SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

To describe the strategies and designs underlying the operation of two different single-room MRI units.

Design, Operation, and Safety of Single-Room Interventional MRI Suites: Practical Experience From Two Centers

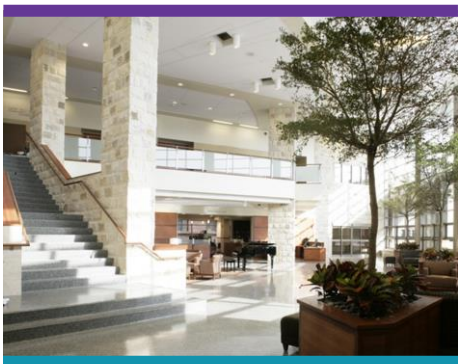
White, M. J., Thornton, J. S., Hawkes, D. J., Hill, D. L .G., Kitchen, N., Mancini, L., McEvoy, A. W., Razavi, R., Wilson, S., Yousry, T., Keevil, S. F., 2015 | Journal of Magnetic Resonance Imaging. Volume 41, Issue 1, Pages 34-43

Key Concepts/Context

Designing and operating healthcare spaces to accommodate magnetic resonance imaging (MRI) scanners presents a variety of challenges. These spaces are often populated with larger amounts of sensitive equipment than typical patient care units, while receiving a nearly equal amount of foot traffic. As MRI scanners are incorporated into more and more "interventional spaces" or areas in which surgical and other medical procedures are taking place, attention must be paid to equipment damage or other hazards that can arise from acoustic noise levels, electromagnetic interference between the scanner and other electronics, and changes in room temperature. This study describes strategies for how MRI scanners can be implemented in interventional spaces using two incident-free interventional spaces as examples.

Methods

The authors describe the concepts, designs, and workflow considerations underlying their best practices in operating two single-patient rooms equipped with conventional cylindrical-bore 1.5 T MRI scanners. The first unit (known as "KCL" in this study) is a combined MRI and x-ray cardiac room, while the second unit (known as NHNN) employed the MRI during neurosurgical procedures. The authors describe a variety of considerations designers and healthcare practitioners might consider to maximize safety and functionality within these spaces. These considerations include static field and equipment placement, MRI receiver coil maintenance, radio-frequency (RF) screening, policies for room access, x-ray protection, staff and safety officer training, and emergency procedures.



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Findings

Several novel designs and workflow decisions helped the two MRI rooms (KCL and NHNN) achieve a high level of safety and functionality. At KCL, a radio-frequency airlock was introduced, which allowed personnel to enter and exit the room without disturbing the MRI's functionality. At NHNN, a customized mattress was installed in the MRI machine to reduce the patients' risk of forming pressure sores. The authors note that regardless of design and equipment, the safety of an MRI space is equally reliant on workflow optimization and consistent protocols that patients and staff can follow in the event of an emergency.

Limitations

This study provided in-depth descriptions of physical spaces, equipment, and workflows; accordingly, no new quantitative or qualitative data were gathered over the course of this study. The authors note that the MRI machines observed may not be the most widely-used or the most up-to-date technology.

Design Implications

Preserving patient and staff safety, along with equipment functionality, is a top priority in rooms equipped with MRI scanners. Designers might consider interventions such as the "RF airlock" to allow personnel to move more freely from the rooms without disturbing machine functions. Custom mattresses can be installed inside the machines to enhance patient comfort.