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# Reliable Projectile Hazard Reduction in MRI

Presented by:  
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## Project Objective

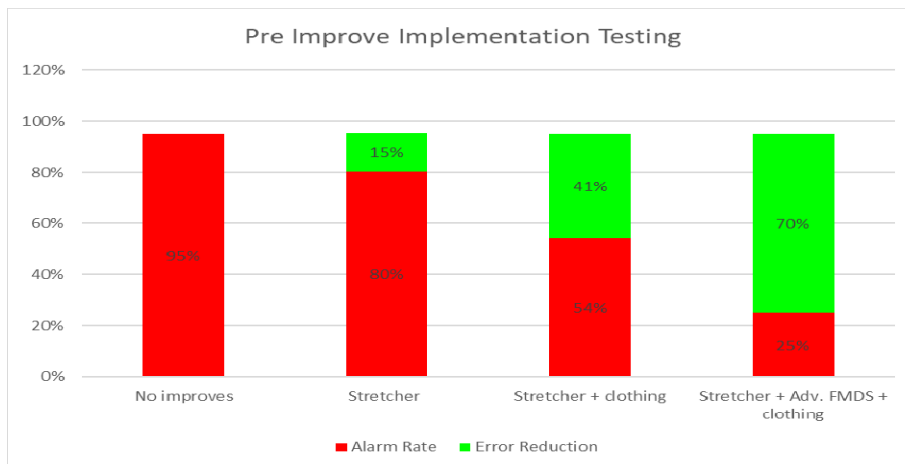
- At the creation of this initiative the Ferro-guard sounded an alarm 95% of the time someone entered from MRI Zone III into Zone IV.
- Observations indicated that there were approximately 300 defects per day per machine in the MRI suite that contains 4 MRI machines. A total of approximately 1,200 alarms per day.
- The primary goal of this project was to decrease the daily alarm rate from 95% to 5% thus reducing alarm fatigue and making alarms more meaningful.

Additionally, approximately 16 times a year an incident with the potential to cause harm occurred.

- The secondary goal of this project was to reduce harmful incidents by 100% so zero harmful incidents occur.



## Our Recipe for Success



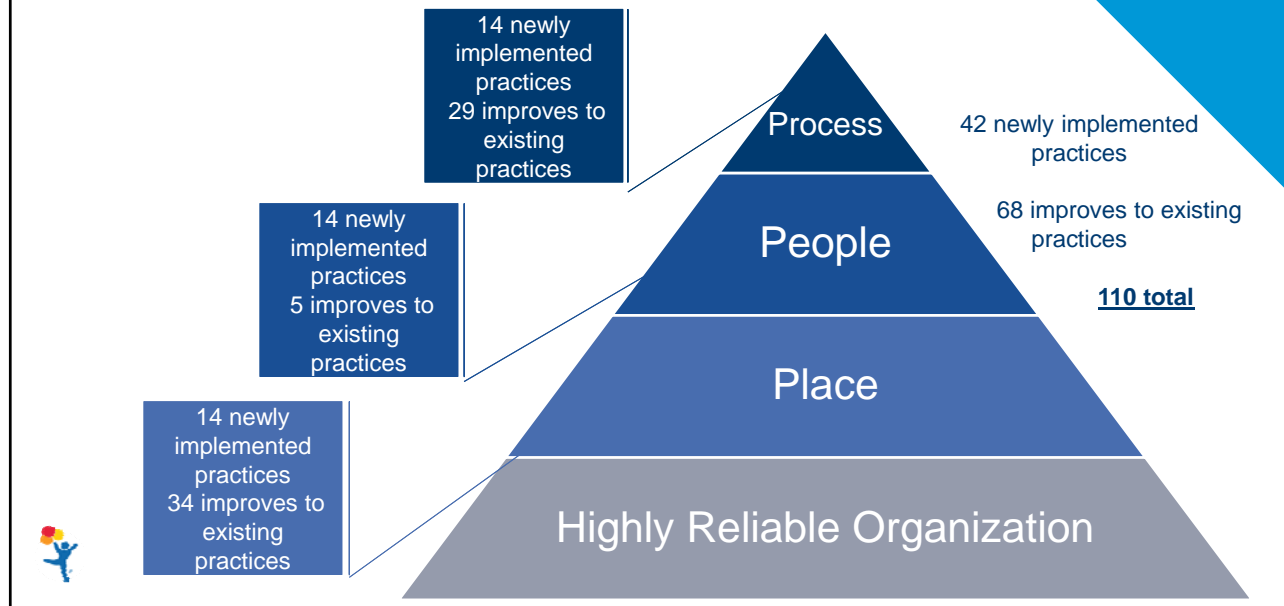
Kaizen event held March 2017

- 3 major improves selected:
1. Upgrade FMDS
  2. Ferrous free stretchers
  3. Ferrous free clothing policy

Prior to implementing these changes were beta tested for potential results in various combinations



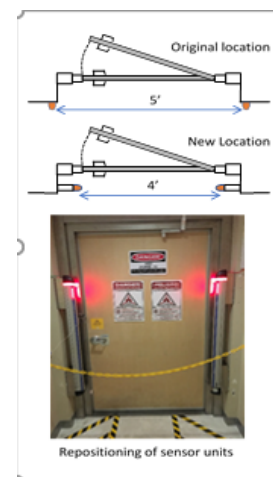
## Creating a Highly Reliable Organization



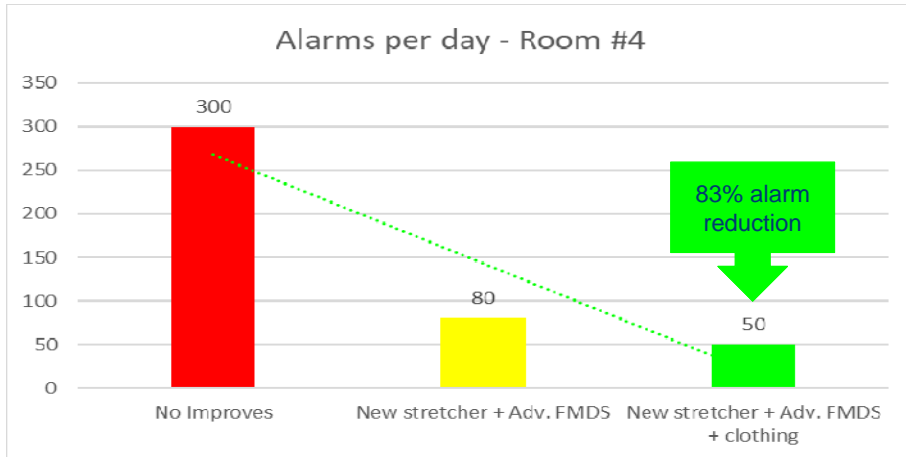
## Plan Do Study Act – PDSA's

Total of 11 PDSA testing sessions completed from 9/1/17 to 7/31/18

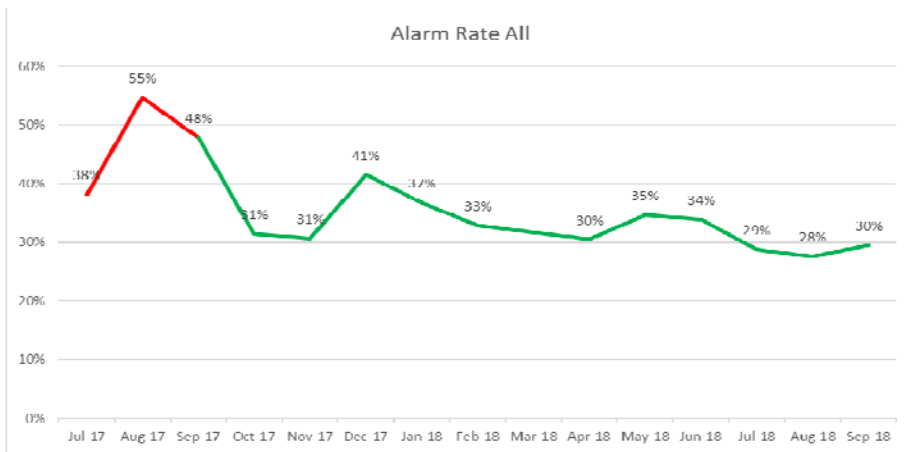
- MRI room 4 selected as beta for upgraded FMDS
- Two leading manufactures systems installed and tested
- 4 - 6 hour sessions on average per session
- Testing on "old" and "new" FMDS system
- Each session of testing required multiple "walk through's" of sensor on door
- Adjust system sensitivity during each session to achieve optimal setting
- Sensors in system modified
- Moved location of sensor poles 2x
- Custom brackets built to move sensors approx. 12" closer in doorway



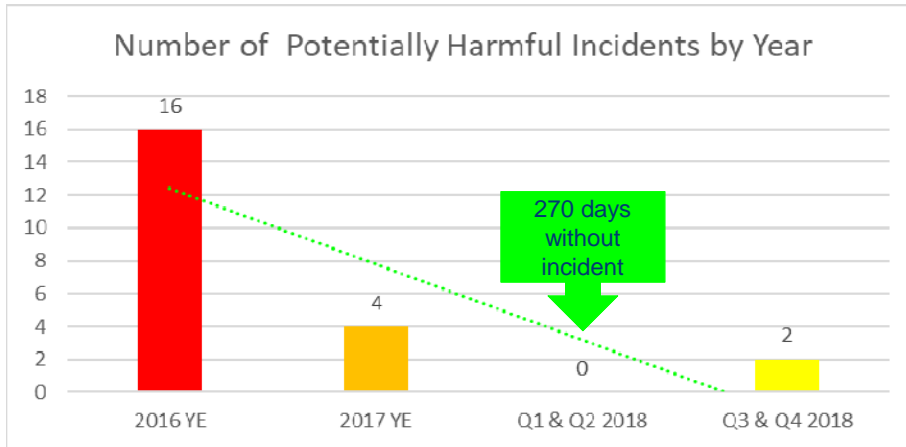
## Post Improve Data - Alarms



## Post Improve Data – Alarms Over Time



# Post Improve Data – Harmful Incidents



**MRI Safety Reform: Final A3**

**Background and Problem Statement:**  
 In May 2016 a patient family member progressed into MRI Zone IV with a pocket knife on his person. The strong magnetic pull caused the pocket knife to be violently removed from his clothing, open to expose the sharp blade and hurtle into the bore of the magnet. Despite employing technology intended to perform screening, alarm fatigue is apparent, therefore staff members are not responding to alarms as expected.  
 1) Observations indicate that there are approximately 300 alarms (defects) per day in the MRI suite that contains 4 MRI machines (approximately 1,200 total).  
 2) Observations indicate that there are 16 defective incidents with the potential to cause harm annually within the MRI suite that contains 4 MRI machines

**Project AIM:**  
 1) The primary goal of this project is to reduce the number of defective harmful incidents by 100% from 16 to 0 annually by year end 2017.  
 2) The secondary goal of this project is to reduce the daily defects overall by 95% from 300 per machine to 15 per machine within the MRI suite space by year end 2017.

**Key Interventions:**

Place	People	Process
<ul style="list-style-type: none"> <li>5S – removal of unsafe items from Zone III</li> <li>Ferrous free stretchers</li> <li>Upgraded Ferro-magnetic detection system</li> <li>Exit only doors</li> </ul>	<ul style="list-style-type: none"> <li>Ferrous-free clothing</li> <li>Improved MRI safety pre-screening</li> <li>Limited access to Zone III</li> <li>Departmental goals tied into prescreening audit</li> </ul>	<ul style="list-style-type: none"> <li>Updated dress code policy.</li> <li>Prescreening checklist added into EPIC</li> <li>3 times daily Safety walk through of Zone III</li> <li>Multiple metal timeout</li> </ul>

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**September 2018**

**Project Results / Performance:**

**Alarms per day - Room #14**

Two Proportions - July 2017 through Sept 2018 P-Value = 0.000

**Number of Potentially Harmful Incidents by Year**

Chi-Square: 2016 through Sept 2018 P-Value = 0.005

**Primary Improvements**

1 Ferrous-free stretchers

2 Upgraded FMDS

3 Ferrous-free clothing

**Challenges and Barriers:**

Pediatric patient population	Physical setup of MRI suite
Culture Change	Change Management
Current FMDS technology	Ferrous-free product availability
Cost of making changes	Maintaining productivity in MRI modality
Time commitment vs. Urgency	Interdepartmental support
Sustaining change over time	External threats

**Lessons Learned:**

- Limits of the current FMDS technology at project start – product optimization timeline
- Imperative to have a multidisciplinary team for project to be successful
- Secondary improvement goal was set too aggressive – continuing to work towards alarm reduction

Key Measures	Definitions	Baseline	Goal	Progress
Outcome	Reduce annual harmful incidents	16	0	Q1 & Q2 2018 = 0 Q3 & Q4 2018 = 2
Process	Reduction of daily false alarms	95%	5%	30% September 2018
Balancing	Maintain productivity	Current productivity	Maintain current	No change
Financial	No negative impact to WHPUOS	Current WHPUOS	Maintain current	No change