

Cardiac Procedure Room: Cardiovascular Implantable Electronic Devices: Care of Patients During Procedure

Site Applicability

SPH Cardiac Procedure Rooms

Practice Level

Specialized: Restricted to:

1. Registered Nurses working in the Cardiac Procedure Room who have completed additional unit orientation to the Cardiac Procedure Room at SPH. As needed the RN should review and remain competent in the following:
 - Common procedural sedation and analgesia medications given in the Cardiac Procedure Room
 - Airway management and resuscitation skills
 - ECG monitoring knowledge and ability to identify and respond to arrhythmias
 - Understand the pharmacology of the drugs they are administering and any relevant antagonists
2. Electrophysiology (EP) or Device Technologist:
 - Has completed post-secondary education in the field of cardiology technology or cardiac device technology.
 - Is able to perform pacemaker/lead analysis on implant
 - Conduct cardiac device assessments, interrogation and programming

Policy Statements

The Cardiac Procedure Room adheres to all protocols and guidelines according to Operating Room Nurses Association of Canada (ORNAC).

Need to Know

- Cardiac permanent pacemakers (PPM), implantable cardioverter defibrillator (ICD), implantable loop recorders (ILR) and cardiac resynchronization therapy (CRT) are collectively referred to as cardiovascular implantable electronic devices (CIED) and are all implanted in the Cardiac Procedure Room (CPR)

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- For patients receiving deep sedation or general anesthesia, the anesthesiologist is responsible for assessment, monitoring and recording of vital signs and administration of all medications unless delegated to RN.
- Nurses will only administer light to moderate procedural sedation. Patients requiring greater than moderate sedation must have an anesthesiologist attending the patient during procedure.
- Procedural sedation is a process where medications are titrated to improve patient comfort, and reduce anxiety to facilitate the performance of a procedure, while the patient remains conscious and responsive. Procedural sedation is an adjunct to effective local and/or topical anesthesia. Sedation is tailored for each individual based upon the urgency and nature of the procedure, and individual patient characteristics. The definitions for levels of sedation can be found in [Appendix A](#)
- Nurse administered procedural sedation may be appropriate for some CIED implants. See [Appendix B](#) & [Appendix C](#) for guidelines.
- When a CIED case is determined to be appropriate for RN led procedural sedation a third RN is required. The RN managing procedural sedation must have no other responsibilities during the procedure that will compromise the RNs ability to adequately monitor the patient. Refer to [B-00-13-10046](#)- Procedural Sedation in Clinics and Procedure Rooms for monitoring expectations.
- Individual patient co-morbidities ([Appendix B](#)), type of procedure ([Appendix C](#)) will be assessed prior to booking the procedure so appropriate personnel and/or requirement of an anesthesiologist for the case can be determined.
- For SICD patient set-up refer to Procedure Room Manual

Protocol

Pre- Procedure

CSSU:

Prior to bringing the patient into the Cardiac Procedure Room, ensure the following:

- CPR Patient Safety Checklist is completed. See [Appendix D](#).
- Patients may walk into procedure room, when appropriate.
- Device selected. Selected by EP Tech, implanting physician or industry representative.

Cardiac Procedure Room:

- Orient patient to area
- Assist patient onto procedure table. (i.e. slider board technique, walking patient into room.)
- Antibiotics are started in the procedure room once IV lines are connected, when appropriate.
- Initiate cardiac monitoring, SpO₂ monitoring, automatic non-invasive blood pressure (NIBP) monitoring.

Circulating Nurse and/or EP/Device Technologist	
Patient Set-up and Preparation	Rationale
1. Position patient on back with head rest. Place pillow under knees and foam padding under patients heels	
2. Ensure patient safety and comfort: <ul style="list-style-type: none"> Safety strap is secured across the patient's legs. Arms are tucked and secured with armboards. IV sites and bony prominences are padded and protected. 	Prevent injury
3. Attach ECG leads from CardioLab to patient	Monitor and record arrhythmia
4. Place hands-free defibrillator pads on any patients involving: <ul style="list-style-type: none"> ICD (i.e. insertion, generator change, lead change) Pacemaker dependent patients As directed by implanting Physician 	Allows for quick hands-free defibrillation or pacing Select patients (ICD, pacemaker dependent) are identified at higher risk and will have defibrillator pads placed at the beginning of the case; other patients will be as directed by the implanting physician.
5. Place electrical surgery (ESU) pad as appropriate: <ul style="list-style-type: none"> On a well vascularized muscle mass Away from scar tissue On opposite side of limb implant Ensure good skin contact (may involve removal with clippers) Or according to surgeon's orders 	
6. In adherence with sterile technique, cleanse operative area: <ul style="list-style-type: none"> Use chlorhexidine gluconate 2% (tinted) with isopropyl alcohol 70% From jaw line to nipple line, from sternum to axilla Use a horizontal back and forth motion then a vertical back and forth motion. 	Allows the product to reach the layers of the skin and achieve optimum bacteria reduction. (3M Summary of Clinical Studies for Professional Health care Use Approval in Canada)

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<p>7. Initiate a “briefing/time out”:</p> <ul style="list-style-type: none"> • Before sedation and/or anesthesia • Before skin incision • All members of the team participate in a surgical safety checklist • A complete pause is taken by all members of the team at the start of a procedure 	<p>To establish a communication process that encourages team conversation.</p> <p>Allows for questions, raise concerns or provide clarifications before proceeding. Appendix D</p>
<p>8. Perform lead analysis as directed by Physician:</p> <ul style="list-style-type: none"> • Note automatic beat-to-beat sensing values (P & R waves) • Check injury current • Turn pacing ON for the lead to be analyzed. • Adjust Lower rate and Amplitude to ensure pacing • Note automatic impedance measurements • Determine Amplitude Threshold • Save and print measurement values for lead (s). 	<p>Confirm appropriate lead functioning and placement.</p>
<p>9. Device interrogation (post-implant)</p> <ul style="list-style-type: none"> • Performed by Physician, EP tech, Pacemaker Clinic RN or industry representatives. 	
<p>10. RN to assist physician with extubation, when required.</p>	
<p>11. Prior to the patient leaving the procedure room a “debriefing” by the entire team is completed. See Appendix D</p>	<p>To confirm what was performed and any post-procedural concerns.</p>
<p>12. Assist patient off procedure table onto stretcher. Patient is transferred back to CSSU.</p>	
<p>13. Patient is transferred to CSSU with Anesthetist and one procedure room RN. Verbal in-person hand over report is given to CSSU RN</p>	

Scrub Nurse	
Set-up	Rationale
<ul style="list-style-type: none"> Prepare tray and surgical supplies with assistance of circulating nurse 	Principles of sterile technique are strictly adhered in accordance with the standards and guidelines of ORNAC.
<ul style="list-style-type: none"> Maintain sterile field 	
<ul style="list-style-type: none"> Assist with gowning and gloving physician 	
<ul style="list-style-type: none"> Perform surgical count pre and post procedure with circulating nurse 	
<ul style="list-style-type: none"> Assist implanting physician as required during procedure. 	
<ul style="list-style-type: none"> Assist with application of dressing 	
<ul style="list-style-type: none"> Return patient to CSSU; as above 	

Procedural Sedation RN (Third Nurse)
<i>This RN will have no other responsibilities during the procedure.</i>
Responsibilities Include:
1. Administration of procedural sedation and analgesia medication as ordered <ul style="list-style-type: none"> a. Monitor vital signs after each administration of sedation or analgesia and every 5 minutes during the procedure
2. Observe, assess and monitor vital signs <ul style="list-style-type: none"> a. Record vital signs every 15 minutes during the procedure and after each medication
3. Monitor and maintain airway patency and adequacy of ventilation.
4. Intervene appropriately and manage complications related to sedation and airway. <ul style="list-style-type: none"> a. Interventions may include medication reversal agents (i.e. naloxone, flumazenil), supplemental oxygen, bag mask ventilation, airway adjuncts (i.e. oral airway) or initiating a Code Blue
5. Refer to B-00-13-10046 - Procedural Sedation in Clinics and Procedure Rooms for monitoring parameters.

Documentation

- Adhere the implant stickers (leads and generators) to the following documents:
 - Progress notes
 - Patient stickers applied to device packaging and saved for equipment coordinator
 - Heart IS
 - Ensure location of patient follow up is documented on HeartIs
 - Patient ID card
- MAR: All medications given by nursing. This includes procedural sedation and analgesia if administered by nursing.
- Trifold (NF233)/Cerner Electronic Health Record, ensure:
 - Vital signs recorded if nurse administered procedural sedation and analgesia
 - Procedure completed
- OR Count Sheet: Scrub and circulating RN sign the count sheet
- Ensure patient discharge instructions as well as patient identification card are appropriate and complete
- CardioLab:
 - Record demographics, procedure number and procedure performed, essential time points (patient enters room, time out, skin cut, skin close and room exit), patient disposition and all people present in the room during the procedure for data collection.
 - Pacing rhythm recorded and documented at completion of implant
 - Device settings documented at completion of implant
 - Fluoroscopy image recorded to confirm lead position (lead position confirmed by physician)

Patient and Family Education

- Members of the CPR Team will introduce themselves to the patient and family members present at bedside.
- RN will explain to the patient what they will be doing to get the patient prepped for the procedure once inside the room (i.e. transferring onto the procedure table, connecting to equipment.)
- When appropriate, throughout procedure, explain procedure and what is required of the patient.

Related Documents

1. [B-00-13-1011](#) - Cardiac Monitoring: Protocol
2. [B-00-13-10090](#) - CSSU Admission and Discharge

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3. [B-00-13-10069](#) - Surgical Count, SPH
4. [B-00-13-10046](#) - Procedural Sedation in Clinics and Procedure Rooms
5. [B-00-13-1086](#) - Cardiology Procedures: Care of Patients Receiving Procedural Sedation General Anesthetic (CSSU)

References

1. American Society of Anesthesiologist. (2014). *Continuum of Depth of Sedation: Definition of General Anesthesia and Levels of Sedation/Analgesia*.
2. Frank L. Robert, edited by Wolfson, B. Allan, Grayzel, Jonathan. (2019). Procedural sedation in adults outside the operating room. *UpToDate*. [Cited 2019 August 12]. Available from https://www.uptodate.com/contents/procedural-sedation-in-adults-outside-the-operating-room?topicRef=273&source=see_link#H11
3. The ORNAC Standards, Guidelines and Position Statements for Perioperative RN Practice (2017) - Operating Room Nurses Association of Canada (ORNAC), 13th Edition
4. AORN (2014) Recommended practices for managing the patient receiving moderate sedation/analgesia. Perioperative Standards and Recommended Practices Association of Perioperative Registered Nurses. Accessed online.
5. Surgical and Procedural Safety Checklist (S-PSCL) Policy, Vancouver Coastal Health Authority and Providence Health Care. 2016.
6. 3M SoluPrep. Preoperative Skin Antiseptic. Summary of Clinical Studies for Processional Healthcare Use Approval in Canada, May 2018.

Persons/Groups Consulted:

Cardiac Procedure Room Physician Group, SPH

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Appendix A

Definitions of PSA

Light sedation/anxiolysis: A drug-induced state during which patients respond normally to verbal commands. Although cognitive function and physical coordination may be impaired, airway reflexes, and ventilator and cardiovascular functions are unaffected.

Moderate sedation/Analgesia: A drug-induced depression of consciousness during which patients respond purposefully* to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

Dissociative sedation: Dissociative sedation is a trance-like cataleptic state in which the patient experiences profound analgesia and amnesia but retains airway protective reflexes, and spontaneous respirations, and cardiopulmonary stability. Ketamine is the pharmacologic agent used for procedural sedation that produces this state. Dissociative sedation stands apart from the continuum of sedation due to its unique characteristics.

Deep sedation: A drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully* following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

General anesthesia: A drug-induced loss of consciousness during which patients are not rousable, even by painful stimulation. The ability to independently maintain ventilator function is often impaired. Patient often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.

Appendix B

Patient Selection Criteria for CIED Implant

The following criteria and/or co-morbidities will exclude patients from CIED implant without Anesthesia in attendance:

***ASA classification will not be used**

- Pediatric patients (less than 18 years old)
Complex congenital heart patients
- History of airway instability, tracheal surgery, stenosis or tracheal malacia
- Facial, dental or airway abnormality that might inhibit or preclude tracheal intubation Allergy or sensitivity to medications relevant to procedure
- Failed previous sedation/extreme anxiety.
- Difficult airway syndrome/abnormal face, mouth, neck, dentition.
- Sleep apnea (diagnosed)
- Stridor, airway obstruction Spinal instability
- Patients on respiratory (ventilator) or inotrope support.
Unstable blood glucose levels
- Hemodynamically unstable (SBP less than 90)
- Severe cardiovascular: Any cardiac condition with functional class NYHA or CCVS Class III
- Severe obesity (BMI greater than 40)
- Dementia
- Non-English speaking, and without translation services

Appendix C Procedure Selection Criteria for CIED Implant

The following procedures **can be** performed with nurse administered procedural sedation and analgesia:

1. Loop recorder implant
2. Generator replacement of PPM and ICD (pre pectoral generator pocket and patient has an underlying rhythm of 40 beats/min)
3. New implant of PPM (single and dual chamber)
4. New ICD implant (single and dual chamber)
5. Simple lead removal (physician operator discretion)

The following procedures **cannot** be performed without an anesthesiologist present to administer procedural sedation and analgesia:

1. CRT implants (CRT-pacing and CRT-defibrillator)
2. ICD implants with planned defibrillator threshold testing
3. Lead extractions
4. PPM or ICD implants with temporary pacing wire dependent patients
5. Submuscular pocket generator changes

Appendix D Cardiac Procedure Room Surgical Safety Checklist

Pre Procedure (prior to bringing patient in the room)

- ☐ Two patient identifiers
- ☐ Consent
- ☐ Site/side marking (right/left)
- ☐ Pre-procedure orders signed
- ☐ Special equipment identified and clarified with the physician
- ☐ Anesthesia has seen the patient
- ☐ Propads required Y/N
- ☐ Isolation precautions

Time Out/Briefing

Pt information confirmed

- ☐ This is _____ (including name they go by)
- ☐ The pt **is/not** device dependent
- ☐ Allergies (verified with caution sheet):
- ☐ INR: _____ or Last Dose of DOAC: _____
- ☐ Propads insitu Y/N

Procedure and Equipment

- ☐ Planned procedure: _____
- ☐ Device is in the room: Y/N
- ☐ Special equipment required (list):

Antibiotic prophylaxis given

- ☐ Drug/dose:

Patient specific concerns (ex. Unipolar device, submuscular device, OSA, overnight bed, etc...)

Debriefing (before patient leaves room)

- ☐ Procedure verified
- ☐ Final parameters
- ☐ Patient/procedure/equipment concern identified: