# Clinical Guideline

Health
Hunter New England
Local Health District

# Management of Permanent Pacemaker (PPM) and Internal Cardiac Defibrillators (ICD) in the Emergency and Elective Surgical Settings

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|---|---|
| **Sites where Clinical Guideline applies** | All HNE Health Hospitals that perform surgery |
| **This Clinical Guideline applies to:** | |
| **1. Adults** | Yes |
| **2. Children up to 16 years** | No |
| **3. Neonates – less than 29 days** | No |
| **Target audience:** | Surgeons, Anaesthetists, Nurses, Cardiac Technologists, Cardiologists |
| **Description:** | This document provides clinical staff with a matrix to consider the process of management of ICD within the theatre environment |

**Hyperlink to Guideline**

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|---|---|
| **Keywords:** | ICD, PPM, Unipolar diathermy, bipolar diathermy, arrhythmia, surgery, theatre, |
| **Document Registration Number** | HNELHD CG 14_21 |
| **Replaces Existing Guideline No** | No |

**Related Legislation, Australian Standards, NSW Health Policy Directive, NSQHS Standard, HNE Health Documents, Professional Guidelines, Codes of Practice or Ethics:**

Relevant or related Documents, Legislation, Australian Standards, Guidelines etc:

- NSW Health Policy Directive PD2007_079 Correct patient, Correct procedure, correct site
- NSW Health Policy Directive PD2005_406 Consent to Medical Treatment
- NSW Health Policy Directive PD2007_036 Infection Control Policy
- NSW Health Policy Directive 2011_077 Recognition and management of a Patient who is Clinically Deteriorating
- HNE LHD Policy Compliance Procedure Recognition and Management of a Patient who is Clinically Deteriorating PD2010_026:PCP 1
- HNE Health Policy Compliance Procedure PD2009_060: PCP1 Clinical handover
- HNELHD Policy Compliance Procedure PD 2009_060 PCP 3 Clinical Handover – INTRA facility transfers
- NSW PD 2008_55 Cardiac Monitoring In Adult Cardiac Patients in Public Hospitals in NSW http://www.health.nse.gov.su/policies/pd/2008/pd/2008/pdf/PD2008 055.pdf

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| **Position responsible for Clinical Guideline Governance** | Clinical Leader, Cardiac Clinical Stream |
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| **Date authorised** | 26 May 2014 |
| **This Clinical Guideline contains advice on therapeutics** | No |
| **Issue Date** | 26 June 2014 |
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| **TRIM number** | 14/38-1-21 |

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Note: Over time links in this document may cease working. Where this occurs please source the document in the PPG Directory at: http://ppg.hne.health.nsw.gov.au/

## GUIDELINE SUMMARY

This document establishes best practice for HNE Health. While not requiring mandatory compliance, staff must have sound reasons for not implementing standards or practices set out within the guideline, or for measuring consistent variance in practice.


**Introduction:** This guideline was developed by the department of Cardiology at John Hunter Hospital with advice from the device manufacturers, cardiac technologists, and the anaesthetics department of the John Hunter Hospital and The Maitland Hospital. This guideline maybe utilised by any clinical staff who are involved in pre op or perioperative care of patients who have a Permanent Pacemaker (PPM) or Internal Cardiac Defibrillator (ICD). **For optimal viewing of this document please use a colour printer**

**Situation: Risk Statement:** Senior clinicians who cared for patients who have a PPM or ICD insitu, who cared for patients undergoing operations expressed a need for greater support in the important area of diathermy use in this group of patients. This document was developed to aid in the pre-operative and peri operative care of these patients.

**Risk Category:** Clinical Care & Patient Safety*;*

**Background:** At present no formal decision making support is given for this sub group of patients. This document provides decision making support for clinical staff involved in the care of these patients who are undergoing operative procedures.

**Assessment:** This document has been developed in conjunction with the Anaesthetic and Cardiology departments and has been accepted through the streams of these groups.

**Recommendation:** That this document be utilised by all clinical staff who are involved in the care of patients who are undergoing an operation who have an ICD or PPM.

**GLOSSARY**

| Acronym or Term | Definition |
|---|---|
| Internal Cardiac Defibrillator (ICD) | Is a small battery-powered electrical impulse generator that is implanted in patients who are at risk of sudden cardiac death due to ventricular fibrillation and ventricular tachycardia |
| Permanent Pacemaker | A permanent pacemaker delivers electrical impulses to the heart via one or two flexible insulated wires to restore normal rhythm. |
| Unipolar Diathermy | Unipolar diathermy is the emitance of the High Frequency Alternating Current (HFAC) from the diathermy via an active electrode through the patient's body tissues and returned back to the diathermy machine via a return electrode or patient return pad (Association for Perioperative Practice (AfPP) 2011) |
| Bipolar Diathermy | Bipolar diathermy is the passage of the HFAC from the diathermy machine down one prong of a bipolar forcep through the tissue that has been placed between the forcep tips and returned to the diathermy machine via the second prong |

**For advice contact the Pacing and Electrophysiology Team John Hunter Hospital**

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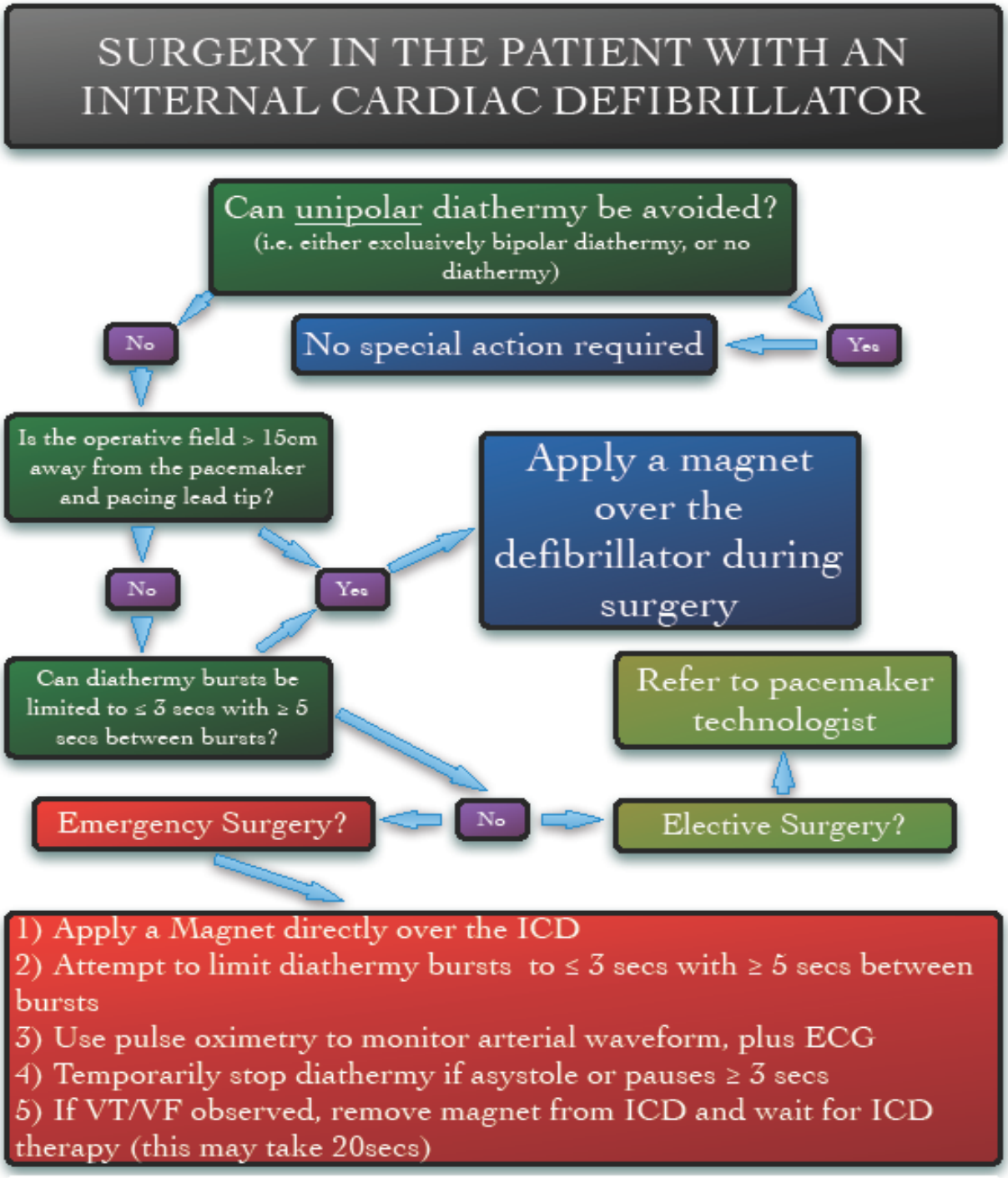
## GUIDELINE INTRODUCTION

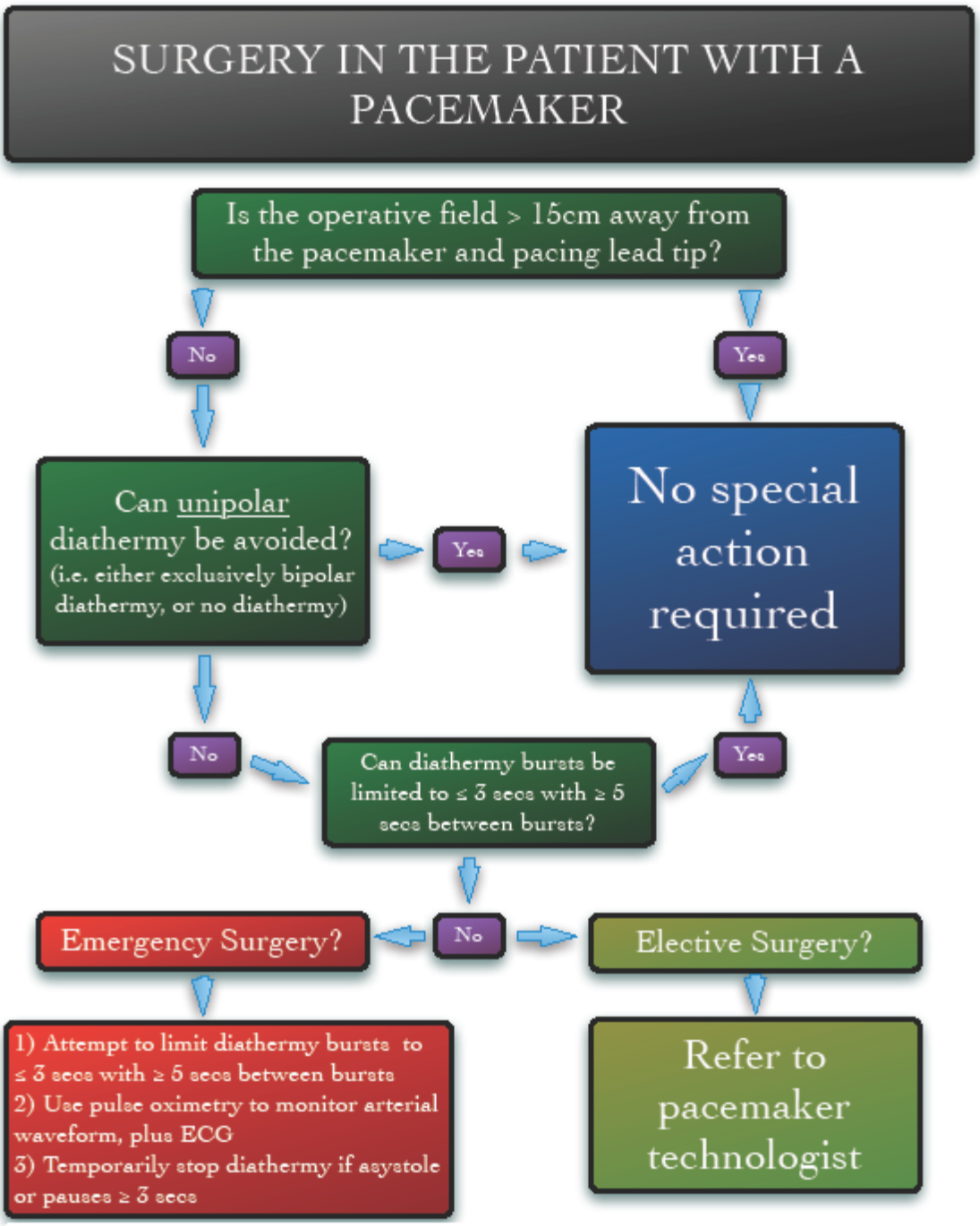
The patient with a Permanent Pacemaker or Internal Cardiac Defibrillator who is undergoing planned surgery should be formally assessed via a surgical pre procedure clinic. This should include a recent pacemaker check report. This guideline will assist all clinicians in the management of this group of patients

The patient with a Permanent Pacemaker or Internal Cardiac Defibrillator who is undergoing emergency surgery presents unique challenges for all clinicians. This guideline will assist all clinicians in the management of this group of patients

Operating theatre staff should refer to the following flowchart for use of diathermy during surgery. Further advice is provided in the frequently asked questions sections.




*** The magnet must be removed at the end of surgery. The ICD will automatically re-enable usual therapies. No device interrogation is necessary simply because the magnet has been used. If the device was programmed prior to surgery, reprogramming will be necessary post-surgery.**
*** The pacemaker technologist can be contacted via JHH on 49223142 or page #6484 during normal hours. For after-hours cases contact the pacing and EP team.**




*There is no need to interrogate the pacemaker simply because diathermy was used during the case. If the device was programmed prior to surgery, reprogramming will be necessary post-op.
* The use of magnets is not recommended for pacemakers as the response is variable depending on manufacturer and model. (Not all pacemakers are placed in an asynchronous pacing mode in response to a magnet). The operation can be performed safely following the algorithm above.

**The pacemaker technologist can be contacted via John Hunter Hospital. They may be contacted on 49223142 or page #6484 during business hours. For after hour cases contact The Pacing and Electrophysiology Team (see page 4)**

**FREQUENTLY ASKED QUESTIONS**

- **What is a pacing technologist and a company representative? What is the referral process to the pacing technologist?** A pacing technologist is a hospital employee who is trained in the interrogation and programming of PPM and ICD. A company representative is employed by a private company who distribute, and assist with the process of implementation of ICD and PPM. In the absence of a local pacing technologist it may be appropriate to contact the local cardiac service for further advice. The pacing technologist may potentially advise a number of approaches including:

    1. Do nothing
    2. Use a magnet
    3. Temporary reprogramming of the device prior to surgery: **Note:** This may require the patient to be transferred to John Hunter Hospital

    **N.B** It is the current policy of the John Hunter Hospital pacing service **not** to use company representatives for this purpose. Contact should be made directly to the John Hunter Hospital pacing technologist for advice on **49223142 or page #6484 during business hours.** For after-hours cases contact one of **the Pacing and Electrophysiology Team: John Hunter Hospital.** Please see page 4 of this document for details

- **Where is 15 cm taken from in the operative field**? This is 15 cm away from both the generator, and the tips of the pacing leads. In fact, avoiding the pacing lead tips is more important than the pacemaker generator. This is so because very few devices are programmed to a "unipolar" sensing mode (sensing between the pacing tip and the pacemaker generator), virtually all have bipolar sensing (between the 2 electrodes at the pacing lead tip). Surgery on the head should be fine, but all chest surgery will be affected and theoretically upper abdominal surgery as well.
- **Will there be interference with pulse oximeters?** There should not be any issue between pulse oximeters and all current devices. Similarly there should not be a problem with diathermy.
- **When should Defibrillator pads be used?** Defibrillator pads are only required if ICD therapies have been disabled by the pacing technologist prior to surgery. If applied Defibrillator pads should never be put within 10cm of the ICD site.
- **Where do we get magnets from and where should they be stored**. The JHH Cardiology Department has a limited supply of magnets. If you require magnets please contact a pacing technologist during business hours to arrange purchase. In terms of storage each anaesthetic unit should arrange storage of magnets as they wish.
- **What is the 3 and 5 second rule?** The 3 second and 5 second rule is a conservative position. The problem is of diathermy-induced temporary cessation of pacemaker function (due to the device interpreting the diathermy current as spontaneous cardiac activity, and thereby not delivering pacing). If the patient was completely pacing dependent, and if there was complete cessation of pacemaker function during this time, then the longest pause would be 3 seconds. The 5 seconds between bursts is to allow a small number of paced beats before the next potential pause. **Note: diathermy should never be delivered to a patient with an active ICD (i.e. therapies not programmed off of magnet not over ICD, not even for 3 seconds)**
- **What is unipolar diathermy and what is its impact on pacing?** Unipolar diathermy is the standard form. It is actually still "bipolar" but the other pole is far away, and large (this is the patch applied to the patient's body, the so-called "indifferent electrode"). The effect is to concentrate the tissue heating close to the small electrode that the surgeon is using (tissue heating is proportional to the resistance to flow of the current; resistance is highest at the small electrode, and minimal at the large electrode.) The path of the current is large, travelling in the most electrically economical ways from the diathermy pen to the indifferent electrode. Thus placement of this indifferent electrode is very important. It should be placed in a position to minimize the chance of current flow past the ppm generator and pacing lead tips (the parts of the pacing lead which are exposed to the body). With bipolar diathermy, the diathermy pen has 2 tips, which are quite close (generally about 5mm), and current flows only between these 2 tips. Hence, unless diathermy were to take place directly over the device, there is no chance of extraneous current being picked up by it

- **The impact of magnets and pacemakers?** All devices are safe with magnets today. In the past, with older pacemakers, a magnet placed over the pacemaker would physically move a "reed-switch",

which would allow entry of external current into the pacemaker itself. Currently many devices have changed to an electrical switch, and all pacemakers and ICDs are fitted with a strong resistor (the zener diode) capable of preventing large voltage spike into the device. Consequently, the chance of device malfunction as a result of diathermy while a magnet is in place is realistically not an issue these days. To damage a device you would have to defibrillate close to the device while a magnet was in place. Note: not all pacemakers respond to a magnet by switching to an asynchronous pacing mode, so therefore the current recommendations do not suggest using magnets on pacemakers during surgery.

- **The patient has an ICD or PPM but you are not sure what it is?** A number of strategies maybe used to identify what the device is; the patient should carry with them a card given to them by the device company, this will have details of generator and leads. If this does not answer the question please discuss with the John Hunter Hospital pacing technologist on **49223142 or page #6484 during business hours** or for afterhours questions contact one of the **Pacing and Electrophysiology Team: John Hunter Hospital (page 4 of this document)**
- **Where do we obtain magnets from, and how do we place them?** John Hunter Hospital Cardiology department can supply magnets upon request. However it is up to each individual Anaesthetic site to define where it is located. The magnet should be placed directly over the ICD for the procedure.
- **Post procedure monitoring and magnets?** As a routine the patient who has a magnet placed on their ICD during a procedure does not require a monitored bed after the procedure. To clarify the patient does not require special monitoring post procedure if a magnet has been used nor is device interrogation required.
- **When assessing patients do you need to get a recent pacemaker check report?** Yes for a planned procedure a comprehensive surgical workup plan should include obtaining a recent PPM check report.
- **Does the patient need special Antibiotic cover if they have an ICD/PPM?** No

## IMPLEMENTATION PLAN

The document was developed in conjunction with senior Anaesthetic staff. The document has been circulated and discussed through the anaesthetic stream and the cardiac stream. The document has been formally presented to the Agency for Clinical innovation and discussed through this state body.

The document will then be implemented through circulation through the Cardiac and anaesthetic stream

## EVALUATION PLAN

The document will be evaluated by both the Anaesthetic and Cardiology streams of Hunter New England Health. This document will be evaluated on a yearly basis by these bodies and any feedback on these documents will be evaluated by these streams.

## CONSULTATION WITH KEY STAKEHOLDERS

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2) Dr Ross Kerridge: Director Perioperative service John Hunter Hospital
3) Dr Ian McKendry: Director Anaesthetic Department: The Maitland Hospital
4) Dr Simon Ford: Director Anaesthetic Department: Tamworth Hospital
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6) Dr Stuart Turner: Cardiologist John Hunter Hospital
7) Mr Lindsay Savage: Cardiac Liaison Officer: Cardiac Stream Co- Lead Hunter New England Health
8) Ms Dawn McIvor: Area Clinical Nurse Consultant Cardiology Hunter New England Health
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10) Dr James Leitch: Director of Cardiology/Electrophysiologist: John Hunter Hospital
11) Dr Bradley Wilsmore: Electrophysiologist John Hunter Hospital
12) Ms Christine Lawrence: Clinical Nurse Specialist: The Maitland Hospital Pre Procedure Clinic
13) Ms Helen Orvad: Clinical Nurse Consultant Cardiology: Northern

**REFERENCES**


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- Jacob,S.,Panaich,S., ,Maheshwari,R., Haddad,J., Padanilam,B.,John,S. (2011) Clinical applications of magnets on cardiac rhythm. *Europace* 13 1222-1230. Doi:10.1093/europace/eur137.


**FEEDBACK**

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