Implanted Cardiac Pacemaker and Defibrillator Management

This practice algorithm has been specifically developed for MD Anderson using a multidisciplinary approach and taking into consideration circumstances particular to MD Anderson, including the following: MD Anderson’s specific patient population; MD Anderson’s services and structure; and MD Anderson’s clinical information. Moreover, this algorithm is not intended to replace the independent medical or professional judgment of physicians or other health care providers. This algorithm should not be used to treat pregnant women.

INITIAL EVALUATION

All patients with an implantable cardiac device and scheduled for procedure or therapeutic radiation are to be seen at the Cardiopulmonary Center.

1. Device check not needed if completed within the last 3 months and with documented NORMAL battery, impedances, and pacing safety margins. Device to be rechecked when transitioning from one treatment to another (Radiation, Surgery). After 5pm, weekends and holidays, cardiology service on-call can be contacted for emergency device checks.

2. Recommend all surgical procedures to be scheduled early AM

   - Pacing dependent or surgery above the waist: Recommend schedule surgery in main operating room
   - Pacing non-dependent surgery below the waist: Recommend schedule surgery in either main or ACB

3. Abdominal implants: If surgery between thorax and pelvis refer to above the waist; if outside thorax and pelvis refer to below the waist.

4. Follow pacemaker clinic recommendations note.

5. Conditions under which postoperative interrogation is not necessary. (see Appendix A on Page 6)

6. Refer to magnet application page for proper application. (see Appendix B on Page 6)

1

Surgery or endoscopy with electrosurgery above the waist

Implantable cardioverter defibrillator (ICD)

ICD pacing dependent?

Yes

Therapy OFF

Asynchronous pacing mode

No

Pacemaker dependent?

Yes

Therapy OFF

Asynchronous pacing mode

No

Pacemaker dependent?

Yes

Place magnet for temporary Therapy OFF

Consider magnet for temporary asynchronous pacing mode

No

Central line

Radiation

MRI

Advanced care planning for patients with pacemaker and defibrillator

See Page 2

See Page 3

See Page 4

See Page 5

● Post-op check prior to leaving a monitored area

● Turn ON therapy

● Check pacing mode

Consider post-op check

All patients need to follow-up with their physician

Postoperative check can occur up to 30 days after surgery
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1 Special circumstance: If ICD or pacemaker implanted less than 6 weeks ago, planning for other venous access device should be considered.

2 Refer to Appendix B- Magnet Application

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Patient presents for central line/peripheral inserted central catheter (PICC) placement

ICD

Pacemaker

Arrangements must be completed by direct communication between Infusion Therapy Team and the Cardiac Catheter (Cath) Lab

Cardiac Cath Lab available?

Yes

No

Dependent?

Yes

No

Therapy OFF asynchronous pacing mode

Monitoring by Licensed Healthcare Provider (LHP) during procedure

Immediately following procedure: return device to pre-procedural settings

Procedure to be done under fluoroscopy in the Cardiac Cath Lab

Cardiac Cath Lab available?

Yes

No

Monitoring by LHP during procedure

Procedure to be done under fluoroscopy in the Cardiac Cath Lab

Proceed with procedure as clinically indicated

Dependent?

Yes

No

Therapy OFF
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THERAPEUTIC RADIATION

1 Radiation dose specification documented in clinic note is recommended prior to Pacemaker Clinic consult.
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**PRIOR TO MRI¹**

- Consult to Pacemaker Clinic noting patient to be scheduled for MRI and has a CIED

**AT THE TIME OF MRI¹**

- Cardiology to collaborate with Diagnostic Imaging faculty regarding clinical indication of MRI
- Monitors applied:
  - Cardiac monitoring
  - Pulse oximetry

**FOLLOWING MRI¹**

- MRI completed
- Pacemaker/CIED checked
- Reprogrammed as needed
- Follow-up less than or equal to 3 months or as noted in the Pacemaker Management note in OneConnect

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¹ There will be an appropriate, qualified and credentialed clinician to monitor patient during procedure.

CIED = cardiovascular implantable electronic device
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**PATIENTS WITH DO NOT RESUSCITATE (DNR) STATUS**

- Advanced care planning\(^1\) has been established.
- Patient is DO NOT Resuscitate status with an implanted cardiac device

**Implanted defibrillator**

- It is recommended to turn OFF shock therapy
- An order must be placed by the physician to turn OFF the shock therapy
  - Contact Pacemaker Clinic during business hours
  - Notify manufacturer representative after 5 PM and weekends\(^2\)

**Pacemaker**

- No need for any intervention

**Continue advanced care plan**

\(^1\) The advanced care planning discussion with the patient/family member should clearly include and document whether or not shock therapy will be turned OFF.

\(^2\) Manufacturer’s information may be obtained in the following manner:
  - Pacemaker Clinic Progress Note
  - Patient/Family member has manufacturer’s card
APPENDIX A: Conditions under which Postoperative Interrogation is not Necessary

1. Device is checked preoperatively and found to be working correctly, and
2. No programming of device took place perioperatively, and
3. No monopolar electrosurgery used (bipolar is acceptable), and
4. No blood transfused, and
5. No hemodynamic issues noted, and
6. Procedures not involving electrosurgery (e.g., endoscopic ultrasonography)

APPENDIX B: Magnet Applications

### Pacemaker Magnet Application

<table>
<thead>
<tr>
<th>Pacemaker Manufacturer</th>
<th>Most Common Magnet Effect</th>
<th>Programmable (On-Off)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biotronik</td>
<td>No sustained asynchronous pacing</td>
<td>Yes</td>
</tr>
<tr>
<td>Boston Scientific/Guidant CPI</td>
<td>Asynchronous pacing at 100 or 90 bpm</td>
<td>Yes</td>
</tr>
<tr>
<td>Intermedics</td>
<td>No sustained asynchronous pacing</td>
<td>No</td>
</tr>
<tr>
<td>Medtronic</td>
<td>Asynchronous pacing at 85 bpm</td>
<td>No</td>
</tr>
<tr>
<td>Sorin</td>
<td>Asynchronous pacing at 85 - 96 bpm</td>
<td>No</td>
</tr>
<tr>
<td>St. Jude Medical/Pacesetter</td>
<td>Asynchronous pacing at 86 - 100 bpm</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Defibrillator Magnet Application

<table>
<thead>
<tr>
<th>Defibrillator Manufacturer</th>
<th>Most Common Magnet Effect</th>
<th>Magnet Confirmation</th>
<th>Programmable (On-Off)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biotronik</td>
<td>Disables tachy therapy</td>
<td>none</td>
<td>No</td>
</tr>
<tr>
<td>Boston Scientific/Guidant CPI</td>
<td>Disables tachy therapy</td>
<td>Defibrillator will beep with each R wave or 1/second</td>
<td>Yes</td>
</tr>
<tr>
<td>Medtronic</td>
<td>Disables tachy therapy</td>
<td>none</td>
<td>No</td>
</tr>
<tr>
<td>Sorin</td>
<td>Disables tachy therapy</td>
<td>Change pacing rate to 90 bpm</td>
<td>No</td>
</tr>
<tr>
<td>St. Jude Medical/Pacesetter</td>
<td>Disables tachy therapy</td>
<td>none</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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SUGGESTED READINGS

Crossley, G. H., Poole, J. E., Rozner, M. A., Asirvatham, S. J., Cheng, A., Chung, M. K., ... & Irefin, S. (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: this document was developed as a joint project with the American Society of Anesthesiologists (ASA), and in collaboration with the American Heart Association (AHA), and the Society of Thoracic Surgeons (STS). *Heart Rhythm, 8*(7), 1114-1154.
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DEVELOPMENT CREDITS

This practice algorithm is based on majority expert opinion of the Pacemaker work group for the management of Implanted Cardiac Pacemaker and Defibrillator patients at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

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