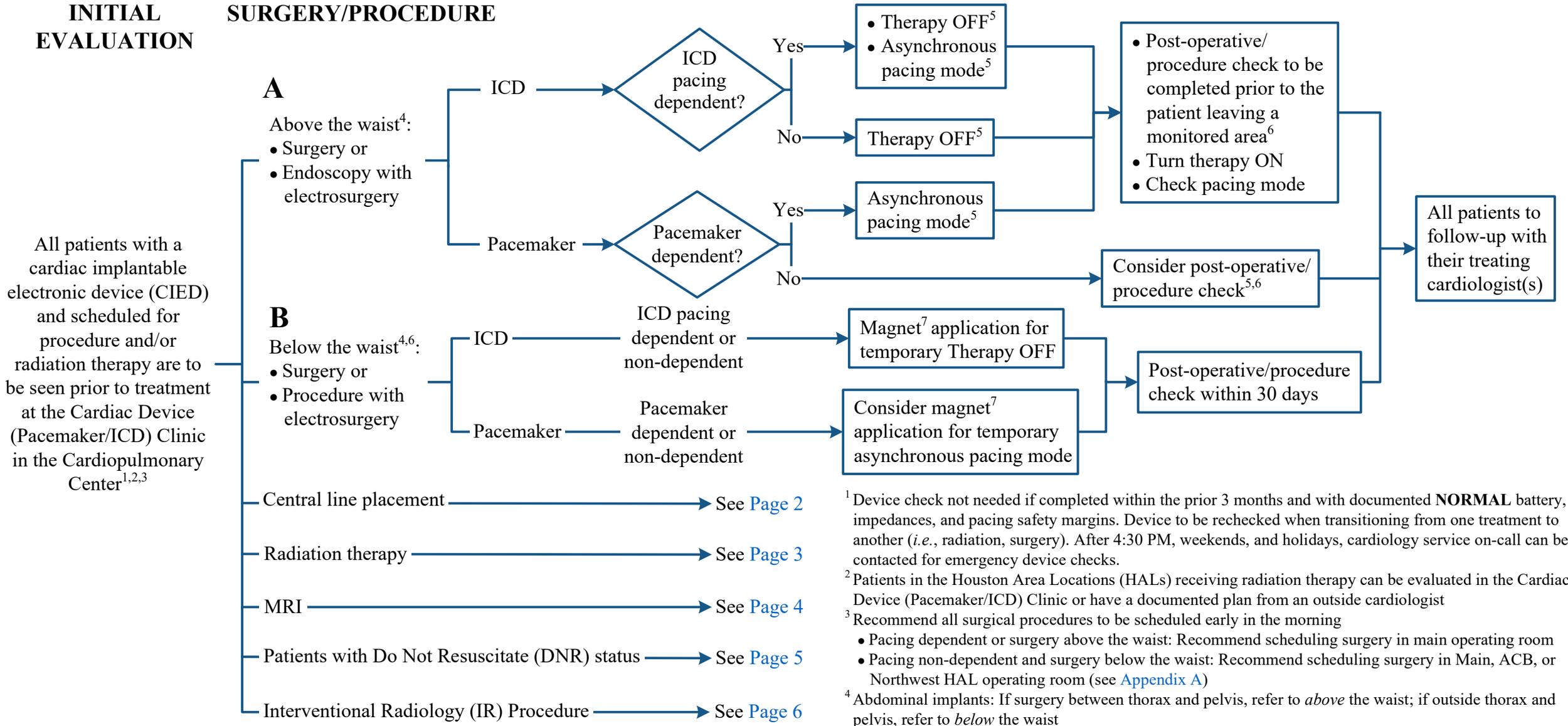


Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Note:** This algorithm is intended for outpatient use. For inpatients needing evaluation, please place "Cardiac Device Check Inpatient (Bedside)" order for the patient to be evaluated at bedside.



ICD = Implantable cardioverterdefibrillator

<sup>1</sup> Device check not needed if completed within the prior 3 months and with documented **NORMAL** battery, impedances, and pacing safety margins. Device to be rechecked when transitioning from one treatment to another (i.e., radiation, surgery). After 4:30 PM, weekends, and holidays, cardiology service on-call can be contacted for emergency device checks.

<sup>2</sup> Patients in the Houston Area Locations (HALs) receiving radiation therapy can be evaluated in the Cardiac Device (Pacemaker/ICD) Clinic or have a documented plan from an outside cardiologist

<sup>3</sup> Recommend all surgical procedures to be scheduled early in the morning

- Pacing dependent or surgery above the waist: Recommend scheduling surgery in main operating room
- Pacing non-dependent and surgery below the waist: Recommend scheduling surgery in Main, ACB, or Northwest HAL operating room (see [Appendix A](#))

<sup>4</sup> Abdominal implants: If surgery between thorax and pelvis, refer to *above* the waist; if outside thorax and pelvis, refer to *below* the waist

<sup>5</sup> Follow Cardiac Device (Pacemaker/ICD) Clinic's recommendations note

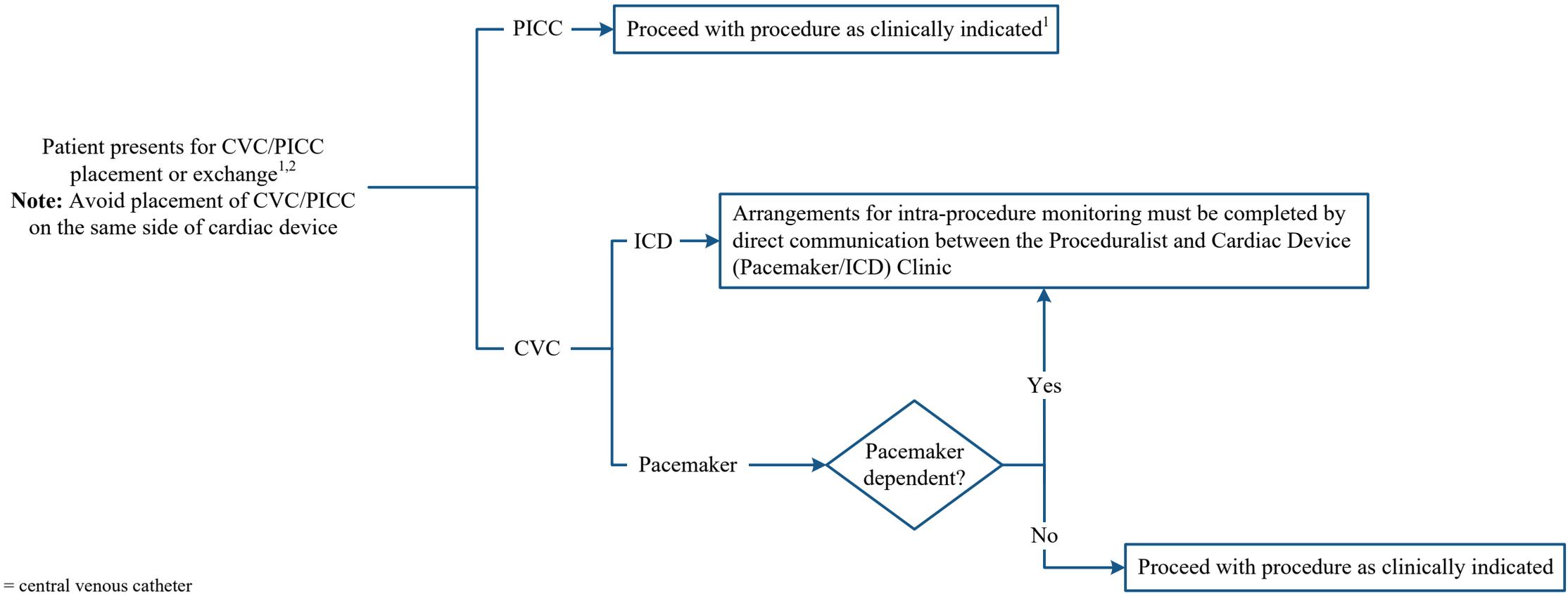
<sup>6</sup> Refer to [Appendix A](#) for Conditions Under Which Post-Operative/Procedure Interrogation is Not Necessary

<sup>7</sup> Refer to [Appendix B](#) for Magnet Application

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Note:** This algorithm is intended for outpatient use. For inpatients needing evaluation, please place "Cardiac Device Check Inpatient (Bedside)" order for the patient to be evaluated at bedside.

## CENTRAL LINE/PERIPHERALLY INSERTED CENTRAL CATHETER (PICC) PLACEMENT



CVC = central venous catheter  
 PICC = peripherally inserted central catheter

<sup>1</sup> Special circumstance: If CIED was implanted within the prior 3 months, procedure should be performed under fluoroscopy or in the Cardiac Catheterization Lab

<sup>2</sup> For central lines placed in IR, see [Page 6](#)

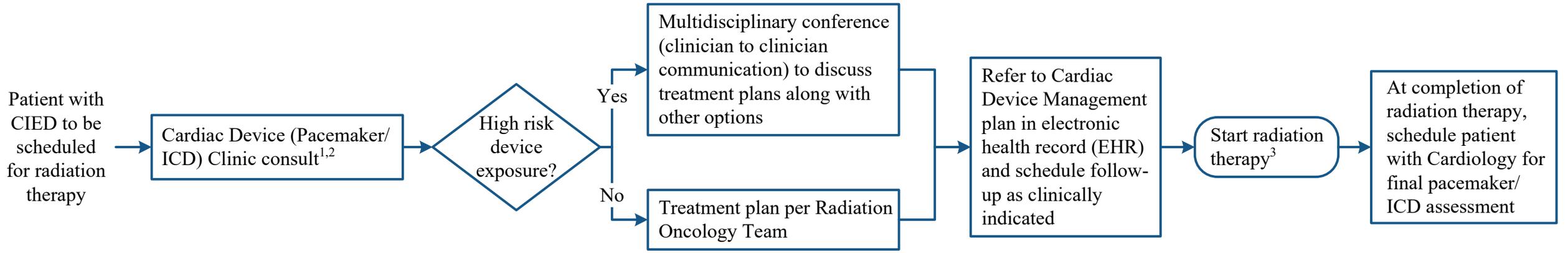
Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Note:** This algorithm is intended for outpatient use. For inpatients needing evaluation, please place "Cardiac Device Check Inpatient (Bedside)" order for the patient to be evaluated at bedside.

## RADIATION THERAPY

### PRIOR TO START OF RADIATION THERAPY

### POST- RADIATION THERAPY



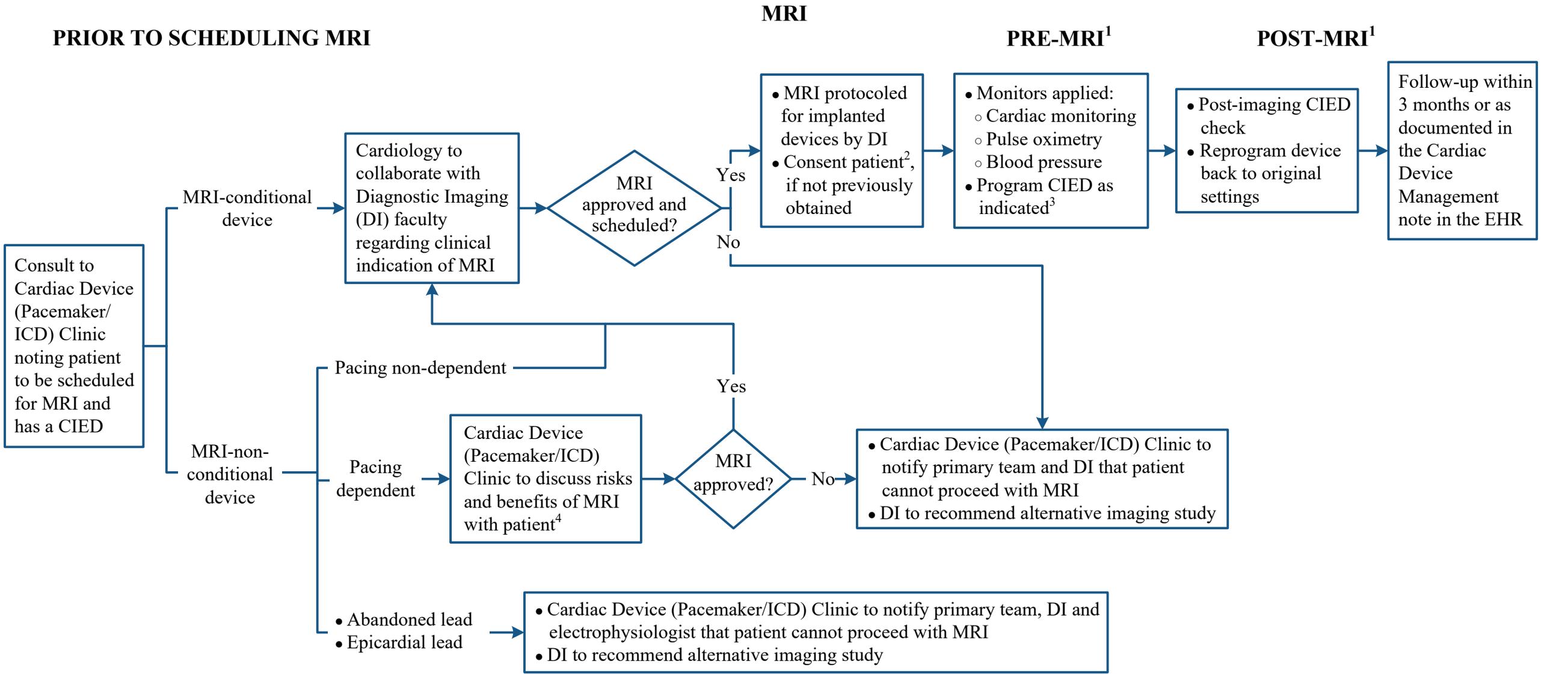
<sup>1</sup> Radiation dose specification and intended use of neutron producing beams (protons or photons  $\geq 10\text{MV}$ ) documented in clinic note is recommended prior to Cardiac Device (Pacemaker/ICD) Clinic consult

<sup>2</sup> Patients in the Houston Area Location (HALs) clinics receiving radiation therapy can be evaluated in the Cardiac Device (Pacemaker/ICD) Clinic or have a documented plan from an outside cardiologist

<sup>3</sup> Start radiation treatment in accordance with Division of Radiation Oncology Electronic Medical Device Clinical Policy

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Note:** This algorithm is intended for outpatient use. For inpatients needing evaluation, please place "Cardiac Device Check Inpatient (Bedside)" order for the patient to be evaluated at bedside.

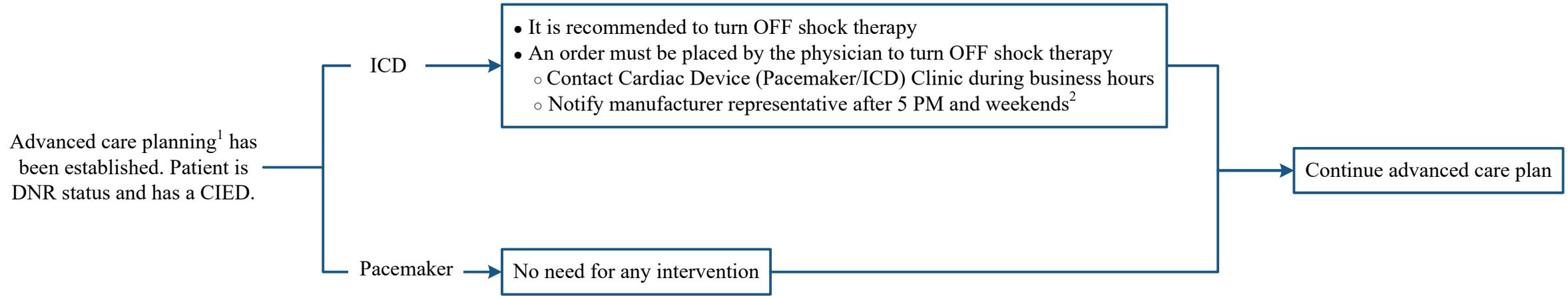


<sup>1</sup> An appropriate, qualified and credentialed clinician to monitor patient during procedure  
<sup>2</sup> Patient will need consent for MRI with CIED  
<sup>3</sup> Follow Cardiac Device (Pacemaker/ICD) Clinic's recommendations note  
<sup>4</sup> Ensure appointment is scheduled for discussion

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Note:** This algorithm is intended for outpatient use. For inpatients needing evaluation, please place "Cardiac Device Check Inpatient (Bedside)" order for the patient to be evaluated at bedside.

## PATIENTS WITH DO NOT RESUSCITATE (DNR) STATUS



<sup>1</sup> The advanced care planning discussion with the patient, or if clinically indicated, Patient Representative should clearly include and be documented whether or not shock therapy will be turned OFF

<sup>2</sup> Manufacturer's information may be obtained in the following manner:

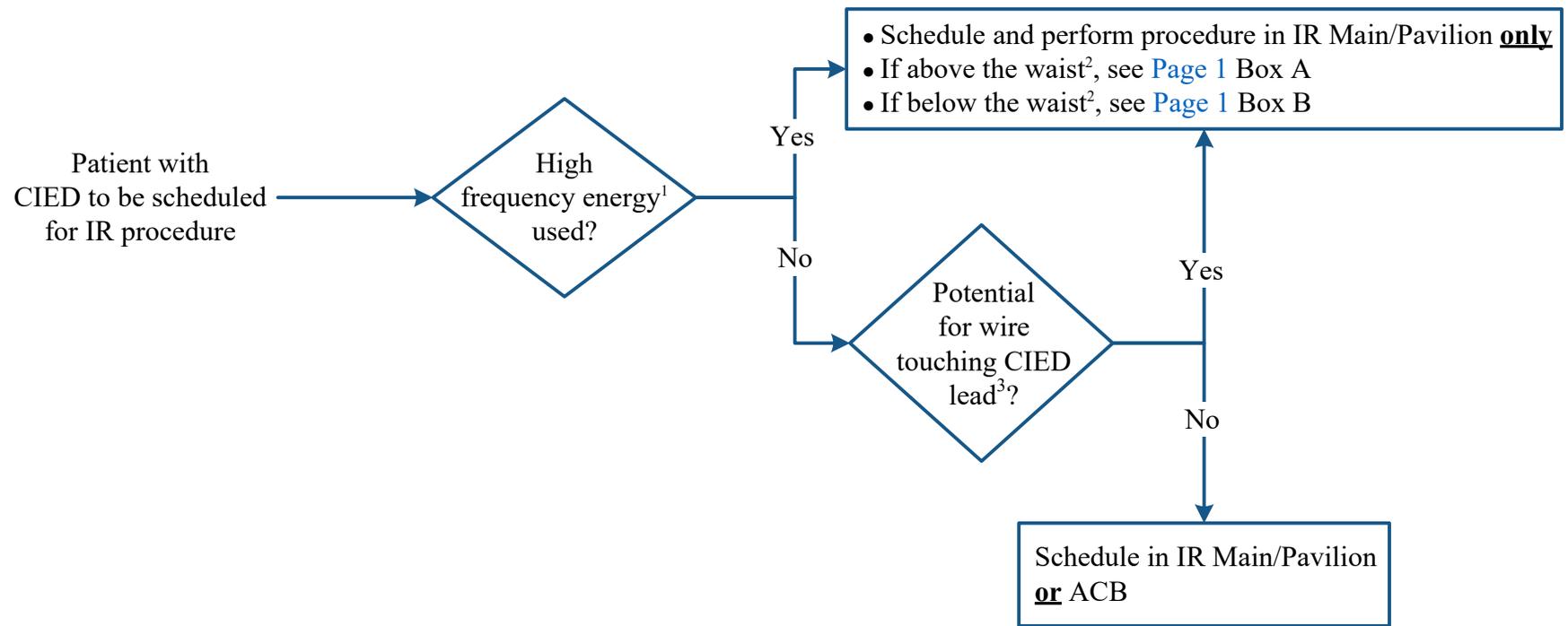
- Cardiac Device (Pacemaker/ICD) Clinic progress note
- Patient/Patient Representative has manufacturer's card

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

**Note:** This algorithm is intended for outpatient use. For inpatients needing evaluation, please place "Cardiac Device Check Inpatient (Bedside)" order for the patient to be evaluated at bedside.

## PRIOR TO IR PROCEDURE

## IR PROCEDURE



<sup>1</sup> IR Procedures with high frequency energy: includes, but not limited to, microwave ablation, radiofrequency ablation, kyphoplasty or irreversible electroporation (IRE)

<sup>2</sup> Abdominal implants: If surgery between thorax and pelvis, refer to *above* the waist; if outside thorax and pelvis, refer to *below* the waist

<sup>3</sup> IR Procedures with potential for wire touching CIED lead: includes, but not limited to, port placement, central line, inferior vena cava filter placement/retrieval, pulmonary embolism thrombectomy

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

## APPENDIX A: Conditions Under Which Post Operative/Procedure Interrogation is Not Necessary

1. Device is checked pre-operative/procedure and found to be working correctly, **and**
2. No programming of device took place peri-operative/procedure, **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

Pacemaker Manufacturer	Most Common Magnet Effect (For ranges listed below, the lower rate indicates a shorter remaining battery life)	Programmable (On-Off)
Biotronik	No sustained asynchronous pacing	Yes
Boston Scientific	Asynchronous pacing at 100 or 90 bpm	Yes
Medtronic	Asynchronous pacing at 85 bpm	No
Sorin	Asynchronous pacing at 85 - 96 bpm	No
St. Jude Medical	Asynchronous pacing at 86 - 100 bpm	Yes

### Defibrillator Magnet Application

Defibrillator Manufacturer	Most Common Magnet Effect (NO defibrillator has asynchronous pacing with magnet)	Magnet Confirmation	Programmable (On-Off)
Biotronik	Disables tachy therapy	None	No
Boston Scientific	Disables tachy therapy	Defibrillator will beep with each R wave or 1/second	Yes
Medtronic	Disables tachy therapy	None	No
Sorin	Disables tachy therapy	Change pacing rate to 90 bpm	No
St. Jude Medical	Disables tachy therapy	None	Yes

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

---

## SUGGESTED READINGS

- American Society of Anesthesiologists. (2020). Practice advisory for the perioperative management of patients with cardiac implantable electronic devices: Pacemakers and implantable cardioverter–defibrillators 2020: An updated report by the American Society of Anesthesiologists task force on perioperative management of patients with cardiac implantable electronic devices. *Anesthesiology*, *132*, 225-252. <https://doi.org/10.1097/ALN.0000000000002821>
- Crossley, G. H., Poole, J. E., Rozner, M. A., Asirvatham, S. J., Cheng, A., Chung, M. K., ... 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), 1114-1154. <https://doi.org/10.1016/j.hrthm.2010.12.023>
- Indik, J. H., Gimbel, J. R., Abe, H., Alkmim-Teixeira, R., Birgersdotter-Green, U., Clarke, G. D., ... Woodard, P. K. (2017). 2017 HRS expert consensus statement on magnetic resonance imaging and radiation exposure in patients with cardiovascular implantable electronic devices. *Heart Rhythm*, *14*(7), e97-e153. <https://doi.org/10.1016/j.hrthm.2017.04.025>

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.

## DEVELOPMENT CREDITS

This practice consensus statement is based on majority opinion of the Pacemaker workgroup at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

### Core Development Team Leads

Kaveh Karimzad, MD (Cardiology)

### Workgroup Members

Wendy Carazo, PA-C, MPAS (Interventional Radiology)

Ivy Cocuzzi, PA-C (Acute Care Services)

Jean-Bernard Durand, MD (Cardiology)

Olga N. Fleckenstein, BS<sup>♦</sup>

Gregory Gladish, MD (Thoracic Imaging)

Donelo Lopez Jr, MBA (Cardiopulmonary Center)

Zeyad Metwalli, MD (Interventional Radiology)

Sarah Mitchell, PA-C, MPAS (Interventional Radiology)

Elie Mouhayar, MD (Cardiology)

Paige Nitsch, MS (Radiation Physics – Patient Care)

Haley Shields, PA-C, MPAS (Interventional Radiology)

Teresa Simon, MEd, PA-C (Interventional Radiology)

Dilip Thakar, MD (Anesthesiology & PeriOper Med)

January Tsai, MD (Anesthesiology & PeriOper Med)

Darla Wagner, BSN, RN (Cardiopulmonary Center)

Hannah Warr, MSN, RN, CPHON<sup>♦</sup>

<sup>♦</sup> Clinical Effectiveness Development Team