

Problem Statement

Report Number	Example	RCA Owner	Brian Hughes
Report Date	6/19/2015	RCA Facilitator	Brian Hughes

Focal Point: Potential injury/fatality to patient and/or staff - loss of equipment 5 days

When

Start Date: 6/15/2015

End Date: 6/19/2015

Start Time: 11:30AM

End Time: N/A

Unique Timing

After a ferrous oxygen bottle was pulled into the magnet of an MRI scanner when patient and staff were in the magnet room.

Where

Company

Example Company

Site

Example Site - Radiology/Imaging

Equipment

MRI Scanner

Actual Impact

Safety	No actual safety impact to staff or patient(s)	\$0.00
Risk Score	3 - Major (Per NPSF Guidelines, due to damaged equipment - not actual patient or staff injury)	\$0.00
Revenue	Shut down production 5 days to respond to event (estimated \$100,000/day)	\$500,000.00
Cost	Minimal costs to respond (estimated)	\$500.00

Actual Impact Total: \$500,500.00

Frequency

1 times Overall

Frequency Note

This is the first event of this type at this location. There are several examples of similar incidents that have resulted in both injuries and fatalities at other sites around the world.

Potential Impact

Safety	Potential serious injury or fatality to staff and patient(s)
Revenue	Potential for extensive shutdown of facility
Cost	Potential costs in the millions, unable to estimate
Risk Score	3 - Catastrophic (Per NPSF Guidelines)

Potential Impact Total: \$0.00

Report Summaries

Executive Summary

Recently an MRI center experienced a near-miss event when a ferrous oxygen bottle was pulled into the magnetic bore of an MRI machine. The patient and staff were present in the magnet room at the time of the event, although not in the line of fire between the oxygen cylinder and the magnet. They were also exposed to helium gas released when a staff member initiated emergency shutdown of the magnet. A risk assessment determined that this was a potentially catastrophic (SAC Matrix score = 3) event, which could have resulted in serious injury and/or fatality.

Summary of Solutions*:

*Detailed solutions listed below

Stronger Actions:

1. Reconfigure the existing space to best reduce risk of ferrous object intrusion.
2. Visibly mark site-supplied, non-ferrous oxygen bottles.
3. Install a ferrous metal detection device.
4. Acquire professional MRI safety expertise.
5. Retrofit the facility to include supplied oxygen.

Intermediate Actions:

1. Develop/modify the pre-admission checklist that includes consideration of patient-supplied oxygen and whether or not it is needed during the MRI procedure.
2. Upon arrival, assess all patient belongings and ensure that all ferrous materials are declared.
3. Flag patients in the system who require supplied oxygen. Replace all patient-supplied oxygen bottles with marked site-supplied non-ferrous bottles.
4. Proactively address risks of increasing the number of scans.
5. Peg production levels to staffing. Develop a safe patient/staff ratio.
6. Obtain MRI emergency training, including periodic drills.

Cause and Effect Summary

Recently an MRI center experienced a near-miss event when a ferrous oxygen bottle was pulled into the magnetic bore of an MRI machine. The patient and staff were present in the magnet room at the time of the event. They were not in the line of fire between the oxygen cylinder and the magnet, and therefore were not struck by the flying cylinder. They were also exposed to, but not injured by, helium gas released when a staff member initiated emergency shutdown (also called “quenching”) of the magnet. A risk assessment determined that this was a potentially catastrophic (SAC Matrix score = 3) event, which could have resulted in serious injury and/or fatality.

Facility Shut Down Five Days:

The staff initiated an emergency shutdown because they were concerned that the oxygen bottle would rupture or explode. This assumption was incorrect – bottle-rupture was not a risk. The staff has not been trained in MRI

emergency response. No emergency drills are conducted. There is also no designated MRI Safety Officer.

The emergency shutdown damaged the MRI machine, requiring five days to repair. No scans were completed during this time.

Ferrous Oxygen Bottle Not Detected:

The patient was admitted to the magnet room with his own bottle of supplemental oxygen. This bottle was made from ferrous material. The staff utilizes a pre-scan checklist to identify ferrous items, but this list does not address supplemental oxygen bottles. The facility normally would supply non-ferrous oxygen bottles to patients for the duration of their visit, but confusion during check-in caused them to miss this one. Compounding the issue, ferrous oxygen bottles look very similar to non-ferrous bottles, which makes them difficult to visually identify. By the time the patient was ready to enter the magnet room, the staff assumed that all ferrous objects had been accounted for and removed.

There is no ferrous metal detection system in the MRI suite. The Ordering Physician did not consider whether the patient could discontinue supplemental oxygen during the MRI procedure. And the facility is not configured with four progressively safer zones per ACR recommendations. It was constructed prior to the four-zone recommendation and existing space constraints preclude it from being reconfigured.

Schedule Pressure:

The staff was very busy during the admission procedure for this patient - they were three scans behind schedule and were trying to catch up. A second MRI technician had to leave work due to illness. No additional staff was available to replace the sick technician. At the time, the facility was not meeting target quality/timeliness metrics. It has experienced a 50% increase in number of scans conducted this year. Managing this growth has proved to be challenging. This growth represents a potential systemic risk that should be examined further in a separate investigation.

- END OF SUMMARY -

Solutions

SO-0007	Solution	Stronger Action: Reconfigure the existing space to best reduce risk of ferrous object intrusion.	
	Cause(s)	Space constraints - size will not accommodate 4 zones	
	Note	There may be space constraints, but that does not mean that the existing space cannot be optimized to reduce risk.	
	Assigned	Chris Eckert;	Criteria Passed
	Due	6/21/2015	Status Approved
	Term	long	Cost \$100,000.00
	SO-0011	Solution	Stronger Action: Visibly mark site-supplied, non-ferrous, oxygen bottles.
Cause(s)		Ferrous O2 containers are not visually different from non-ferrous containers	
Note		Use stickers, paint, tags, and/or other means to visually identify site-supplied oxygen bottles.	
Assigned		Brian Hughes;	Criteria Passed
Due		6/28/2015	Status Approved
Term		short	Cost \$500.00
SO-0005		Solution	Stronger Action: Install a ferrous metal detection device.
	Cause(s)	No ferrous metal detection system in MRI Suite	
	Note	Be sure to include recommended testing and maintenance schedule. Using a ferrous metal detection device may cause the staff to over-rely on it.	
	Assigned	Melani Egbert;	Criteria Passed
	Due	6/21/2015	Status Approved
	Term	medium	Cost \$5,000.00
	SO-0006	Solution	Stronger Action: Acquire professional MRI safety expertise.
Cause(s)		No MRI Safety Officer designated	
Note		Either hire or train an MRI Safety Officer. Consider using contractor if no internal candidates are available.	
Assigned		Chris Eckert;	Criteria Passed
Due		6/21/2015	Status Approved
Term		medium	Cost \$50,000.00

SO-0002	Solution	Stronger Action: Retrofit this facility to include supplied oxygen.
	Cause(s)	Portable oxygen required: No piped O2 available in MRI Suite
	Note	This can occur during major upgrades planned in the future. Once installed, do not allow patient-supplied oxygen bottles into exam room.
	Assigned	Chris Eckert; Criteria Passed
	Due	6/21/2015 Status Approved
	Term	long Cost \$50,000.00
SO-0001	Solution	Intermediate Action: Develop/modify the pre-admission checklist that includes consideration of patient-supplied oxygen and whether or not it is needed during the MRI procedure.
	Cause(s)	Physicians not prompted to address O2 discontinuation during procedure
	Note	Be sure to weigh the risks of discontinuing oxygen treatment as well.
	Assigned	Brian Hughes; Criteria Passed
	Due	6/26/2015 Status Approved
	Term	short Cost \$500.00
SO-0003	Solution	Intermediate Action: Upon arrival, assess all patient belongings and ensure that all ferrous materials are declared.
	Cause(s)	Ferrous O2 containers are not visually different from non-ferrous containers Pre-scan checklist does not address type of oxygen cylinder being used
	Note	Include a checklist that the receptionist walks through with the patient. Cost estimate assumes that this will increase patient processing time.
	Assigned	Cory Boisoeneau; Criteria Passed
	Due	6/21/2015 Status Approved
	Term	short Cost \$5,000.00
SO-0004	Solution	Intermediate Action: Flag patients in the system who require supplied oxygen. Replace all patient-supplied oxygen bottles with marked site-supplied non-ferrous bottles.
	Cause(s)	Patients use their own equipment
	Note	This note will prompt the receptionist to ask the patient specifically about the oxygen bottle type. Be sure that the receptionist knows exactly how to distinguish a ferrous vs. non-ferrous oxygen bottle.
	Assigned	Cory Boisoeneau; Criteria Passed
	Due	6/21/2015 Status Approved
	Term	short Cost \$0.00
SO-0008	Solution	Intermediate Action: Proactively address risks of increasing the number of scans.

Cause(s)	50% increase in number of scans this year		
Note	As the number of scans increases, strain is put on the entire system. This leads to greater risks - both to patient and staff safety as well as to the ability of the facility to complete scans. Program system flags to reassess risks as capacity is consumed.		
Assigned	Melani Egbert;	Criteria	Passed
Due	6/21/2015	Status	Approved
Term	medium	Cost	\$2,500.00

SO-0009	Solution	Intermediate Action: Peg production levels to staffing. Develop a safe patient/staff ratio.	
	Cause(s)		
	Note	Patient capacity is relatively fixed given human and non-human resources. When resources are reduced, this facility needs to reduce and reschedule number of procedures.	
	Assigned	Cory Boisoneau;	Criteria Passed
	Due	6/21/2015	Status Approved
	Term	short	Cost \$2,500.00

SO-0010	Solution	Intermediate Action: Obtain MRI emergency training, including periodic drills.	
	Cause(s)	Training and emergency drills are not conducted in MRI Unit	
	Note	Implement a certification and ensure that employees keep their skills sharp. Periodically drill employees to maintain effectiveness.	
	Assigned	Melani Egbert;	Criteria Passed
	Due	6/21/2015	Status Approved
	Term	medium	Cost \$10,000.00

Chart Key

- Primary
- Secondary
- Terminatory
- Non-Terminatory
- Unidentified
- Other Quality Alert
- Out of Scope
- External
- Internal

