

Policy: Guidelines for Peri-operative Management of Patients with Implanted Cardiac Devices

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Statement:

Today's implanted pacemakers and ICDs rarely detect signals from electrocautery that are more than 6 inches from the device or leads. EMI (electromagnetic interference) is the most common and well-described problem occurring in patients with CIEDs, causing malfunction of pacemakers and defibrillators. Experience has shown that if the distance from the electrosurgery current path to the pulse generator and leads is greater than 6 inches, and the return electrode is placed on the lower body (thigh or gluteal area), damage to or interaction with the pulse generator is unlikely.

Inactivation of ICD detection is recommended for all procedures using monopolar electrocautery or RF ablation above the umbilicus (magnet or reprogramming is acceptable). The benefit of a magnet is that in the event of spontaneous ventricular tachycardia or fibrillation, the magnet may be quickly removed and the device will detect and deliver therapy within the parameters of the programmed rate detection zones.

Rendering a Pacemaker asynchronous in a dependent patient is preferable for most procedures above the umbilicus (magnet or reprogramming is acceptable). "Pacemaker-dependence" is defined as no underlying rhythm below an arbitrary lower rate cutoff, usually 40 beats per minute. It is important to realize that in some cases an unnecessary or inappropriate use of a magnet can be associated with significant untoward hemodynamic effects. For example, asynchronous pacing in the midst of the patient's underlying intrinsic rhythm will cause irregular ventricular contractions. Rarely, asynchronous pacing in a patient with a competing intrinsic rhythm can also potentially induce an atrial or ventricular arrhythmia.

It is important to note that a magnet placed over a Pacemaker usually results in asynchronous pacing. However, **a magnet placed over an ICD generator results in critically different behavior than a magnet over a pacemaker.** Magnets will not render asynchronous pacing in an ICD, but simply disable ICD detection and shocks.

For surgeries below the umbilicus, no intervention is generally recommended, as long as the device is in the pectoral region and not the abdomen.

All patients undergoing thoracic surgery, cardiac surgery, or hemodynamically challenging surgeries such as aneurysm repair should have a device evaluation before surgery and a post-op interrogation, even if no reprogramming was done.

Procedures generally NOT requiring intervention for devices placed in pectoral region include:

Ophthalmic or superficial facial procedures
Leg surgery below the waist
Arm surgery below the shoulder
Cystoscopy, ureteral stents, TURP
Colonoscopy
Hysteroscopic ablation
Craniotomy, burr holes
Other surgery not using electrocautery

Scope/Procedure:

SCOPE:

Patients with Cardiac Implantable Electronic Devices (CIED's, previously termed implanted pacemakers and implanted cardioverter defibrillators) should have a device evaluation prior to their scheduled operative procedure. This evaluation will be for the purpose of development of *an individualized CIED programming prescription*. This prescription will be carried out on the day of procedure.

“The perioperative management of CIEDs must be individualized to the patient, the type of CIED and the procedure being performed. A single recommendation for all CIED patients is not appropriate.” 1 ***While many peripheral procedures can safely be performed without the need for reprogramming, the above statement mandates a preoperative call to the Device Clinic for any patient with such a device, especially one who is having surgery within 6 inches of his/her device.***

Knowledge of the type of device and implant location is required in order to make an informed decision regarding the need for any action.

PROCEDURE:

It is ultimately the surgeon's responsibility to identify surgical patients with CIEDs. This may be done at the time of pre-admit testing in Anesthesia Preop Clinic (APC). The APC staff will notify the Arrhythmia Center/Device Clinic of the patient's date and type of surgery. The CIED team will provide guidance in the form of a prescription for the day of the procedure.

The Perioperative Device Management Form will be completed by the Device Clinic staff, and may be completed without a patient evaluation if the patient has a device evaluation on record within 6 months for an ICD or 12 months for a Pacemaker. The form will be completed with prescribed device management recommendations, based on type of device and type of surgery, and will be returned to PAT. Programming of the patient's CIED will be carried out, if prescribed, on the day of surgery.

To make the most appropriate decision about individualized CIED management, there are essential elements of the information required by the CIED team:

1. Type of procedure.
2. Anatomic location of surgical procedure.
3. Patient position during the procedure.
4. Will monopolar electrocautery be used? (if so, anatomic location of EMI delivery and proposed placement of grounding pad)
5. Unusual circumstances: cardiothoracic or chest wall surgical procedure that could impair/damage or encroach upon the CIED leads, operation in close proximity to CIED.

The CIED team will provide the following essential elements of the interrogation to the operative (anesthesia) team:

1. Date of last device interrogation
2. Type of device: Pacemaker, ICD, ILR
3. Manufacturer and model
4. Battery longevity documented if less than 3 months
5. Pacing mode and programmed lower rate
6. ICD therapy zones (Lowest heart rate for shock delivery, Lowest heart rate for ATP delivery)
7. Indicate if rate response is the thoracic impedance type (accelerometers are not affected by machinery/ventilators)
8. Underlying heart rhythm and evidence of pacemaker dependence
9. What is the response of this device to magnet placement/Magnet pacing rate.

Preoperative recommendations are made based on essential elements of the patient procedure

1. The CIED team will provide guidance in the form of a prescription to the procedure team for the management of the CIED.
2. General principles guiding this prescription include the acknowledgement that:
 - a. Inactivation of ICD detection is not a universal requirement for all procedures.
 - b. Rendering PMs asynchronous in pacemaker-dependent patients is not a universal requirement of all procedures.
 1. Pacemakers that need to be protected from inhibition may be made asynchronous by programming or by placement of a magnet applied over the pulse generator, provided the pulse generator is accessible.
 2. ICD arrhythmia detection can be suspended by placement of a magnet over the pulse generator, provided the pulse generator is accessible.
 3. If upon review of the patient's CIED interrogation and review of the medical record and or in-person evaluation, the CIED management team identifies new or worsened arrhythmias or new clinical symptoms, then there should be collaboration with the patient's clinical management team for further assessment as needed.

Perioperative Timeline: Workflow

1. Patient presents to APC area.
2. APC notifies Arrhythmia Center/Device Clinic with required information
3. Device Clinic returns completed Perioperative Device Management form to APC, to be placed on the patient's chart.
4. At the time of patient presentation to Pre-Op, RN will notify the appropriate contact if the recommendation is to reprogram the device the day of surgery. If the recommendation is to do nothing, then no call should take place.
5. If the ICD therapy is to be programmed OFF, the pre-op RN must place the pt on a cardiac monitor and have external defib pads at the bedside.
6. Device Clinic Staff (or vendor rep if after hours) will reprogram as per the Perioperative Device Management prescription, and document.
7. Verbal report will be given to anesthesiologist.

8. When the patient presents to PACU in the post-operative period, RN will notify appropriate contact if the recommendation in the Post-operative management section is to reprogram or assess CIED. If it is after hours, and the patient goes directly to the ICU (and is in a monitored environment), it is usually acceptable to wait until morning to notify the device staff to reprogram the device. The anesthesiologist/CCM faculty may request reprogramming upon arrival to ICU in the event that current programming is causing, or is likely to cause, hemodynamic disturbances.
9. Post-operative programming/assessment will be performed as prescribed.
10. In the event that patient presents to PACU after hours, and patient has prescribed reprogramming changes that are required prior to leaving PACU, then prescribed recommendations may be called to vendor at the number provided on the form.

*** Note: If the vendor is unwilling or unable to come, the Electrophysiology attending is responsible and should be called, not the Electrophysiology fellow.**

Recommendations for the intraoperative monitoring of patients with CIEDs:

- External defibrillation equipment is required in the OR and immediately available for all patients with pacemakers or ICDs having surgical and sedation procedures or procedures where EMI may occur.
- All patients with ICDs deactivated should be on a cardiac monitor and during surgery should have immediate availability of defibrillation.
- Some patients may need to have pads placed prophylactically during surgery (e.g., high risk patients and patients in whom pad placement will be difficult due to surgical site).
- All patients with pacemakers or ICDs require plethysmographic or arterial pressure monitoring for all surgical and sedation procedures.
- Use an ECG monitor with a pacing mode set to recognize pacing stimuli.
- Keep a magnet immediately available for all patients with a CIED who are undergoing a procedure that may involve EMI.

Urgent/Emergent Procedures:

The following guidelines are recommended if surgery **must** proceed urgently or emergently, prior to accessing support to interrogating the CIED.

1. Identify the type of device

- a. ICD, pacemaker, CRT-ICD, or CRT-pacemaker. Options for help in identification are:
 - 1) Evaluate the medical record
 - 2) Examine the patient registration card
 - 3) Telephone the company to clarify device type
 - 4) Examine the chest radiograph

2. Determine if the patient is pacing

- a. Obtain a 12-lead electrocardiogram or rhythm strip documentation
- b. If there are pacemaker spikes in front of all or most P wave and/or QRS complexes, assume pacemaker dependency

3. Pacemaker dependent?

Yes: pacemaker (not ICD)

Use short electrosurgical bursts, place magnet over device for procedures above umbilicus or extensive electrosurgery, have magnet immediately available for procedures below umbilicus

- a. Monitor patient with plethysmography or arterial line
- b. Transcutaneous pacing and defibrillation pads placed anterior/posterior
- c. Evaluate the pacemaker before leaving a cardiac-monitored environment

Yes: ICD or CRT-D*:

Place magnet over device to suspend tachyarrhythmia detection, use short electrosurgical bursts

- a. Monitor patient with plethysmography or arterial line
- b. Transcutaneous pacing and defibrillation pads placed anterior/posterior
- c. Evaluate the ICD before leaving a cardiac-monitored environment

No: pacemaker (not ICD):

Have magnet immediately available

- a. Monitor patient with plethysmography or arterial line
- b. Transcutaneous pacing and defibrillation pads placed anterior/posterior
- c. Evaluate the pacemaker before leaving a cardiac-monitored environment

No: ICD or CRT-D:

Place magnet over device to suspend tachyarrhythmia detection, use short electrosurgery bursts

- a. Monitor patient with plethysmography or arterial line
- b. Transcutaneous pacing and defibrillation pads placed anterior/posterior
- c. Evaluate the ICD before leaving a cardiac-monitored environment

4. Contact Emory Cardiac Device Clinic/EP fellow on-call/vendor representative

- a. A member of the CIED team should be contacted as soon as feasible
 - 1) Provide preoperative recommendations for CIED management if time allows
 - 2) Contact manufacturer representative to assist in interrogation of device pre-and/or post-operative (under the direction of a physician knowledgeable in CIED function and programming e.g., EP fellow on-call 404-686-4411)
 - 3) Perform or review postoperative interrogation

Vendor Contact Numbers For All Sites:

BOSTON SCIENTIFIC 800-227-3422

MEDTRONIC 800-328-2518

**ST JUDE
BIOTRONIK
SORIN**

**800-777-2237
800-547-0394
800-352-6466**

DEFINITIONS:

CIED: Cardiac Implantable Electronic Device (previously termed implanted pacemakers and implanted cardioverter defibrillators)

Related Policies/Procedures:

EHC Policy: Universal Protocol for Preventing Wrong Site, Wrong Procedure, Wrong Person Surgery/Procedure

Related Document: Perioperative Device Management Form

Key Words for Search: Pacemaker pre-op management, Surgery, ICD pre-op management, cardiac device

Regulatory References:

The Joint Commission. (2018). PC.02.01.11. *Comprehensive accreditation manual for hospitals: The official handbook*. Oakbrook Terrace, IL.

The Joint Commission. (2018). PC.02.02.01. *Comprehensive accreditation manual for hospitals: The official handbook*. Oakbrook Terrace, IL.

The Joint Commission. (2018). PC.03.01.01 through PC.03.01.07. *Comprehensive accreditation manual for hospitals: The official handbook*. Oakbrook Terrace, IL.

Sources of Evidence:

Heart Rhythm Society(HRS)/American Society of Anesthesiologists (ASA) Expert Consensus Statement on the Perioperative Management of Patients with Defibrillators, Pacemakers, and Arrhythmia Monitors: Facilities and Patient Management. May 2011.

Review/Approval

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Reviewer Approval	Stuart Brooker	01/31/2018 03:17:24 PM
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