

PRACTICE GUIDELINE:

Use of a pacemaker magnet for adult patients with a pacemaker or implantable cardioverter defibrillator undergoing operative or other procedures

Introduction

This guideline was developed to assist physicians, surgeons and other staff in the care of adult patients with a cardiovascular implantable electronic device (CIED) (commonly known as a pacemaker or implantable cardioverter defibrillator) who undergo operative or other procedures where electrosurgery (commonly known as cautery) or lithotripsy (with laser or electrosurgery) is used. The guideline provides an overview of key issues for the preoperative, intraoperative and postoperative care of this patient population. This includes patients being cared for, but not limited to, healthcare facilities within the province.

The discussion and ultimately the decisions related to care of the patient with a CIED undergoing a operative procedure is ultimately the responsibility of the physician responsible for the care of the patient. It is recommended that preoperative planning and consultation with the WRHA Cardiac Sciences Pacemaker and Defibrillator Clinic staff at St. Boniface Hospital occurs when indicated to minimize potential complications.

Note: Subcutaneous implantable cardioverter defibrillators (SICDs) are not covered under this guideline. Contact the Pacemaker/Defibrillator Clinic during regular business hours or the Arrhythmia Physician on call outside of regular business to discuss the treatment plan

Guideline Perspective

The focus of this document is on patient centred management. It is recognized that for a variety of reasons a wide range of clinical practice in caring for this patient population in operating rooms and day surgery clinical areas may exist, and although these practices are acknowledged, the patient perspective supersedes (Healey et al., 2012).

Guideline Assumption

The physician or delegate responsible for the preoperative management of patients with a CIED will follow this guideline, consulting the WRHA Cardiac Sciences Pacemaker and Defibrillator clinic staff in advance of a patient's operative or other procedure when appropriate (see below).

Definitions

Pacemaker: a CIED that is implanted in patients who have significant bradyarrhythmias. The device will ensure that the heart rate does not drop below a pre-specified rate. **Implantable cardioverter defibrillator (ICD):** a CIED that is implanted in patients who are at risk of sudden cardiac death due to ventricular arrhythmias. The device is programmed to detect and treat ventricular arrhythmias by delivering a shock (cardioversion or defibrillation). The other type of therapies delivered by the device will depend on the settings programmed and may include pacing functions.

Pacemaker magnet: a magnet that is specifically manufactured by a cardiac device company for pacemakers and ICDs.

Electromagnetic Interference (EMI): inappropriate sensing of electromagnetic interference caused by electrosurgery.

Electrosurgery: Refers to the application of a high-frequency electric current to biological tissue as a means to cut and/or coagulate tissue, also known as cautery.

Operative or other procedures: includes general surgeries or endoscopic procedures in those instances when electrosurgery is used as well as lithotripsy (with laser or electrosurgery). The use of electrosurgery as well as lithotripsy (with laser or electrosurgery) may result in the inappropriate sensing and/or delivery of therapy by the CIED.

Guiding Principles

- It is the professional responsibility of staff caring for this patient population to determine if the placement of a magnet is within his/her scope of practice.
- Appropriate staff who may apply a magnet includes physician/surgeons or delegates, cardiology technologists or other staff who have received training or instruction in this. The WRHA Cardiac Sciences Pacemaker and Defibrillator Clinic staff can provide this instruction.
- Continuous ECG monitoring, including the capability of providing immediate defibrillation of the patient is highly recommended while the magnet is in place as an ICD will not be able to detect and treat any arrhythmias.
- If a sustained ventricular arrhythmia occurs, staff will: 1) remove the magnet to restore permanently programmed detection and therapy settings or 2) use external defibrillation Staff will follow WRHA Policy Code Blue Team Resuscitation in Acute Care (policy #110.050).
- In the ‘magnet mode’ (when the magnet is placed over the device):

ICDs:

- Tachyarrhythmia detection and therapy are suspended and as a result the ICD will not provide any therapy
- The magnet application generally does not affect the programmed pacing mode of the device (rarely, with some manufacturers, the device will pace at a pre specified rate) so cautery may inhibit bradycardic pacing
- The magnet application may result in a tone or ringing being emitted from the device for 10-20 seconds

Pacemakers:

- The magnet disables the sensing ability of the device and will result in pacing of the heart at a pre specified rate (asynchronous pacing). The rate depends on the manufacturer as well as the age of the device
- Patients who are dependent on pacing may experience inhibition of pacing with electrosurgery

Procedure for Contacting St. Boniface Hospital (SBH) Pacemaker/Defibrillator Clinic*

To contact the SBH Pacemaker/Defibrillator Clinic during regular office hours, please phone (204) 237-2431. If urgent assistance is required after hours, the patient’s Physician should contact the on call Arrhythmia Physician through SBH paging at 204-237-2053. For questions regarding the management of a patient with a CIED undergoing an elective operation/procedure, please contact the clinic a minimum of 3 working days prior to the operation/procedure date.

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***Some pacemaker patients, particularly those in the Brandon region are followed in the Brandon clinic. They can be contacted during regular office hours at (204) 578-4091.**

Perioperative/Procedural Management

Preoperative/Preprocedure Management

ICDs

- If the patient has an ICD: The SBH Pacemaker / Defibrillator Clinic can be contacted as per above contact procedure.

Pacemakers

- If the patient has a pacemaker: the routine notification of the WRHA Cardiac Sciences Pacemaker and Defibrillator Clinic is not required prior to the patient's operative or other procedure. However, if questions or concerns please see procedure for contacting SBH Pacemaker/Defibrillator clinic section above for contact information.

Intraoperative/Intraprocedural Management:

ICDs

The placement of a pacemaker magnet is recommended for adult patients undergoing operative or other procedures when there is a high risk of EMI which may result in inappropriate sensing and/or delivery of therapy by the ICD. Very rarely, electrosurgery may result in resetting of a device. These settings are not necessarily optimal for any given patient, but neither are they likely to be unsafe for the patient.

- EMI is more likely if surgery is less than 15 cm from ICD or leads (ie, intrathoracic, cardiac, shoulder) or above the umbilicus*
- EMI is more likely if monopolar cautery, rather than bipolar cautery to be used. Surgeries close to the CIED (such as breast, shoulder, head and neck, pulse generator replacement, or carotid procedures) should be done with bipolar rather than monopolar electrosurgery whenever that is possible
- EMI is more likely if long (greater than 5 seconds) or frequent (less than 5 seconds between) bursts of cautery to be used
- Positioning of the electrosurgery return electrode such that the predicted current path avoids the CIED coupled with working at a lower electrosurgery power setting may reduce exposure of the CIED to the effects of electrosurgical energy
- EMI is more likely if the CIED has unipolar leads or bipolar leads programmed in unipolar mode or with very high sensitivity (note, all high voltage ICD leads are bipolar)
- Magnetized metal objects used for the surgery/procedure should be greater than 6 cm away from the pacemaker magnet

Pacemakers

A magnet is not generally routinely required for procedures below the umbilicus. Precautions with electrosurgery should be taken if the operative or other procedure is above the umbilicus, particularly if the surgery is less than 15 cm from the device, as per the ICD section above.

Placement of a Pacemaker Magnet

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- 1) Locate the CIED: it is usually located in the upper left chest area but may be on the upper right chest or in rare instances in the abdomen
- 2) Place the magnet directly over the CIED and secure it to the skin with medical tape to prevent movement away from the device

Note: Removal of the magnet will restore the pre programmed settings of the CIED

Postoperative/Postprocedural Management

- 1) The routine notification of the St. Boniface Hospital Pacemaker/ Defibrillator Clinic is not required unless suspected CIED malfunction. If there is objective evidence of CIED malfunction (i.e. printed strips of failure to pace or sense, pauses) or significant arrhythmias then St. Boniface Hospital Pacemaker/ Defibrillator Clinic may be contacted. Please see procedure for contacting SBH Pacemaker/Defibrillator clinic section above for contact information.
- 2) The pacemaker magnet should be cleaned and disinfected after each use as per existing hospital infection control policies and procedures.

Obtaining a Pacemaker Magnet

Contact the WRHA Cardiac Sciences Pacemaker and Defibrillator Clinic staff at 204-237-2431 during regular office hours or contact the site purchasing departments to ensure adherence to purchasing policies or regional contracts.

*Pediatric and some (usually) younger adult patients, particularly those with congenital heart disease, may have their CIED located in the abdomen. In these patients, precautions should be taken with surgeries both above and below the umbilicus

References

- Healy, J.S., Merchant, R., Simpson, C., Tang, T., Beardsall, M., Tung, S., Fraser, J.A., Long, L., van Vlymen, J.M., Manninen, P., Ralley, F., Venkatraghavan, L., Yee, R., Prasloski, B., Sanatani, S., & Philippon, F. (2012). Canadian Cardiovascular Society/Canadian Anesthesiologists' Society/Canadian Heart Rhythm Society Joint Position Statement on the Perioperative Management of Patients with Implanted Pacemakers, Defibrillators, and Neurostimulating Devices. *Canadian Journal of Cardiology*, 28, 141-151. doi: 10.1016/j.cjca.2011.08.121
- Jacob, S., Panaich, S., Maheshwari, R., Haddad, J., Padanilam, B., & John, S.K. (2011). Clinical applications of magnets on cardiac rhythm management devices. Retrieved July 30, 2014 from http://www.medscape.com/viewarticle/749751_print
- Crossley, G.H., Poole, J.E., Rozner, M.A., Asirvatham, S.J., Cheng, A., Chung, M.K., Ferguson, T.B., Gallagher, J.D., Gold, M.R., Hoyt, R.H., Irefin, S., Kusumoto, F.M., Prudente Moorman, L., Thompson, A. (2011). The Heart Rhythm Society (HRS)/American Society of Anesthesiologists (ASA) Expert Consensus Statement on the Perioperative Management of Patients with Implantable Defibrillators, Pacemakers and Arrhythmia Monitors: Facilities and Patient Management. *Heart Rhythm*, 8(7), 1114–1152. doi: <http://dx.doi.org/10.1016/j.hrthm.2010.12.023>
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