The extra challenges in today's healthcare environment

- More implanted devices in our patient population
- Greater sophistication of those devices
- Faster and more complicated pulse sequences and scanner capabilities
- Less time to make decisions and attend to parameter controls in conditional devices
  - Concerns for more efficiency
  - Patient comfort and ability to tolerate the exam
  - Multi-tasking with other job duties

HOW IS IT THAT WE KEEP EVERYONE SAFE?
WHOSE RESPONSIBILITY IS THAT?
The answer is complicated

MRI and metal in our subjects/patients

- Both clinical and research patients come to the MR exam with varying levels of complexity.
- Surgical interventions
- Clothing
- Ancillary equipment
- Those subjects who have internal or external devices may be affected by the magnetic field or radio frequency and can be an issue in the MR environment.
- EM field interactions=Big Safety concerns
- Much to the displeasure of everyone, there is no black and white answer to the question
  - IS THIS (XXXXXXXX) SAFE FOR MRI?
- It can be dangerous to have a MR exam without careful attention to conditions and scan parameters

The job at hand

- Screen patients for MR safety-
  - Verbally, Visually, and in Writing (or digital documentation)
  - Ferrous Metal Detection (FMD)
- Investigate any surgery or procedures they might have had in their whole life
  - Medical Records
  - Family/caregiver information
  - Documentation-
    - Implant Cards
    - MD reports
Investigate Results of the Screening process
- Determine if any of their answers constitute a safety concern.
  - Research on-line
  - Call the vendor
  - Other diagnostic testing
- If there is a concern, what are the risks? What is the benefit of the exam?
  - Complicated decision to proceed (or not) with the exam-
    - Input from MRSE and MD before the exam
- How do we meet the conditions of the device and perform a quality test?
  - Pre/before the scan
  - During the exam
  - Post/After the scan

MR Safety Decision Tree
- MR Conditional Labeling:
  - MR Safe
  - MR Conditional
  - MR Unsafe
- Safe-Scan
- Conditional-Maybe scan
- Unsafe-Potentially scan???

MR Exam preparation
- What are the conditions?
  - Patient prep before exam
    - Intervention by another service
    - Patient/device interaction (turn off/on)
    - Potential wait time before and after exam
  - Scanning safety
    - Scanner limitations
    - Exclusion zones
    - RF, gradient, or scan time limits
  - Post exam follow up
    - Patient may need device interrogated or switched into working mode after the exam

Risk versus benefit
- Should always be done as a team
  - MRSO-Determines the vendor recommendations, patient condition, scanner capabilities
  - MR expert-Lays out all the risks and potential safety concerns
  - MRMD- weighs those risks and the benefit to the patient of the exam and makes the ultimate decision about performing the exam

The Safety Committee
- Consists of at least:
  - MRSO-Usually a technologist
  - MRSE-Usually a physicist
  - MRMD-Usually a radiologist
- Takes responsibility for MR safety administratively and directs day-to-day operations
- Writes, maintains and oversees MR safety policy and QA processes
- Deals with incidents, regulatory inspections and hospital policy

MR SAFETY IS NOT ONE PERSON OR ONE ROLE
IT IS A TEAM OF PEOPLE WHO WORK TOGETHER TO ENSURE PATIENT SAFETY

IT’S A TEAM EFFORT

https://www.healthecareers.com/article/healthcare-news/interdisciplinary-healthcare-team

The Safety Committee
MRSO-MR Safety Officer

Why do we need this role
Who should/does fill this role
How is the role defined and what is the operational responsibilities

Definition
Magnetic Resonance Safety Officer
The person in charge of day to day MR safety workflow
Works as part of a team that includes a physicist and a radiologist
Makes the first pass decision
Oversees and helps to write/implement policy
Educates staff and other hospital personnel
  Level 1
  Level 2
  Other ancillary basic or advanced training

Responsibilities
Resource for technologist questions
Helps with researching implants, conditions and patient history
Designs, implements and manages safety workflow with input from the safety committee
Trains, teaches, maintains knowledge of industry changes, updates and issues

Developing a Safety Program
Policies, procedures and processes
  Review and update policies at least annually
  Good clear concise procedures-Complicated workflows are hard to implement
  Make sure everyone knows the process and at least is aware they should be following it!
  Staffing-MRSO is seldom a position, but usually an additional role for a technologist who is already busy
    For effective safety practice this position needs protected time
  Research, volunteers, new equipment, Zone 4 labeling, etc.

ACR Required Policies
MR Safety related
  Screening and changing patients
    Ferrous metal detection*
  Level 1 & 2 training
  Safety Officer and MD
  Zones, Restricted access
  Hearing Protection
  Unforeseen/unknown metal
  Quench
  Pregnant patients
  Heating and preventing RF burns
Coloring outside the lines

- When your Risk/benefit equation tips to the Benefit side for complicated exams/implants
- Clearly define the risks and understand how to best mitigate them
- All the information we can garner about the implant, patient condition, pre/post scan preparation
- Design the best scan parameters to obtain the exam needed
- Ensure all emergency procedures are in place

Issues for further development

- Role definition
  - Although much work has been done there is still many different job descriptions in the world
  - Making the argument to management and the MR community in general that this is a much needed position *(NEEDS DEDICATED TIME)*
- Better tools for tracking of implanted devices
- Training and education
  - There is education but not a clear pathway or universally agreed upon material
  - Referring clinician, patient and hospital staff knowledge and understanding for MR safety and its impact on patient care

References

- ACR white paper on MR safety 2013
- FDA
  - [https://www.fda.gov/radiation-emitting-products/mri-magnetic-resonance-imaging/information-industry](https://www.fda.gov/radiation-emitting-products/mri-magnetic-resonance-imaging/information-industry)
- ISMRM white paper on MR safety roles
  - [ismrm.org/smr/safety](https://www.ismrm.org/smr/safety)