Clinical Safety Guidelines for the Use of a 0.064 T Portal MRI System: A Scoping Review

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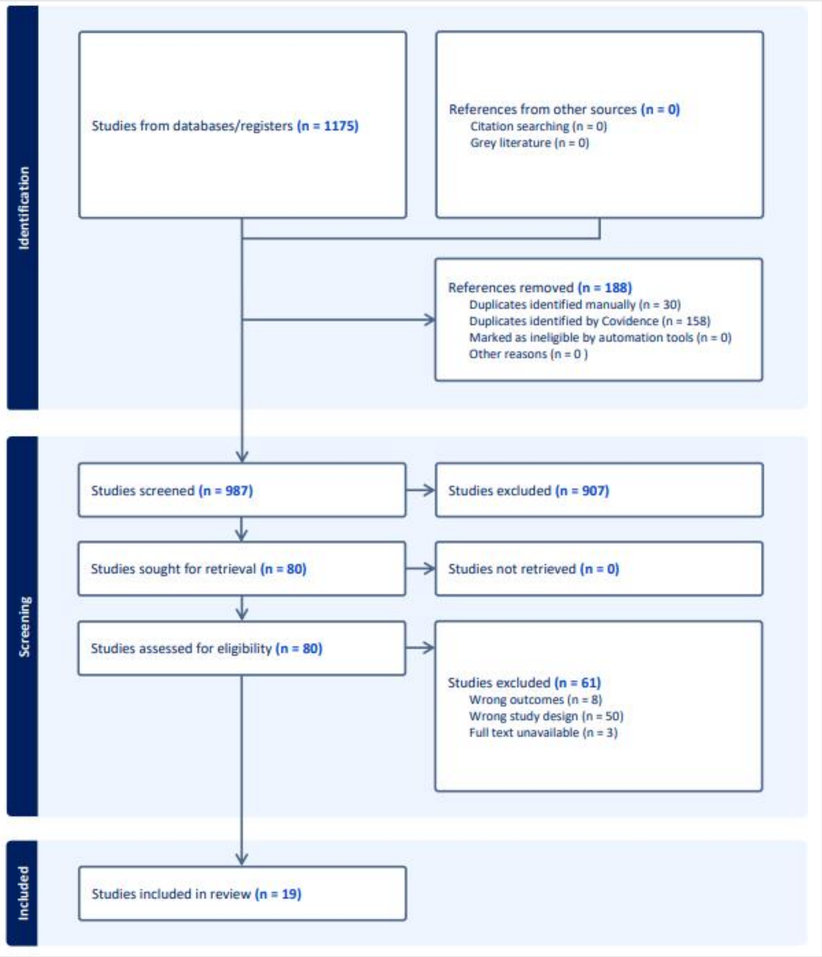
PURPOSE

The development of the Hyperfine Swoop MRI system has increased the use of ultra-low-field (64 mT) portable MRI (pMRI) for patients in which conventional 1.5T or 3T MRI (cMRI) is not readily accessible. In contrast to well-established safety guidelines and protocols for cMRI, the paucity of safety data and literature investigating pMRI systems limits clinical adoption. This summary of the existing literature aims to develop preliminary guidelines for its application in the hospital setting.

METHODS

A Boolean search using 'low field MRI,' 'portable MRI,' 'Hyperfine Swoop,' combined with 'safety' and 'equipment safety,' was conducted in PubMed, Embase, Cochrane Library, and Web of Science. Results were reviewed in COVIDENCE, with 988 references imported for screening. Articles were excluded if they lacked safety information, used an MRI with a magnet strength greater than 0.064 T, or had irrelevant study designs or outcomes.

RESULTS



RESULTS

This review included 19 studies: 2 case reports, 15 prospective trials, and 2 retrospective studies. The studies included a total of 775 patients with ages ranging form neonates to the elderly. Hospital settings included ICU (9 studies), emergency department (3 studies), inpatient floor (2 studies), interventional radiology suite (1 study), and an ambulance (1 study). Standard cMRI contraindications were used as the exclusion criteria in 8 studies. Devices contraindicated in cMRI, such as an intracranial bolt (N=1), cardiac implantable device (N=1), and ECMO/ECLS (N=54), remained on patients, highlighting the pMRI system's expanded safety. Among 775 patients, no serious adverse events occurred. 3 minor adverse events were reported: ECMO transient decrease in flow, ECMO suction event from patient positioning and transient balloon pump malfunction secondary to a setting triggered by MRI artifacts. All standard medical equipment remained in the room, with 490 patients scanned in 14 studies without significant interference.

CONCLUSION

Previously established paradigms for cMRI safety may not be relevant to ultra-low-field pMRI systems. We present a scoping review of the literature to develop a safety paradigm for the use of pMRI in the hospital setting.