

Managing intra-operative and interventional MRI services

The role of MRI as a purely diagnostic technique is being supplemented by its use to support a range of interventions from image-guided biopsies to intra-operative monitoring and novel treatments such as focused ultrasound or laser ablation. This article is a short description of the author's experience of a neurosurgical intra-operative MRI service.

Preparing for the challenges

Early planning: The selection of a small core team at an early stage is essential – this should include representatives from key groups: MRSE, radiographers, radiologists, surgeons, anaesthetists as well as facilities management. Published guidance (1, 2, 3) is useful. Consideration should be given to building architecture, MR equipment type and layout, building facilities and anaesthetic/monitoring equipment.

Training and screening: Identification of new staff groups who will require access to the MR controlled area and MR environment (e.g., theatre staff) and extension of safety screening, training and access control.

Process development: Plan to start gradually. For each type of procedure, the procedure should be rehearsed involving all key personnel. This can help identify areas of difficulties and highlight time or other constraints. In addition to conventional WHO checklist and MR safety checklist, additional checklists may be required at key timepoints. Emergency procedures should be developed and rehearsed to identify any barriers to evacuation or management. Hazards from therapeutic equipment (e.g. lasers) must also be addressed according to appropriate legislation and guidance.

Reducing risk

- MRI safety pre-screening at the time of booking and prior to acceptance. Formal MRI safety screening should be performed at the same time as the WHO checklist.
- Checklists to ensure that only MR safe or conditional equipment is brought into the MR environment. Instrument and sharps counts prior to entry to MR environment.
- The number of staff with access to the MR environment should be kept to the minimum. Use of distinctive uniforms without pockets.
- Clear emergency plans (e.g. medical emergency, fire, electrical failure) should be available and appropriate to the type of procedure being performed.

Conclusion

The use of intra-operative MRI or other MR guided procedures offer new treatment options. However, they increase complexity of the MR procedure and introduce new hazards. A multi-disciplinary approach to planning and careful practice can mitigate hazards and reduce the risk.

References

1. MHRA. [Safety Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use](#), 2021
2. S.R. Wilson et al. Guidelines for the safe provision of anaesthesia in magnetic resonance units. *Anaesthesia* 2019 74(5): supplementary material.
3. Kettenbach et al. Intraoperative & interventional MRI: Recommendations for a safe environment, *J Minimally Invasive Therapy* 2006