The Framework of a Robust, System-wide Magnetic Resonance Safety Program

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**Introduction, Purpose and Objective**

**IDENTIFIED KEY COMPONENTS TO ALIGN BEST PRACTICES**

- Physical layout and patient screening are critical in reducing adverse events in MRI.
- Demand for MRI services has increased as well as the number and complexity of active implanted medical devices (AIMD).

**LARGE, COST-CONSCIOUS HEALTHCARE SYSTEM**

- Diverse patient population implanted with complex passive and active devices
- Operates 22 MRI units at 17 locations

**MR SAFETY PROGRAM**

- MR Medical Director (MRMD)
- MR Safety Expert (MRSE / Internal MR Physicist)
- Lead MR Safety Officer (MRSO)
- MR Safety Expert Improvement Team (EIT) comprised of Radiology Leadership, Risk Management, and Process Improvement members
- Certified MRSO or appropriate representative (MR Safety Associates) at each MRI facility. Under the direction of the Lead MRSO, MRMD, and MR Leadership

**ADOPTION OF AN INTEGRATED MR SAFETY PROGRAM IS ACHIEVABLE. LET US SHOW YOU!**
Investment in an expert, proactive MR Safety Program adds value to a cost-conscious Healthcare system.

- Collected data provides key performance indices to justify the effort and cost of a robust MR Safety program.
  - Can be evaluated in real-time, providing leadership with insights into the load balancing of the thorough preemptive safety review tasks performed by the program.
  - Provide reasonable and timely access for patients
  - Quality imaging study done safely
  - Cost-efficient operation
Material & Methods

Upon placement of an MRI order, the patient completes a comprehensive MRI screening questionnaire via a scheduling representative or secure electronic patient portal.

Based on questionnaire answers, MRI orders are flagged for safety review based on positive answers to certain questions:
- Scheduling of the MRI is temporarily held unless emergent and approved by MR Safety/Radiologist

Screening answers are reviewed by MR Safety team member (MRSO):

Data metrics identified and tracked electronically:
- Primarily based on outpatient MRI orders (Total MRI referrals)
- Total number of safety reviews performed
- Number of patients with contraindications for MR studies
- Number of patients allowed to proceed but have implants that need ancillary support from a vendor representative or specialty physician

Primary Metrics:
- Revenue loss avoided by last-moment MRI appointment cancellations due to safety contraindication
- Avoidable delays due to device research and coordination with staff and patient

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Patients identified with potential safety concern

MRSO Team review

Cases with identified concerns

Scheduler screening

Total MR Referrals

87,115

16,419 (18.8%)

Patients cleared for scan. no delays or cancellation 14,375 (88%)

2,029 (12%)

12 Month period (10/9/21 – 10/10/22)
Total Margin
Loss
Avoidance
(TMLA)

Internal Financial Analyst consultation

- If a patient shows up for an MRI that cannot be performed at that site due to an implant or other safety concern, the exam is denied or severely delayed. MRI unable to immediately backfill. Results in an unused MRI appointment.
- What is an MRI timeslot worth?

Net Margin per Unit of Service (UOS)

- Based on where MRI was performed
  - Hospital location = $840/exam
  - Ambulatory/outpatient location = $360/exam
  - Unable to proceed (Do Not Scan) = $600*
- Average per MRI exam
  - Includes CMS and all accepted commercial insurance payments
  - Based on completed exams ONLY

*No MRI performed. Value calculated by averaging UOS for hospital and ambulatory locations
Proceed with Vendor/Physician support
Annual TMLA summary

MRI Safety Officer Volumes

*Margin per QOS applied to studies needing physician/vendor support or flagged as "Do not proceed"
**Applied margin based on completed exams only, $840 per GR/Hospital exam, $360 per offline exam, and $500 per exam screened as "Do Not Proceed"

Screening Decision and Cost Savings

<table>
<thead>
<tr>
<th>Screening Decision</th>
<th>Vendor/Physician Support Required for Pacemaker/ICD?</th>
<th>Margin Loss Avoided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not proceed</td>
<td>No</td>
<td>$313,800</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>$23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
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<tr>
<td>Proceed</td>
<td>No</td>
<td>$45,600</td>
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<td></td>
<td>Yes</td>
<td>$95,760</td>
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<tr>
<td></td>
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<td>$13,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>181</td>
</tr>
<tr>
<td></td>
<td></td>
<td>147</td>
</tr>
</tbody>
</table>

Grand Total

Total Margin Loss Avoided

$1,225,800

Total Number of Patients Screened

16,419

*Courtesy of www.tableau.com
## Benefits of comprehensive MRI Safety program

<table>
<thead>
<tr>
<th>Maximized access to MRI for patients within and outside hospital system</th>
<th>Cost savings based on efficient MR slot utilization</th>
<th>Standardized and rigorous MR safety screening and awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI Safety program pays for itself by making entire MR enterprise more efficient</td>
<td>Data shows value of adopting an MRI Safety program and can also be used to highlight areas for process improvement.</td>
<td>Lessons learned from reported Zone 4 infractions, “good catches”</td>
</tr>
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