correctly.
2. Prompt identification and treatment of arrhythmias are performed.
3. Accurate documentation is maintained.

2.3 CARDIOVERSION

STANDARD STATEMENT

The patient requiring cardioversion has the procedure performed safely and timely.

PROCESS STANDARD

The **ICU** nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family.
2. follow the unit "Guidelines on Cardioversion" and attend to the following critical elements:
   - 2.1 Ensure an intravenous line is patent for parenteral administration,
   - 2.2 observe the patient's respiratory state if sedative is given,
   - 2.3 observe baseline electrocardiogram strips or l2-leadselectrocardiogram if possible,
   - 2.4 ensure all equipment and drugs for cardiopulmonary resuscitation are ready;
   - 2.5 apply conductive gel pads to the chest in appropriate position,
   - 2.6 ensure the [SYNC] button is activated,
   - 2.7 ensure all personnel are clear of contact with patient, bed and equipment, and
   - 2.8 assess patient's pulse, general condition and response;
3. ensure the patient is in a comfortable and appropriate position after completion of procedure;
4. act promptly if complications are encountered;
5. obtain a l2-lead electrocardiogram after cardioversion; and
6. document the nursing interventions.

OUTCOME STANDARD

1. The patient has cardioversion performed timely.
2. Patient and staff safety is ensured.
3. Complications are identified and managed promptly.
4. Accurate documentation is maintained.

2.4 DEFIBRILLATION

STANDARD STATEMENT

The patient requiring defibrillation has the procedure performed safely and timely.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family.
2. follow the unit "Guidelines on Defibrillation" and attend to the following critical elements:
   - 2.1. evaluate the presence of ventricular fibrillationJpulseless tachycardia
   - 2.2. lie the patient flat,
   - 2.3. obtain baseline electrocardiogram strip if possible,
   - 2.4. ensure all equipment and drugs for cardiopulmonary resuscitation are ready,
   - 2.5. apply conducive gel pads to the chest in appropriate position,
   - 2.6. select energy to the desired level/adhere to established algorithms,
   - 2.7. ensure all personnel are clear of contact with the patient, bed and equipment,
   - 2.8. assess the patient's pulse, general condition and response,
   - 2.9. obtain electrocardiogram after defibrillation;
3. act promptly if complications are encountered; and
4. document the nursing interventions.

OUTCOME STANDARD

1. The patient has defibrillation performed timely.
2. Patient and staff safety is ensured.
3. Complications are identified and managed promptly.
4. Accurate documentation is maintained.

2.5 ARTERIAL CATHETER INSERTION

STANDARD STATEMENT

The patient has the arterial line inserted safely and has the pressure transducer system connected properly.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Assisting with Arterial Catheter Insertion" and attend to the following critical elements:
   - 2.1 connect the pressure transducer set and the monitoring cable tightly and properly;
   - 2.2 ensure the transducer is located at the heart level and perform zeroing as required,
   - 2.3 ensure the whole system is free of air bubbles and kinking,
   - 2.4 maintain patency of the system with appropriate flushing system,
   - 2.5 set alarm limits appropriately;
3. observe the patient for any abnormalities, such as:
   - 3.1. signs and symptoms of inflammation and infection,
   - 3.2. bleeding or haematoma at puncture site,
   - 3.3. displacement of the catheter;
4. act promptly if complications are encountered;
5. document and report:
   - 5.1 date, time and site of catheter insertion,
   - 5.2 arterial pressure readings if appropriate, and
   - 5.3 condition of the insertion site e.g. bleeding.

OUTCOME STANDARD

1. The patient has the arterial catheter inserted safely.
2. The pressure transducer set and the monitoring cable are connected properly.
3. The patient experiences no untoward complications throughout the procedure.
4. Accurate documentation is maintained.

2.6 ARTERIAL BLOOD PRESSURE (ABP) MONITORING

STANDARD STATEMENT

The patient requiring arterial pressure monitoring has the blood pressure measured continuously and accurately to reflect his/her haemodynamic status.

PROCESS STANDARD

The lCU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Arterial Pressure Monitoring" and attend to the following critical elements:
   - 2.1 connect the pressure transducer set and the monitoring cable tightly and properly;
   - 2.2 secure the transducer at the heart level and perform zeroing as required,
   - 2.3 ensure the whole monitoring system is free of air bubbles and kinking,
   - 2.4 maintain patency of the system with an appropriate flushing system,
   - 2.5 set alarm limits appropriately;
3. observe the patient for potential risks, such as:
   - 3.1 disconnection of the system,
   - 3.2 occlusion of arterial circulation,
   - 3.3 cannulation site infection;
4. observe for abnormalities in displayed waveform and readings; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient's arterial blood pressure is measured continuously.
2. Potential risks are identified early and appropriate actions are taken accordingly.
3. Accurate documentation is maintained.

2.7 ARTERIAL CATHETER REMOVAL

STANDARD STATEMENT

The patient has the arterial catheter removed with optimal comfort and safely in an aseptic manner.

PROCESS STANDARD

The lCU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Removal of Arterial Catheter" and attend to the following critical elements:
   - 2.1 remove the dressing and the arterial catheter with universal precautions,
   - 2.2 maintain manual pressure at the cannulation site for at least 5 minutes or as necessary until haemostasis is achieved,
   - 2.3 clean the site with alcohol and cover with Band-Aid or sterile gauze;
3. observe the insertion site periodically thereafter for bleeding;
4. instruct the patient to report for any bleeding; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient experiences minimal discomfort throughout the procedure.
2. Complications are identified early and treated properly.
3. Accurate documentation is maintained.

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2.8 CENTRAL VENOUS CA THETER INSERTION

STANDARD STATEMENT

The patient has the central venous catheter inserted safely and has the pressure transducer system connected properly.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient! family; follow the unit "Guidelines on Central Venous Catheter Insertion" and attend to the
2. following critical elements:
   - 2.1. connect the pressure transducer set and the monitoring cable tightly and properly,
   - 2.2. secure the transducer set at the heart level and perform zeroing as required,
   - 2.3. ensure the whole monitoring system is free of air bubbles and kinking,
   - 2.4. maintain patency of the system with adequate pressure,
   - 2.5. set alarm limits appropriately;
3. observe the patient for any abnormalities such as:
   - 3.1. signs and symptoms of inflammation and infection,
   - 3.2. bleeding or haematoma,
   - 3.3. complications such as pneumothorax;
4. document and report:
   - 4.1. date, time, site and marking of catheter inserted,
   - 4.2. central venous pressure if appropriate, and
   - 4.3. condition of the insertion site e.g. bleeding.

OUTCOME STANDARD

1. The patient has the central venous catheter inserted safely.
2. The pressure transducer set and the monitoring cable are connected properly.
3. The patient experiences no untoward complications throughout the procedure.
4. Accurate documentation is maintained.

2.9 CENTRAL VENOUS PRESSURE (CVP) MONITORING

STANDARD STATEMENT

The patient requiring central venous pressure monitoring has the pressure measured accurately to reflect his/her haemodynamic status.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family; follow the unit "Guidelines on Central Venous Pressure Monitoring" and attend to the
2. following critical elements:
   - 2.1 for continuous CVP monitoring:
     - 2.1.1 connect the pressure transducer set and monitoring cable tightly and properly,
     - 2.1.2 secure the transducer set at the heart level and perform zeroing as required,
     - 2.1.3 ensure the whole monitoring system is free of air bubbles and kinking,
     - 2.1.4 maintain patency of the system with appropriate flushing system,
     - 2.1.5 set alarm limits appropriately,
     - 2.1.6 observe for abnormal waveforms;
   - 2.2 for intermittent CVP measurement:
     - 2.2.1 connect the manometer system tightly and properly;
     - 2.2.2 ensure the whole monitoring system is free of air bubbles and kinking,
     - 2.2.3 measure the CVP, with the zero point at the heart level,
     - 2.2.4 observe for swinging movement of fluid level with respiratory movement;
3. observe the patient for potential risks:
   - 3.1 disconnection and blockage of the monitoring system,
   - 3.2 line sepsis,
   - 3.3 air embolism; and
4. document the nursing interventions.

OUTCOME STANDARD

1. The patient's central venous pressure is accurately measured.
2. Potential risks are identified early and appropriate actions are taken accordingly.
3. Accurate documentation is maintained.

2.10 CENTRAL VENOUS CATHETER REMOVAL

STANDARD STATEMENT

The patient has the central venous catheter removed with optimal comfort and safely in an aseptic manner.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient! family;
2. follow the unit "Guidelines on Removal of Central Venous Catheter" and attend to the following critical elements:
   - 2.1 remove the dressing and the central venous catheter with universal precautions,
   - 2.2 maintain manual pressure at cannulation site for at least 5 minutes or as necessary until haemostasis is achieved,
   - 2.3 clean the insertion site with alcohol and cover with sterile gauze; observe the site
3. periodically thereafter for signs of bleeding;
4. instruct the patient to report for any bleeding; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient experiences minimal discomfort throughout the procedure.
2. Complications are identified early and treat properly.
3. Accurate documentation is maintained.

2.11 PULMONARY ARTERY PRESSURE MONITORING

STANDARD STATEMENT

The patient requiring pulmonary artery (PA) pressure monitoring has the pressure reading recorded accurately.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on PA Pressure Monitoring" and attend to the following critical elements:
   - 2.1 connect the pressure transducer set and the monitoring cable tightly and properly,
   - 2.2 secure the transducer at heart level and perform zeroing as required,
   - 2.3 ensure the whole monitoring system is free of air bubbles and kinking,
   - 2.4 maintain patency of the distal end with appropriate flushing system,
   - 2.5 maintain patency of the proximal end with fluid/appropriate flushing system,
   - 2.6 set alarm limits appropriately;
3. observe the patient for potential risks:
   - 3.1 disconnection of the system,
   - 3.2 pulmonary infarction, haemorrhage and embolism,
   - 3.3 site infection;
4. observe for abnormalities in the displayed waveforms and readings such as:
   - 4.1 overwedging,
   - 4.2 spontaneous wedging,
   - 4.3 catheter migration;
5. act promptly if complications arise; and
6. document the nursing interventions.

OUTCOME STANDARD

1. The patient with PA pressure is measured continuously and accurately.
2. Potential risks are identified early and appropriate actions are taken promptly.
3. Accurate documentation is maintained.

2.12 CARDIAC OUTPUT MEASUREMENT
(Thermodilution method)

STANDARD STATEMENT

The patient requiring cardiac output measurement has the procedure perfonned properly and effectively.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Measuring of Cardiac Output" and attend to the following critical elements:
   - 2.1 set up and operate the monitor in accordance with manufacturer's recommendations,
   - 2.2 enter the computation constant,
   - 2.3 avoid inotrope/vasoactive infusion at the proximal port to prevent inadvertent bolus of these medications,
   - 2.4 verify the position of PA catheter,
   - 2.5 detennine the volume and temperature of injectate,
   - 2.6 inject solution (5% Dextrose or 0.9% Normal saline) smoothly and complete the injection within 4 seconds,
   - 2.7 repeat the procedure as required;
3. observe the patient for any abnormalities in:
   - 3.1 PA wavefonn tracing,
   - 3.2 ECG;
4. report and act promptly for any abnormalities; and
5. document the nursing interventions.

OUTCOME STANDARD

1. Cardiac output measurement is performed properly and accurately.
2. Complications are identified and managed promptly.
3. Accurate documentation is maintained.

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2.13 TRANSVENOUS PACING

STANDARD STATEMENT

The patient requiring emergency transvenous pacing has the pacing catheter inserted correctly with his/her heart rate optimized and potential complications minimized.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Application of Emergency Transvenous Pacing" and attend to the following critical elements:
   - 2.1 ensure the necessary equipment for pacing insertion are ready,
   - 2.2 obtain baseline Electrocardiogram strip or 12-lead Electrocardiogram if possible,
   - 2.3 ensure all equipment and drugs for cardiopulmonary resuscitation are ready,
   - 2.4 ensure correct attachment of electrodes to the pulse generator and secure the electrodes properly,
   - 2.5 observe the patient's haemodynamic status and response throughout the procedure,
   - 2.6 set appropriate alarms on cardiac monitor;
3. observe the patient for any abnormalities and potential risks, such as:
   - 3.1 unstable haemodynamic status,
   - 3.2 lead displacement,
   - 3.3 capture failure,
   - 3.4 sensing failure;
4. report abnormal rhythm and provide immediate interventions for life-threatening arrhythmias; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient has emergency transvenous pacing catheter inserted correctly.
2. The patient's heart rate is optimized.
3. Complications are identified and managed promptly.
4. Accurate documentation is maintained.

2.14 TRANSCUTANEOUS PACING

STANDARD STATEMENT

The patient requiring external transcutaneous pacing receives a safe, effective and well-tolerated pacing support.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and complication to the patient/family;
2. follow the "Guidelines on Application of Transcutaneous Pacing" and attend to the following critical elements:
   - 2.1 assist the patient in an optimal position for the application of the pacing,
   - 2.2 prepare the patient's skin for ECG electrode placement,
   - 2.3 obtain an appropriate ECG tracing for the best display of patient's intrinsic rhythm,
   - 2.4 apply the anterior pacing electrode at the cardiac apex (V 4 or V5 position),
   - 2.5 attach the posterior pacing electrode over the left subscapular area,
   - 2.6 avoid trapping any pocket of air between the electrode and skin to minimize the risk of skin burn,
   - 2.7 administer analgesia/sedative as required,
   - 2.8 inform the patient that he/she will experience some pain over the contact site at every heart beat and reassure him/her that it will not be harmful,
   - 2.9 initiate pacing as prescribed, aiming at the lowest stimulation current to maintain an effective pacing rhythm,
   - 2.10 activate the alarm setting appropriately,
   - 2.11 observe the patient's vital signs,
   - 2.12 observe the patient for any abnormal ECG tracing such as:
     - 2.12.1 failure to sense,
     - 2.12.2 failure to pace,
     - 2.12.3 failure to capture,
   - 2.13 take safety precautions for potential electric hazards,
   - 2.14 inspect the underlying skin periodically in case of continuous pacing,
   - 2.15 ensure patient's comfort,
   - 2.16 document the nursing interventions; and
3. document the pacemaker settings and patient's response to pacing.

OUTCOME STATEMENT

1. The patient receives appropriate and effective transcutaneous pacing.
2. The patient's haemodynamic status improves.
3. Complications are identified and intervened promptly.
4. Accurate documentation is maintained.

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2.15 INTRA-AORTIC BALLOON PUMP (IABP) MANAGEMENT

STANDARD STATEMENT

The patient requiring intra-aortic balloon pump (IABP) assistance receives an effective and optimal ventricular support which enhances his/her coronary and systemic perfusion.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Management of Intra-aortic Balloon Pump" and attend to the following critical elements:
   - 2.1 prepare and shave both groins for insertion of the lAB catheter,
   - 2.2 get ready resuscitation trolley and defibrillator,
   - 2.3 obtain a display of ECG and arterial pressure tracing in the IABP,
   - 2.4 perform zeroing of the pressure transducer,
   - 2.5 lnitate counterpulsation by selecting the operating parameters (trigger mode, inflation volume and assist ratio) as prescribed,
   - 2.6 assist in defining the inflation/deflation timing in 1:2 assist ratio,
   - 2.7 administer heparin as prescribed and observe patient's coagulation profile,
   - 2.8 observe and document patient's vital signs,
   - 2.9 monitor systolic, augmented peak diastolic, end-diastolic pressures and waveform recording with IABP assistance,
   - 2.10 determine the alarm settings according to patient's parameters,
   - 2.11 maintain a precise control of inflation/deflation timing and other operating parameters of the IABP by monitoring and revising the pump settings according to any changes in ECG rhythm and arterial pressure waveform to ensure an optImal ventncular support,
   - 2.12 arrange chest X-ray to verify proper placement of the lAB catheter,
   - 2.13 notice signs of balloon migration such as decrease left radial pulse or sudden decrease in urine output,
   - 2.14 instruct the patient to limit groin movement to prevent kinking of catheter, and
   - 2.15 observe the patient for potential risk, such as:
     - 2.15.1 iscfiaemia ofthe affected limb,
     - 2.15.2 aortic dissection,
     - 2.15.3 thrombo-embolism,
     - 2.15.4 thrombocytopenia,
     - 2.15.5 mal-timing,
     - 2.15.6 haematoma,
     - 2.15.7 systemic/ local infection; and
3. document the nursing interventions.

OUTCOME STANDARD

1. The patient receives appropriate and maximum cardiac support.
2. Complications are identified and managed promptly.
3. Accurate documentation is maintained.

2.16 ASSISTING WITH PERICARDIOCENTESIS

STANDARD STATEMENT

The patient requiring pericardiocentesis has the procedure performed safely and effectively.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Assisting with Pericardiocentesis" and attend to the following critical elements:
   - 2.1 prepare the echocardiogram,
   - 2.2 position the patient appropriately,
   - 2.3 administer sedative or apply topical anesthetic as prescribed,
   - 2.4 prepare the insertion site,
   - 2.5 assist the doctor during the procedure with aseptic technique,
   - 2.6 monitor the patient's ECG, blood pressure and SpO_2/SaO_2 continuously throughout the procedure,
   - 2.7 ensure the emergency trolley and defibrillator are ready,
   - 2.8 comply with universal precautions in handling blood or body fluids;
3. apply sterile dressing over the insertion site;
4. connect to drainage system if necessary;
5. observe the amount and characteristics of the drainage and report for any abnormalities;
6. observe for complication(s) such as anhythmia and report promptly;
7. send specimens to laboratory when required;
8. prepare the patient for echocardiogram after pericardiocentesis; and
9. document the nursing interventions.

OUTCOME STANDARD

1. Pericardiocentesis is performed safely and effectively.
2. Complications are identified and managed promptly.
3. Accurate patient's documentation is maintained.

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2.17 POST-OPERATIVE MANAGEMENT OF PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA)

STANDARD STATEMENT

The patient receives appropriate care after percutaneous transluminal coronary angioplasty/ stenting.

PROCESS STANDARD

The ICU nurses should:

1. explain the reasons, procedure and potential complications to patient/family;
2. follow the unit "Guidelines on Post Percutaneous Transluminal Coronary Angioplasty Stenting Management" and attend to the following critical elements:
   - 2.1 observe the puncture site for:
     - 2.1.1 oozing of blood,
     - 2.1.2 formation of haematoma,
     - 2.1.3 kinking of arterial sheath,
   - 2.2 apply manual pressure over the puncture site if bleeding is detected,
   - 2.3 advise the patient to stay in bed and keep the affected leg straight,
   - 2.4 observe the patient for abnormalities and potential risk such as:
     - 2.4.1 elevation in cardiac enzymes,
     - 2.4.2 changes in electrocardiogram pattern,
     - 2.4.3 experience of chest pain or chest discomfort;
3. encourage fluid intake to ensure clearance of contrast media;
4. act promptly if complications encountered; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient experiences minimal discomfort after the procedure.
2. Complications are identified and managed prompted.
3. Accurate patient's documentation is maintained.

UNIT 3: THE NEUROLOGICAL SYSTEM

3.1 MEASURING OF INTRACRANIAL PRESSURE (ICP)

STANDARD STATEMENT

The patient's intracranial pressure is measured properly and accurately.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the unit "Guidelines on Measuring of Intracranial Pressure" and attend to the following critical elements:
   - 2.1 use strict aseptic technique in setting up of the ICP monitoring system,
   - 2.2 maintain a closed system and ensure no kinking or leakage,
   - 2.3 elevate the head of bed according to post-op order,
   - 2.4 keep the patient's head in neutral position,
   - 2.5 place the transducer at the level of patient's ear lobe,
   - 2.6 perform calibration as needed,
   - 2.7 set alarm limits appropriately;
3. observe patient for any abnormalities in:
   - 3.1 ICP waveform tracing and its trends,
   - 3.2 neurological status,
   - 3.3 vital signs,
   - 3.4 wound condition;
4. report any abnormalities and provide immediate interventions accordingly; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient's intracranial pressure is measured properly and accurately.
2. Complications are identified and managed promptly.
3. Accurate patient's documentation is maintained.

UNIT 4: MISCELLANEOUS SYSTEMS

4.1 MEASUREMENT OF INTRA-ABDOMINAL PRESSURE (lAP)

STANDARD STATEMENT

The patient requiring intra-abdominal pressure measurement has the procedure performed correctly and potential complications minimized.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to patient/ family;
2. follow the unit "Guidelines on Intra-Abdominal Pressure Measurement" and attend to the following critical elements:
   - 2.1 connect the pressure monitoring tubing to urethral catheter tightly,
   - 2.2 use the patient's symphysis pubis as zero-reference point with patient lying in a supine position,
   - 2.3 ensure patency of the system,
   - 2.4 instill prescribed amount of Normal Saline into the bladder,
   - 2.5 record the amount of returned Normal Saline;
3. observe the patient for abnormalities and potential risks such as:
   - 3.1 abdominal distension,
   - 3.2 respiratory distress;
4. act promptly if complications encountered; and
5. document the nursing interventions.

OUTCOME STANDARD

1. Intra-abdominal pressure measurement is performed properly.
2. Complications are identified and managed promptly.
3. Accurate patient's documentation is maintained.

4.2 USE OF HYPOTHERMIAIHYPERTHERMIA BLANKET

STANDARD STATEMENT

The patient requiring hypothermia/hypothermia blanket has the blanket applied safely and properly.

PROCESS STANDARD

The ICU nurse should:

1. explain the reasons, procedure and potential complications to the patient/ family;
2. follow the "Guidelines on Using of Hypothermia/Hyperthermia Blanket" and attend to the following critical elements:
   - 2.1 ensure the reservoir in the machine is filled with distilled water to the recommended level,
   - 2.2 ensure a constant water flow within the blanket,
   - 2.3 check the patient's core temperature and adjust the water temperature accordingly,
   - 2.4 take safety precautions for potential electric hazards while the blanket is in use;
3. observe the patient for any abnormalities and potential risks such as:
   - 3.1 overheating/overcooling,
   - 3.2 pressure sore;
4. act promptly if complications encountered; and
5. document the nursing interventions.

OUTCOME STANDARD

1. The patient receives the hypothermia/hypothermia blanket properly.
2. The patient experiences no untoward complications.
3. Accurate patient documentation is maintained.

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