

# Hard Stops in the Computerized Physician Order Entry Process to Improve MR Patient Safety

## Purpose-

- To highlight a Hard Stop system in MR ordering.

## Educational Objectives-

- Learn how Hard Stops can reduce unwanted events.
- Show how to integrate Hard Stops into the Computerized Physician Order Entry (CPOE).

## Materials and Methods-

- In the past, ACR safety guidelines were employed for patients with Cardiovascular Implantable Electrical Devices (CIEDs), denying access to zone III of the MR suite<sup>2</sup>.
- Despite the guidelines, a few close calls still occurred where patients arrived only to be halted by technicians who noted unreported pacemakers.
- In conjunction with IT and Cardiology, a hard stop system was implemented.
- The CPOE automatically prompts the ordering provider to contact the cardiologist when an MR-Unsafe or Conditional CIED is reported.
- The cardiologist assesses the device model number and documents placement in safe mode and at what time the device will return to original settings.
- The documentation is electronically transferred to the MRI questionnaire for the technicians to view and for the radiologists to give their approval.
- A clinician attestation must then be signed to complete the order.

## Summary-

A Hard Stop system **boosts confidence** in MR orders and **reduces adverse events** for CIED patients. Orders that are hard stopped may impede the workflow, so interdepartmental communication and collaboration is essential<sup>1</sup>. The technologists are still gatekeepers and reassess and screen all patients prior to having them enter the MR exam room.

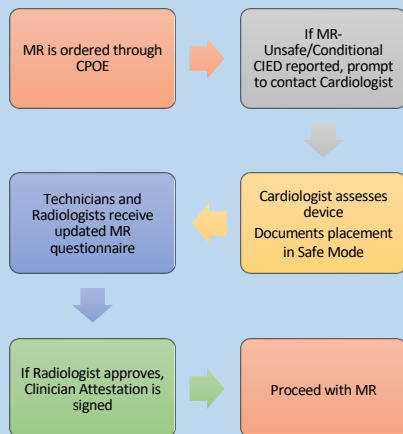


Figure 1: A flow chart depicting the Hard Stop progression in MR ordering.

| CIED MR Safety Category              | Description                                                                                                            |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Unsafe 1<br><b>(CONTRAINDICATED)</b> | Object poses the threat of dislodgement in presence of the MR system.                                                  |
| Unsafe 2<br><b>(CONTRAINDICATED)</b> | Object does not pose threat of dislodgement. However, other potentially hazardous conditions may occur.                |
| Conditional 5                        | Object is acceptable for MR procedure <b>ONLY</b> if specific manufacturer guidelines or recommendations are followed. |

Table 1. Safety Categories: If CIED falls under Unsafe 1 or 2, MR is **CONTRAINDICATED**. If CIED falls under Conditional 5, Cardiologist must first place device in Safe Mode in order to proceed<sup>3</sup>.

- Alert Summary
 

| Ack...                              | View...                             | Do...                               | Alert                               | Priority | Type        | Comment | Scope |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------|-------------|---------|-------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | MRI approval or Finalization of the | HIGH     | WARNING     |         | Chart |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Acknowledge Continuous Cardiac      | HIGH     | USER NOTICE |         | Chart |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | MRI Contraindications               | LOW      | REMINDER    |         | Chart |
- \*\*\* NOTE \*\*\*  
PLEASE SCREEN PATIENT FOR MRI CONTRAINDICATIONS PRIOR TO ENTERING ORDER \*\*Defibrillator Pacemaker or Cerebral Aneurysm clips are CONTRAINDICATED for all MRI Procedures\*\*
- Alert: MRI Contraindications  
Message: You cannot order an MRI. This patient has had a Pacemaker entered on the visit below.  
Expand  
Admit Date : 12/16/2019  
Visit ID : 7217326
- Comment History  
Comments  
pt has pacemaker that was set to mri mode for the scan  
MRI CERVICAL SPINE W/O CONTRAST
- Alert: MRI approval or Finalization of the MRI document has not been done.  
Message: Documentation of MRI approval or Finalization of the MRI document has not been done. You cannot enter order until document modifications are addressed.  
Expand  
You may not proceed with this MRI Brain w/Contrast  
Acknowledge << Previous Alert 1 of 3 Next >>

## Hard Stops in the CPOE: Step by Step

- If the EMR detects a pre-existing mention of CIED, an alert is shown before an order is even placed.
- Upon attempting to enter an MR order, there is a reminder to pre-screen patient for MR contraindications, regardless of CIED status.
- The CPOE will deny MR order entry if there is a previously confirmed CIED, and a Contraindication Alert is given.
- The ordering provider must contact the cardiologist, who can then assess and place the CIED in Safe Mode. This action is documented.
- The Radiologist must then sign the approval attestation.
- The order entry may now continue. The ordering provider must include the name of the attesting Radiologist for finalization.

PATIENT HISTORY:  
Is there a history of any of the following. Check ALL that apply

|                                     |                                        |
|-------------------------------------|----------------------------------------|
| Cardiac Pacemaker                   | Any type of internal electro           |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>    |
| Aneurysm Clip(s)                    | Internal hearing aid                   |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>    |
| Implanted Insulin pump              | Cochlear implant                       |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>    |
| Implanted drug infusion device      | Graniturble coil (spring embolus coil) |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>    |
| Bone growth stimulator              | Any type of biosimulator               |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>    |
| Neurostimulator (TENS-Unit)         |                                        |
| <input checked="" type="checkbox"/> |                                        |

Exposure to small metal silver?  
 No

Is Patient Unconscious?  
 No

Name of Radiologist  
MRI Approved by Radiologist