

Implementation of a Comprehensive MR Safety Course for Medical Students

Steffen Sammet¹

¹Department of Radiology, University of Chicago, Chicago, Illinois, United States

Purpose

This educational electronic poster outlines the design of an educational MR safety module with a concise multiple choice exam for instructing medical students about basic MR and patient related safety. The MR safety course can be implemented as a traditional didactic lecture, interactive, or self administered online. The goal of the course is to make sure that medical students get a basic understanding of MR principles and safety considerations. It prepares the medical students for optimal ordering of MR studies while emphasizing patient screening and safety. A standardized multiple choice exam, accessible through the internet and the program ExamWeb (Exam Web, LLC; Newport Beach, CA) at the end of the course documents the proficiency of the medical students. The course can be used universally by all medical school programs and will help to ensure consistent quality of teaching materials and MR safety standards.

Outline of Content

- 1.) Course description and examples of implementation
- 2.) Importance of MR safety for physicians
- 3.) MR principles and magnetic fields
 - Static magnetic fields (B_0)
 - Radiofrequency field (B_1)
 - Gradient fields (G_x, G_y, G_z)
- 4.) Effects of magnetic fields in an MR suite
 - Attractive forces on ferromagnetic objects
 - Projectile effects
 - Thermal effects
 - Peripheral nerve stimulation
- 5.) Types of MR systems
- 6.) Fringe fields and 5 Gauss line
- 7.) MR screening procedures
 - Implanted devices (e.g. pacemakers, hearing aids, surgical implants)
 - Pregnancy
 - MR contrast agent reactions and renal insufficiency
- 8.) Emergency procedures in an MR suite

Summary

This educational electronic poster will provide a comprehensive overview on the implementation of an MR safety course for medical students. Education in MR safety for medical students will enable these future physicians to optimize requests for MR studies by increasing their understanding of patient screening and safety procedures.

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a) Sample slide of the MR safety module

The MRI is a controlled access area.

- It is labeled with warning signs and markings to prevent entry of ferromagnetic objects into the controlled access area and to limit access of individuals with medical implants near high magnetic fields.
- Public access begins at the 5 Gauss line (0.5mT).



b) Sample multiple choice test question

Which magnetic field interacts with the patient in an MRI scanner?

- A) Static magnetic field
- B) Gradient field
- C) Radiofrequency field
- D) A and B
- E) A, B and C

Fig. 1 a) Sample slide and b) sample multiple choice test question of a comprehensive MR safety module for medical students.