

### Cardiac Surgery: Post Operative Care (CSICU)

1. [B-00-12-10061](#) – Chest Tubes: Removal Post Cardiac Surgery (CSICU)
2. [B-00-12-10064](#) - Pacemaker (Epicardial): Temporary, Checking Intrinsic Rhythm
3. [B-00-13-10011](#) – Cardiac Monitoring
4. [B-00-13-10017](#) – Physical Assessment (Critical Care Areas)
5. [B-00-13-10035](#) – Pulmonary Artery Catheter: Removal
6. [B-00-13-10036](#) – Radial Artery Free Graft (for CABG): Care of Patient
7. [B-00-13-10074](#) - B-blocker, Intravenous (Metoprolol, Labetolol, Esmolol): Administration Of First Dose (SPH – Only)
8. [B-00-13-10118](#) - Epicardial or Transvenous Temporary Pacing in Critical Care: Patient Care
9. [B-00-13-10125](#) - Pacemaker (Temporary Epicardial) CSICU: Patient Care in Emergency Situations
10. [B-00-12-10127](#)- Dressing change Procedure: Post op Cardiac Surgery
11. AACN procedure manual

**Skill Level:** Registered Nurses working in Cardiac Surgery ICU

#### Need to Know:

It is the goal of the Cardiac surgery pathway to rapidly progress patients according to their abilities. It is our aim to extubate patients within 4 hours of arrival from the operating room.

#### Assessment:

##### Initial Assessment:

1. **Neurological status:**
  - Glasgow coma scale (GCS); papillary response,
  - CAM screen- positive or negative
  - RASS
  - Pain score – location, quality, intensity
  - Temperature – oral, axillary or core (if pulmonary arterial catheter present)
2. **Respiratory status:**
  - Presence of safety/emergency equipment (OPA 8,9 10 mL syringe, manual resuscitation mask and ambu bag)
  - Oxygen delivery method (nasal prongs, face mask, high flow/Optiflow)
  - Document FiO2 or litre flow
  - Respiratory rate, depth, rhythm, presence of dyspnea
  - Chest expansion- symmetry and quality
  - Use of accessory muscles
  - Breath sounds – quality, location and adventitious sounds

- Document presence of secretions/ sputum/cough effectiveness
- SpO<sub>2</sub> via pulse oximeter
- ETCO<sub>2</sub> monitoring (if applicable) See [Appendix A](#) for criteria
- Use and dose of Nitric Oxide ( if applicable)
- Elevate HOB to minimum of 30 degrees (if applicable)
- Artificial airway (Endotracheal tube /tracheostomy) if applicable –
  - Assess for presence of cuff leak and pressure (in collaboration with RRT)
  - Document airway size
  - Centimeter mark at teeth or gums with absence of dentures
  - Security of tapes/ties in collaboration with RRT
  - Condition of facial skin and oral mucosa
- Ventilator settings (if applicable) –
  - Mode
  - Set rate/patients rate
  - FiO<sub>2</sub>
  - Minute volume (MV)
  - Tidal volume (V<sub>T</sub>)
  - Positive end expiratory pressure (PEEP)
  - Inspiratory pressure

**3. Cardiovascular status:**

- Heart sounds S<sub>1</sub> and S<sub>2</sub> – presence, regularity, quality
- Heart rate and rhythm interpretation
- ST segment analysis and monitoring unless 100% AV or V paced
- Blood pressure – arterial and cuff (compare value once per shift and PRN)
- Assess arterial monitoring equipment (if applicable) –
  - Site and flush system
  - Level and zero transducer
  - Observe arterial waveform for dampening
  - Obtain systolic, diastolic, and mean arterial values
- Peripheral pulses – palpate or use Doppler to obtain radial, femoral, dorsalis pedis and posterior tibialis and document quality and strength
- Assess ulnar pulse if radial artery used and apply pulse oximeter probe to thumb on operative hand
- Radial artery graft management per protocol [B-00-13-10036](#)
- Capillary refill speed
- Skin – colour, temperature, turgor and moisture
- Ground and secure epicardial pacing wires if not in use
- Check temporary pacemaker- and document -if applicable

- Connections and setting- mode, mA, sensitivity, rate
- Assess pacing wires- site, grounding, dressing
- Document presence or permanent pacemaker or AICD
- Assess chest tube equipment (if applicable)
  - Pleur-Evac functioning (suction float, suction setting, system intact, etc.)
  - Presence of air leaks ( air leak meter)
  - Drainage – amount , quality (serous, sero- sanguinous, sanguinous)

4. **GI status:**

- NG/OG tube (salem or entereflex)
  - Insertion site and size (by auscultation/aspiration/Xray)
  - Placement mark NG at insertion site and document centimeter marking
  - Feeds- type, rate, tolerance- amount of residual
  - Drainage amount & quality and connect to continuous low wall suction
- Abdominal distention (a soft/rigid, masses, pulsations and girth if applicable)
- Bowel sounds and movements
- Nutrition (document specific diet or NPO status)
- Assess abdominal drains and tubes –site, dressing, patency and drainage (if applicable)
- Assess rectal tube- drainage- amount, colour and quality (if applicable)

5. **Renal status:**

- Type and size of catheter (if applicable)
- Amount, colour, clarity of output
- Renal replacement
  - Dialysis catheter (peritoneal or vascular) site, dressing
  - CRRT or intermittent dialysis ( if applicable)
  - Integrity of system

6. **Intravenous (IV) infusions:**

- Insertion site/dressing
- Infusion rate
- Additives (dose, concentration)

7. **Skin:**

- Turn/tilt patient and assess skin within 2 hours (if stable)
- Integrity, reddened areas, rashes, bruising, hematomas
- Classify wound(s) and assess dressings or topical treatments – including Negative Pressure wound Therapy
- Surgical wounds – Assess amount and quality of drainage on dressing

8. **Equipment:**

Any equipment not previously listed must be included (e.g. all drainage tubes/ catheters), stating position, condition of site and type of equipment

In collaboration with RT and anesthesia: **review post op chest X-ray** for correct placement of all visible equipment including but not limited to: ETT, Chest tubes, PA line, CVC, OG/NG) where applicable

9. **Vital signs & hemodynamic pressures**

(HR, BP, CVP, PAP, [CO, SVR, SVO<sub>2</sub>, if oximetric swan]) ventilator settings (set respiratory rate over total, FiO<sub>2</sub> and peak inspiratory pressure, PEEP), SpO<sub>2</sub>, urine output, chest tube drainage and all intake (intravenous or other)]

- On admission
- Q 15 minutes x 2 hours or longer if unstable; then
- Q 30 minutes x 2 hours or longer if unstable; then
- Q 1 H until discharge from unit or according to physician's order
- Record All ventilator settings Q1H and with any ventilator changes until extubation

**Ongoing Assessment:**

- Complete a full 'head-to-toe' assessment Q4H
- Assess and document pain score hourly and PRN
- Vital signs & hemodynamic pressures (HR, BP, CVP, PAP, [CO, SVR, SVO<sub>2</sub>, temp if oximetric swan]), ventilator settings, SpO<sub>2</sub>, urine output, chest tube drainage and all intake (intravenous or other)]
  - Q1H until discharge from unit or according to physician's order
  - Recalibrate SVO<sub>2</sub> Q24H and PRN
- Cardiac output with bolus thermodilution on admission, Q 4 hourly, and PRN (with any change in patient hemodynamic status or hemodynamic intervention)
- CAM screen Q4 hours and PRN
- Document sleep q1hourly ( awake , sleep, intermittent)
- Tally intake and output Q change of shift
- Weigh patient daily 0600 after dangling (when applicable)

**Interventions:**

**Initial Interventions:**

- Admit patient to monitor and activate ST monitoring if not V or AV paced
- Attach chest tube to wall suction, ensure connections are secure and mark starting drainage
- Attaches IV fluids and cardiac output flush system to proximal port of PA catheter
- Obtain hemodynamic pressures (CVP, PAP, CO, CI, SVR, SVRI,) attach and recall oximetric data if applicable
- Warm patients with blankets or Bair hugger to 36.5C
- Obtain blood work as per prescriber orders within 20 mins of arrival to unit
- Measure O.R. intake and output – empty foley if necessary
- If epicardial-pacing wires in situ and patient not paced insulate with rubber glove tip and secure with tegaderm.
- Verify temporary pacemaker settings
- Ensure temporary pulse generator in synchronous mode
- Secure PA catheter, foley, chest tubes and pacemaker (if present)
- Verify NG placement; connect anti-reflux valve and continuous low suction.(if present)
- Saline lock unused peripheral IV's
- Ensure post-op CXR & 12 lead ECG are completed (ECG not necessary if patient ventricular or atrioventricular paced)
- Review clinical pathway outcomes, applicable order set and update Care Map.
- Invite family to bedside as soon as possible, explain briefly unit routine and family presence philosophy

**Ongoing Interventions:**

1. **Neurological status:**

- Assess pain level and administer analgesic PRN.
- Assess RASS as ordered

2. **Respiratory status:**

- Deep breathing and cough when extubated Q1H
- Aim for extubation within 4 hours post-surgery

Use protocol RTD5019 Protocol for Ventilator Orders and Management in CSICU as your guide, includes the following weaning and extubation criteria:

**Weaning criteria:**

- Normothermic
- Core body temperature greater than 36C
- Hemodynamically stability:

- Cardiac index greater than 2.0
  - Systolic blood pressure between 90 to 130 mmHg
  - Stable cardiac rhythm
  - Minimal inotropic support
  - Intact airway reflexes:
  - Effective cough
- Sedation and pain level:
  - BPS score less than or equal to 6 and RASS score less than or equal to +1
- Absence of pulmonary pathology in chest radiograph
- Oxygenation status:
  - PEEP less than or equal to 8 cm H<sub>2</sub>O
  - FiO<sub>2</sub> 0.50 or less
  - SPO<sub>2</sub> greater than 92%

If the above criteria have been satisfied then initiate the weaning protocol using CPAP mode PS +5 cm H<sub>2</sub>O. Allow a minimum of 15 minutes and then assess for extubation readiness.

**Extubation Criteria:**

- Ventilation status:
  - pH 7.25 to 7.48
  - PaCO<sub>2</sub> less than 55 mmHg
  - SpO<sub>2</sub> greater than or equal to 92%
  - PaO<sub>2</sub> greater than 60 mmHg
- If ETCO<sub>2</sub> being monitored: for pathway patients there is no need to do extubation ABG, rely on SpO<sub>2</sub> of greater than 92% and ETCO<sub>2</sub> less than 55 mmHg
- Respiratory pattern:
  - Stable rhythm
  - No accessory muscle usage or abdominal paradoxus (unless noted prior to surgery)
  - Cough reflex:
  - Strong cough reflex present
  - Spontaneous cough
  - Sedation and pain level:
  - BPS score 6 or less and RASS score +1 or less

Note: if the patient exhibits any signs of respiratory distress, deterioration in ABGs, or hemodynamic changes, (after pre extubation ABG is drawn), the extubation is stopped and the patient is placed on higher level of ventilator support and the anesthetist will be notified.

Patients will be assessed for weaning within the first 4 hours post-operative, and if unsuccessful will be reassessed every hour for readiness to wean and subsequent extubation until the morning of post op day 1 at which time the extubation plan must be discussed in AM unit rounds. These rounds will include the bedside nurse, the RT and the physician; any plan discussed will then be documented clearly in the patient chart by the physician and the RN.

At the end of each day shift that the patient remains intubated; another set of rounds will take place where the overnight plan for ventilator management /extubation will be discussed with the bedside RN, RT, day anesthesia and oncoming night anesthesia. This plan will be documented clearly in the patient chart by the physician and the RN

3. **Cardiovascular status:**

- Wean/titrate inotropes as tolerated to maintain hemodynamic parameters ordered
  - Generally systolic between 90 to 130 mmHg
  - CI 2.2 or above
- Some individual patient situations may necessitate changes to these parameters such as aortic valve surgery, aortic aneurysm, aortic root repair
- Most responsible physician is to write specific hemodynamic parameter orders if necessary
- (anesthesia in consultation with surgeon)
- Inform responsible physician immediately if pacemaker non-sensing or non-capture noted, and initiate supportive measures if patient symptomatic as per [B-00-13-10125](#)
- Elevate HOB 30 degrees, & increase activity as tolerated

4. **GI status:**

- Remove NG/OG after extubation (if appropriate)
- Initiate dysphagia protocol (if appropriate), fluids and progress to DAT

5. **Renal status:**

- Monitor and record urine output Q hourly

6. **Equipment:**

- Remove Pulmonary Artery catheter as per criteria and physician order [B-00-13-10035](#)
- Remove chest tubes per [B-00-12-10061](#)
- Saline lock in situ and patent

7. **General Care:**

- Mouth care minimum Q2H on intubated patients and PRN on extubated patients
- Post operative bed bath on post op (wait minimum 6 hours post-op)

- Eye care PRN
- Assess skin and reposition patient Q2H

**Transfer:**

Prior to Transfer:

- Patients must have transfer orders written and meet discharge criteria prior to transfer  
Discharge to ward criteria:

**Hemodynamically Stable**

- SBP 90 to 140
- BT 36 to 37.5C
- HR greater than 35 bpm with back up pacing (Not 5A) or pace with underlying rhythm
- Orders for pacemaker settings is required
- Patient warm and well perfused
- Urine output greater than 1 mL/kg/h
- 30 minutes post central/arterial line removal
- 1 hour post first beta blocker administration
- Always check with MD if rising creatinine, rising lactate greater than 2.5, and /or urine output less than 1 mL/kg/h

**Oxygenation:**

- Minimal oxygen therapy to maintain SpO<sub>2</sub> greater than 92%
- Extubated for at least 4 hours
- Able to protect airway
- Stable sternum
- Incisions intact with minimal drainage; If chest tubes in situ, needs to have orders for suction/or no suction.
- CXR reviewed by physician

**Pain Management:**

- Pain controlled to score of less than or equal to 3/10

**CNS:**

- If patient is CAM positive following surgery consult unit attending first before calling psychiatry.

**Endocrine:**

- Sliding scale initiated per preprinted orders. The final decision for endocrine consults are discretion of attending, unless patient is type one diabetic

**Interventions Prior to transfer:**



- Saline lock in situ and patent
- Remove arterial line and central line minimum 30 minutes prior to transfer
- Dressings clean dry, intact and dated
- Ensure post chest tube removal CXR has been reviewed by a physician and documented in progress notes
- If temporary pacing required, ensure pacemaker settings are set as per physician order and complete Epicardial Pacemaker Flowsheet (NF259) and Fax to ward prior to transfer
- Transfer via wheelchair with monitor and oxygen if required to maintain SpO<sub>2</sub> greater than 92%
- Fax completed Patient Transfer Report form NF384 to 5A/B at least 1 hour prior to agreed upon transfer time
- Follow up with a phone call prior to transferring the patient

RN to accompany transfer:

- Any patient who will be monitored on ward, or any patient going to another critical care area post-op should be accompanied by an RN

**Documentation:**

**Ensure the following forms are completed and updated**

- Critical Care 24 hour Flow sheet
- Nurse's notes/Cardiac Surgery Clinical Pathway
- Medication Administration Record
- ECG Flow sheet
- Heart Centre Care Map
- CSICU Assessment Record
- Patient transfer report form

**References:**

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**Persons/Groups consulted:**

Clinical Nurse Leader SPH CSICU  
Cardiac Surgeon SPH  
CSICU Nursing staff  
Clinical Coordinator Respiratory services PHC  
Anesthesia SPH

**Revised By:**

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**Approved/Reviewed/Revised:**

Revised	February 1995
	November 1999
	January 2007
	November 2011

**Appendix A: End Tidal Monitoring Criteria**

ETCO<sub>2</sub> monitoring will be used in the following situation in CSICU

1. All intubated/ventilated patients
2. All extubated or non ventilated patients that have a diagnosis of OSA (obstructive sleep apnea)

ETCO<sub>2</sub> can be used as a guide to extubate when the patient is close to extubating rather than sending an ABG.

The use of ETCO<sub>2</sub> monitoring for other extubated/non ventilated patients with respiratory concerns should be tailored to the clinical situation; hence, a collaborative discussion between RT/ anesthesia / nursing should occur.