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Interprofessional Management of Anxiety in Claustrophobic Patients Undergoing Magnetic Resonance Imaging

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Abstract

Magnetic Resonance Imaging (MRI) is an essential diagnostic modality across a wide range of clinical settings. However, anxiety and claustrophobia remain common barriers to successful examination completion, potentially compromising image quality, patient experience, and healthcare service efficiency. This systematic review aimed to evaluate the effectiveness of non-pharmacological interventions implemented by the MRI team, with particular emphasis on the collaborative role of nurses and radiographers in the management of anxiety and claustrophobia among adult patients undergoing MRI. A literature search was conducted in PubMed/MEDLINE between September and October 2025, following the PRISMA 2020 guidelines and a research question developed according to the PICO framework. Studies published between 2008 and 2025 investigating MRI-related anxiety or claustrophobia and evaluating nursing, communicative, educational, or other non-pharmacological interventions were considered eligible. Of the 190 records initially identified, nine studies met the inclusion criteria and were included in the final narrative synthesis. The findings indicate that MRI-related anxiety is highly prevalent and may result in motion artefacts, premature examination termination, reduced patient cooperation, and an increased need for sedation. Interventions such as therapeutic communication, structured patient education, emotional support, breathing and relaxation techniques, music therapy, mindfulness, and immersive technologies demonstrated beneficial effects in reducing anxiety and improving examination tolerability. The available evidence suggests that a multidisciplinary, patient-centred approach can facilitate successful examination completion, improve diagnostic outcomes, and reduce the need for pharmacological interventions.

Introduction

Magnetic Resonance Imaging (MRI) is currently one of the leading diagnostic imaging modalities for addressing a wide range of clinical questions owing to its excellent soft-tissue contrast, high spatial resolution, and the absence of exposure to ionising radiation. Despite its well-established diagnostic advantages, a substantial proportion of patients experience varying degrees of psychological distress and anxiety during MRI examinations. These reactions are primarily related to the intrinsic characteristics of the procedure, including confinement within a narrow space, acoustic noise generated by the scanner, prolonged immobility, and a perceived loss of control. Emotional responses range from anticipatory anxiety to severe claustrophobic reactions.

The literature indicates that pre-procedural anxiety affects approximately 25%–30% of patients undergoing MRI, whereas the reported prevalence of claustrophobia ranges from 1% to 15%, reaching up to 66.6% in specific clinical settings. The qualitative meta-synthesis conducted by Nieto Alvarez et al. [1] estimated the prevalence of clinically significant anxiety at approximately 25%–30% in Western populations, although considerable heterogeneity exists across studies and clinical settings. Several studies have also reported that the majority of patients require additional information before the examination, highlighting the pivotal role of effective communication in modulating emotional responses [2]. Regarding claustrophobia, large-scale reviews indicate that approximately 1% of MRI examinations are prematurely terminated because of claustrophobic symptoms in routine clinical practice [3]. However, the risk is significantly higher among women, individuals aged 45–64 years, and patients undergoing head MRI examinations [4]. Among patients with clinically significant claustrophobia, fewer than one-third are able to complete the examination without targeted interventions [5].

From a clinical perspective, MRI examinations degraded by motion artefacts or prematurely terminated represent failures in the diagnostic pathway, potentially delaying diagnosis and compromising patient care. From an organisational perspective, repeated or interrupted examinations increase scanner utilisation time, prolong waiting lists, and generate additional direct and indirect healthcare costs. When sedation is required, the organisational burden becomes even greater, as it necessitates the involvement of anaesthesiology staff, haemodynamic monitoring, post-procedural recovery, and, in some

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cases, dedicated facilities. Over the past decade, increasing evidence has supported the effectiveness of a range of non-pharmacological interventions aimed at reducing MRI-related anxiety, including patient education, relaxation techniques, therapeutic communication, and person-centred care strategies [6,7]. Within this context, the multidisciplinary MRI team plays a pivotal role. Through complementary expertise, nurses and radiographers contribute not only to the technical execution of the examination but also to patient preparation, emotional support, and guidance throughout the entire imaging pathway. The integration of clinical, interpersonal, and technical competencies enables the early identification of vulnerable patients, the implementation of tailored interventions, and the optimisation of examination completion, thereby improving both diagnostic outcomes and the overall patient experience.

The present systematic review aims to examine the available evidence regarding the management of anxiety and claustrophobia in adult patients undergoing MRI, with particular emphasis on non-pharmacological interventions and the collaborative contribution of the MRI team in delivering person-centred care.

Materials and Methods

The methodology adopted for this literature review was designed to ensure a high level of scientific rigor, transparency, and internal consistency, in accordance with international guidelines for conducting systematic reviews. The initial phase of research question formulation was guided by the PICO framework, which is widely used in clinical research to develop focused questions and to guide literature search strategies. The application of the PICO model ensured a clear definition of the population of interest, types of interventions, potential comparisons, and relevant outcomes, thereby enhancing the specificity of keyword selection and the subsequent development of search strings.

The research question, formulated according to the PICO framework, that guided this review was defined as follows:

"What strategies implemented by an MRI team are effective in the management of anxiety and claustrophobia in adult patients undergoing Magnetic Resonance Imaging?"

The study population consists of adult patients undergoing MRI, a heterogeneous group that includes individuals with varying levels of anxiety, pre-existing anxiety disorders, clinically significant claustrophobic symptoms, or subjective experiences of discomfort related to the perception of confined space. Available evidence indicates that anxiety and situational fear are highly prevalent in this population, with reported rates reaching up to 60% of cases [2,8], whereas clinically significant claustrophobia affects a smaller proportion of patients but has a greater impact on examination completion [4].

The interventions considered include all nursing, communicative, and supportive strategies such as emotional preparation, breathing and relaxation techniques, music therapy, grounding interventions, verbal support during the examination, and the use of immersive technologies such as virtual reality (VR) [9,10].

The primary comparator is standard care, defined as the diagnostic procedure performed without specific supportive interventions, or alternative approaches such as pharmacological management.

The outcomes assessed include reduction in anxiety and claustrophobia levels measured using validated psychometric instruments, improved patient cooperation during the examination, reduction of motion artefacts, and successful completion of the procedure without the need for sedation. Studies such as those by Bolejko and Hagell [11] and Shojaie et al. [12] highlighted the importance of educational interventions and relaxation techniques as effective tools in achieving significant improvements in these outcomes.

The literature search was conducted between September and October 2025 using the PubMed/MEDLINE database, which is considered one of the most authoritative and comprehensive sources for biomedical literature. Keywords were selected based on the four PICO domains, identifying relevant MeSH descriptors and free-text terms related to the phenomenon under investigation. The main search terms included "magnetic resonance imaging," "anxiety," "claustrophobia," "nursing care," "patient preparation," and "non-pharmacological interventions," combined using Boolean operators in accordance with methodological recommendations in the literature [13].

Table 1. *PICO Framework Application*

Element	Description applied in the present review
P (Population)	Adult patients undergoing MRI who experience anxiety or claustrophobia
I (Intervention)	Healthcare, nursing, or supportive interventions aimed at managing anxiety or reducing claustro-phobia
C (Comparison)	No intervention, standard care, or alternative strategies
O (Outcome)	Reduction in anxiety/claustrophobia levels, im-proved patient cooperation, and successful com-pletion of the examination without the need for sedation

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The search strategy was designed to balance sensitivity and relevance. Filters were applied regarding language, full-text availability, adult population, and study design, prioritising randomised controlled trials, observational studies, qualitative studies, and systematic reviews. The selected time frame (2008–2025) allowed the inclusion of both early studies on informational and psychological interventions and more recent research on digital technologies such as VR and immersive applications [14].

Given the multidimensional nature of the phenomenon under investigation, which encompasses clinical, psychological, perceptual, organisational, and relational aspects, the electronic search was complemented by a manual review of the reference lists of the included articles. This approach, known as snowballing, is particularly recommended in reviews addressing complex topics, as it allows the identification of relevant studies that may not be easily retrieved through database searching alone [15].

The strict definition of inclusion and exclusion criteria represented a further essential step to ensure methodological consistency and quality. Included studies involved adult patients undergoing MRI and investigated anxiety, fear, or claustrophobia related to the procedure. Eligible studies assessed nursing, communicative, or non-pharmacological interventions delivered by the MRI team and reported relevant outcomes such as emotional management, examination tolerance, and completion rates. Full-text availability was considered an essential requirement, as it allowed critical appraisal of methodology, interventions, measurement tools, and reported outcomes. Studies involving paediatric populations were excluded due to the substantially different emotional and cognitive characteristics of children, which require distinct methodological approaches. Editorials, commentaries, case reports, and studies lacking clear methodological frameworks or validated anxiety assessment tools were also excluded. Finally, irrelevant articles were removed following a cross-evaluation of titles, abstracts, and full texts.

The study selection process was conducted in accordance with the PRISMA 2020 flow methodology, which consists of four stages: identification, screening, eligibility, and inclusion. In the initial phase, 190 records were identified through database searching. Subsequently, 56 articles were selected for title and abstract screening, allowing a preliminary distinction between potentially relevant studies and those clearly unrelated to the review topic. Of the 56 screened articles, 15 were selected for full-text review as they aligned with the keywords and objectives of the study. At the eligibility stage, only nine studies fully met the inclusion criteria and were therefore included in the final narrative synthesis. The included studies represent a methodologically diverse body of evidence that strengthens the review. These include randomised controlled trials evaluating interventions such as music therapy or guided breathing techniques [10,12], multicentre observational studies documenting the prevalence of anxiety and claustrophobia in MRI settings [2,8], qualitative studies exploring the experiences of claustrophobic patients [6], and systematic reviews assessing the effectiveness of non-pharmacological interventions [1,3].

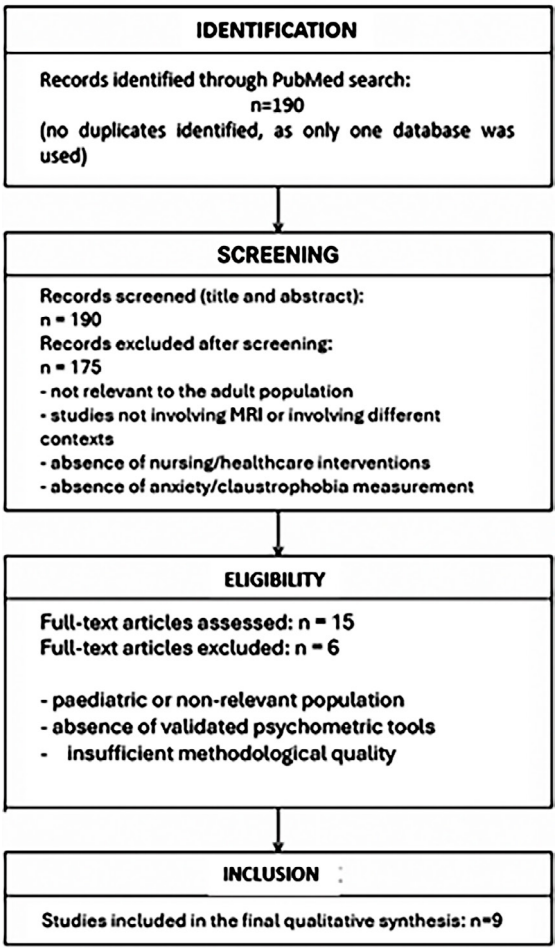


Figure 1. *PRISMA flow diagram of the study selection process*

Table 2. *Studies included in the systematic review*

Study	Autor / Year	Coun-try	Study design	Interventions/ Strategies	Main findings	Implications for Radiographic and Nursing Practice
Mindfulness respiratory decompression therapy in claustrophobic MRI patients	Zhou et al., 2023	Cina	RCT	Mindfulness-based intervention and psychological support	MRI completion rate: 90.9% vs. 26.2%; significant reduction in anxiety.	Teach mindfulness techniques to patients

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Supporting claustrophobic patients during MRI – focus group	Lawal et al., 2023	United Kingdom	Qualitative study (focus group)	Exploration of coping strategies and patient communication	Clear information and emotional support	Continuous communication
Interventions to reduce anxiety, distress and sedation – systematic review	Munn & Jordan, 2013	Australia	Systematic review	Scanner design, cognitive techniques, prone positioning, and patient training	All interventions were effective, with cognitive techniques demonstrating the greatest benefit.	Implement cognitive and environmental strategies to reduce patient anxiety.
Patients' experience to MRI – qualitative metasynthesis	Nieto Alvarez et al., 2025	Germany	Qualitative review	Exploration of patients' experiences and factors influencing the MRI experience	Key factors: information provision, patient–staff communication, and scanner noise.	Provide personalised information and empathetic support.
Predictors of anxiety in MRI – Palestinian multicenter study	Masalma et al., 2024	Palestine	Multicentre cross-sectional study	Assessment of anxiety using the Visual Analogue Scale (VAS) and clinical variables	Anxiety in 66.6% of participants and more prevalent among women and patients undergoing their first MRI examination.	Perform early anxiety screening and imple-ment targeted inter-ventions.
CLAUSTRO RCT protocol – open vs short-bore MRI	Enders et al., 2011	Germany	RCT protocol	Comparison between open MRI and short-bore MRI systems	Study protocol aimed to reduce MRI-related claustrophobia.	Offer alternatives, such as open MRI systems, for patients with significant anxiety or claustrophobia.
Assessment of Anxiety Associated with MRI Examina-tion Among the General Population in the Western Region of Saudi Arabia	Al Shan-bari N.M. et al. – 2023	Saudi Arabia	Cross-sectional study conducted using an online questionnaire	Questionnaire administration, collection of sociodem graphic data, and statistical analysis of MRI-related anxiety levels	- 55.9% → moderate anxiety, - 18.5% -> high anxiety - Women with higher anxiety lev-els than men,- 51% with panic symptoms; 48% with breathing difficulties - Anticipatory anxi-ety was reported by 80% of participants.	Provide clear infor-mation and emotional support, recognise signs of anxiety, pre-pare patients ade-quately, and optimise patient comfort.
Effects of aromatherapy and music therapy on patients' anxiety during MRI examinations	Xueke Wen et al., 2022	Cina	Sin-gle-centre, double-blind randomized controlled trial	- Music therapy (Pachelbel's Canon in D) - Standard care without additional intervention	Music therapy significantly reduced anxiety levels.	• Music therapy can reduce MRI-related anxiety. • It enhances patient cooperation and may improve image quality by reducing motion artefacts. • It decreases the like-lihood of examination interruption or repeti-tion. • It represents a non-invasive, cost-effective intervention

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Effects of an information booklet on patient anxiety and satisfaction with in-formation in MRI	A. Bolejko & P. Hagell, 2021	Sweden (Skåne Uni-versity Hospital, Malmö)	Single-blind, placebo-con-trolled randomized controlled trial	Intervention: MRI-specific informational booklet covering procedural, behavioural, and sensory aspects of the examination. Control: Placebo booklet with identical layout but generic heal-th-related content unrelated to MRI. Both groups recei-ved the standard verbal information routinely provided by MRI radio-graphers.	• Participants in the inter-vention group reported greater satisfaction with the information provided. •Written infor-mation reduced the risk of high anxiety but had no significant ef-fect on moderate anxiety levels.	• Providing MRI-specific infor-ma-tional booklets is a sim-ple and effective strategy for reducing the risk of severe anxi-ety. • It improves patient satisfaction and supports effective communication • It may enhance patient preparation and promote greater cooperation • It is recommended as a standard com-ponent of nursing care in radi-ology departments.

Results

Claustrophobia: Predisposing Factors, Clinical Presentation, and Assessment Tools

To better understand the emotional responses experienced by many patients during Magnetic Resonance Imaging, psychiatric literature distinguishes between fear and anxiety. Fear is defined as an immediate emotional response to a real and identifiable threat and, in the context of MRI, typically arises during the initial stages of entering the scanner bore, when patients perceive the rapid reduction of available space, the proximity of the scanner walls, and the requirement to remain motionless [16]. Anxiety, by contrast, is a more diffuse emotional response that often develops during the anticipatory phase, hours or even days before the examination. Patients may anticipate breathing difficulties, fear being unable to remain still, worry about becoming trapped or losing control, and ultimately doubt their ability to complete the procedure [2,8].

Claustrophobia represents the most severe and disabling manifestation of this spectrum of emotional responses. It is classified as a situational specific phobia characterised by an intense fear of enclosed spaces, catastrophic thoughts, pronounced somatic symptoms, and a strong urge to escape [16]. The qualitative meta-synthesis conducted by Nieto Alvarez et al., including eight studies and more than 200 patients, demonstrated that the MRI scanner is frequently perceived as a "tunnel" or a "cage" and that the subjective feeling of entrapment plays a central role in triggering anxiety and claustrophobic reactions [1].

From a biological perspective, the multicentre study by Masalma et al. [8], conducted across several Palestinian hospitals and involving 383 patients, identified several predisposing factors for MRI-related anxiety. Female sex, unemployment, and the absence of previous MRI experience were significant predictors of higher anxiety levels, with 66.6% of participants reporting varying degrees of anxiety. Similarly, Al Shanbari et al. [2], in a cohort of 465 participants from Saudi Arabia, found that more than half of the sample experienced mild-to-moderate anxiety, with significantly higher levels observed among women. Age also appears to influence emotional responses. Younger individuals may exhibit greater emotional reactivity and less effective coping strategies, whereas older adults may be more susceptible to confusion, disorientation, and sensory overload, particularly in the presence of sensory or cognitive impairment [1]. Psychological factors play an even more prominent role. A history of anxiety disorders, depressive episodes, or panic attacks has been associated with an increased likelihood of severe emotional reactions during MRI examinations [17]. The JBI systematic review on non-pharmacological interventions in diagnostic imaging further emphasises that patients with high trait anxiety require structured supportive care, including comprehensive pre-examination information, continuous reassurance, and distraction or relaxation techniques delivered by healthcare professionals [3].

The clinical manifestations of anxiety are primarily related to activation of the sympathetic nervous system and include tachycardia, elevated blood pressure, sweating, tremor, muscle tension, and shallow or rapid breathing. Masalma et al. [8] reported that a substantial proportion of participants experienced sensations of "shortness of breath" and respiratory discomfort despite the absence of objective ventilatory impairment, highlighting the influence of emotional distress on the interpretation of bodily sensations. Similar findings were reported by Al Shanbari et al. [2], in which approximately half of the participants described subjective dyspnoea and more than 50% reported panic symptoms during the examination. From a cognitive perspective, anxiety is characterised by intrusive and catastrophic thoughts, including fear of being unable to complete the examination, concerns about fainting inside the scanner, beliefs that breathing will become impossible, or fears of "losing control" during the procedure [1]. Systematic assessment of anxiety is essential for identifying patients at greater risk and implementing appropriate preventive strategies. In

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this context, psychometric instruments provide an important complement to routine nursing and clinical assessment. The State–Trait Anxiety Inventory (STAI) is one of the most widely used instruments in MRI research and distinguishes between state anxiety, which reflects the individual's immediate emotional response to a specific situation, and trait anxiety, which represents a stable predisposition to experience anxiety. In the randomised controlled trial conducted by Bolejko and Hagell [11], the STAI was used to demonstrate a significant reduction in pre-examination anxiety among patients who received a structured MRI information booklet compared with those receiving standard information alone.

The Visual Analogue Scale (VAS) for anxiety, employed by Masalma et al. [8] in the Palestinian population, provides a rapid and easily interpretable measure of perceived anxiety and is particularly suitable for high-throughput clinical settings such as MRI departments.

Specific instruments for assessing claustrophobia, such as the Claustrophobia Questionnaire (CLQ), allow a more targeted evaluation of fear of enclosed spaces and avoidance behaviours, two dimensions that are particularly relevant for predicting MRI tolerance, especially during brain MRI examinations. Previous studies have demonstrated a significant association between higher CLQ scores and an increased likelihood of unsuccessful MRI completion [5].

The integration of these assessment tools into routine clinical practice is not intended to pathologise patients' emotional responses but rather to provide the MRI team with objective information to support individualised care planning and the implementation of appropriate supportive interventions.

Role of the MRI team

The management of anxiety in claustrophobic patients undergoing Magnetic Resonance Imaging requires a multidimensional approach that integrates technical, clinical, and relational competencies. In this context, the MRI team plays a fundamental role in ensuring not only the safety and diagnostic quality of the examination but also the psychological well-being of patients throughout the entire care pathway.

The pre-procedural phase represents a crucial moment for the early identification of risk factors associated with anxiety and claustrophobia. Nurses assess implanted medical devices, contrast media-related risk factors, and, in parallel, the patient's anxiety level and potential emotional vulnerabilities that may compromise the successful completion of the examination [8]. Radiographers, through clear and personalised communication, provide information regarding the examination procedure, sequence duration, acoustic noise generated by the scanner, and the importance of remaining still during image acquisition. Coordinated communication between the two professional figures fosters the development of a trust-based relationship and helps reduce uncertainty, a factor frequently associated with the onset of anxiety states.

During the examination, nurses and radiographers maintain continuous contact through the scanner communication system.

The perception of being constantly supported and monitored contributes to an increased sense of safety and helps reduce panic reactions associated with the confined MRI environment. Complementary techniques such as guided breathing, music therapy, and guided imagery have demonstrated effectiveness in modulating physiological stress responses [10,12,18]. Consequently, non-pharmacological strategies achieve their greatest effectiveness when implemented within a shared care model. In this perspective, nurses and radiographers act in a complementary manner, integrating different but converging competencies toward a common goal: facilitating examination completion under the best possible conditions for the patient. In the post-procedural phase, the nurse evaluates the patient's general condition, provides recovery instructions, and collects feedback regarding the overall experience. This stage is essential not only for clinical safety but also for reinforcing a positive memory of the procedure, thereby reducing the likelihood of anticipatory anxiety during future examinations [19].

Communication as a therapeutic intervention

Communication with patients is recognised as one of the most effective and widely applicable interventions. The qualitative meta-synthesis by Nieto Alvarez et al. [1] indicates that the communication relationship between healthcare professionals and patients is the factor with the greatest impact on the subjective MRI experience. Clear, reassuring, and empathetic communication reduces anticipatory anxiety and enhances patient cooperation.

Studies such as that by Bolejko and Hagell [11] confirm that structured informational interventions significantly reduce pre-examination anxiety. International nursing literature supports these findings, emphasising that "therapeutic communication" is a clinically recognised intervention with measurable impact on patient outcomes.

Educational interventions and pre-examination preparation

Pre-examination preparation represents one of the most frequently addressed topics in the literature. Yakar et al. [20] demonstrated that a multimedia informational intervention significantly reduces anxiety and claustrophobia scores. Similarly, the study by Bolejko and Hagell [11] reported comparable findings using a structured informational leaflet.

The cognitive appraisal theory provides a useful conceptual framework: knowledge reduces uncertainty, and uncertainty is one of the main factors contributing to anxiety in MRI settings. Consequently, pre-

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paration delivered by the MRI team helps modulate the emotional response by transforming a perceived threatening stimulus into a predictable and controllable experience.

Non-pharmacological techniques

Non-pharmacological techniques represent a particularly active area of research. Music therapy combined with guided imagery, controlled breathing techniques, and virtual reality (VR) has been shown to be effective in reducing anxiety levels. In particular, music reduces sympathetic activation and modulates the sensory processing of MRI-related acoustic noise. Guided breathing techniques help rebalance the autonomic nervous system by increasing heart rate variability and reducing the subjective sensation of dyspnoea. VR represents one of the most promising innovations: immersive simulations cognitively prepare patients for the examination experience, reducing sensory mismatch and improving tolerance to the scanning environment.

Intra-procedural support

The active presence of healthcare professionals during the examination is a crucial determinant of procedural success. The ability to maintain verbal contact via the intercom system, receive feedback on sequence duration, and be reassured during critical moments is perceived as an important safety factor [6]. According to the "sense of presence" theory, the perception of not being alone reduces activation of the threat response system and enhances emotional self-regulation. This explains why many patients report that the voice of the nurse acts as an "emotional anchor" during the examination.

Pharmacological approaches

Pharmacological interventions, although effective, are considered second-line options. According to StatPearls [16], the use of benzodiazepines should be limited due to associated risks, including sedation, respiratory depression, and the need for prolonged monitoring. The role of the nurse is central in assessing the patient's clinical condition, monitoring vital signs, and managing post-procedural care.

Overall effectiveness of interventions

Comparative analysis of the included studies indicates that the most effective interventions are those of a communicative, educational, and non-pharmacological nature, particularly when integrated into multimodal care protocols. The literature confirms that structured approaches improve examination completion rates, reduce motion artefacts, and enhance patient satisfaction [4,22]. Pharmacological interventions are effective but less sustainable in routine clinical practice and are associated with risks that require increased nursing vigilance. Virtual reality (VR) techniques, although promising, still require further large-scale studies to confirm their effectiveness.

Discussion

This systematic review highlights that anxiety and claustrophobia associated with Magnetic Resonance Imaging (MRI) represent clinically relevant and widespread issues that can affect not only the patient experience but also diagnostic quality and the organisational efficiency of radiology services. The findings confirm that the MRI experience may be perceived as highly stressful due to intrinsic procedural characteristics, including confinement within a narrow space, acoustic noise, required immobility, and a perceived loss of control.

The included studies report a significant prevalence of pre-procedural anxiety. In particular, Masalma et al. [8] reported mild to severe anxiety levels in approximately two-thirds of participants, while other evidence indicates lower but still clinically relevant proportions. This variability suggests that anxiety is influenced not only by individual characteristics but also by cultural, organisational, and relational factors, including the ways in which healthcare professionals prepare and support patients throughout the diagnostic pathway.

Claustrophobia also emerges as a key determinant. Estimates by Hudson et al. and Munn and Jordan [3,4] indicate that the rate of aborted or incomplete examinations due to claustrophobia is approximately 0.76–1% in highly standardised clinical settings. Although this proportion is relatively low, qualitative evidence indicates that MRI-related psychological distress is far more common than suggested by examination abandonment rates alone. In patients with clinically significant claustrophobia, the likelihood of successful examination completion is markedly reduced.

Another relevant aspect concerns the impact of anxiety on image quality. High levels of stress are associated with increased motion artefacts, the need for sequence repetition, and prolonged examination times. Anxiety should therefore be considered not only as an emotional component of the patient experience but also as a variable that directly affects diagnostic efficiency and healthcare resource utilisation. Findings from qualitative studies further enrich this quantitative perspective by providing deeper insight into patient experiences. The work by Nieto Alvarez et al. (2025), synthesising evidence from multiple contexts, confirms that patients often experience a tension between the perceived necessity of the examination for their health and a strong negative emotional response to the procedure. The most frequently reported dimensions include a sense of loss of control, the perception of the scanner bore as a hostile environment, distress related to noise and immobility, and the central role of the relationship with healthcare professionals, particularly radiographers and nurses.

The available evidence supports the use of non-pharmacological interventions as first-line strategies for managing MRI-related anxiety. Structured informa-

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tional materials, multimedia educational programmes, relaxation techniques, guided imagery, music therapy, and virtual reality (VR) have shown promising results in reducing emotional distress and improving examination tolerability. In particular, interventions based on cognitive preparation and familiarisation with the MRI environment appear to enhance perceived control and reduce anxiety responses.

In this context, the MRI team, consisting of nurses and radiographers, plays a strategic role within the care pathway. Early anxiety assessment, therapeutic communication, patient education, and the implementation of non-pharmacological interventions are competencies that can significantly improve the patient experience and reduce the need for pharmacological sedation. The implementation of structured and standardised protocols may further support the effective management of at-risk patients, simultaneously improving care quality and diagnostic outcomes.

The findings of this review should be interpreted in light of several limitations. The methodological quality of the included studies is variable, the analysed interventions are often heterogeneous, and direct comparisons between different non-pharmacological strategies are lacking. These limitations highlight the need for further multicentre, randomised studies focusing on the evaluation of integrated multimodal protocols.

Conclusions

This systematic review confirms that anxiety and claustrophobia are frequent and clinically significant issues in the context of Magnetic Resonance Imaging, with potential repercussions on both patient experience and diagnostic image quality. The available evidence shows that these conditions may impair patient cooperation, increase the risk of motion artefacts, prolong procedural time, and, in more severe cases, lead to examination discontinuation.

The analysed non-pharmacological interventions, including structured information provision, pre-examination education, relaxation techniques, guided imagery, music therapy, and virtual reality (VR), demonstrate significant potential in reducing anxiety levels and improving examination tolerability.

Within this context, nurses are required to perform a highly specialised role that goes beyond technical patient management, encompassing relational, educational, and stress-management competencies. A key area is the pre-procedural assessment of anxiety and claustrophobia. Quantitative studies [2,8] indicate that anxiety is considerably more prevalent than is often perceived in routine clinical practice. The routine implementation of validated assessment tools (e.g., STAI-State, MRI-AQ, brief claustrophobia scales) during patient admission would enable early identification of at-risk individuals, stratification of support needs, and timely implementation of appropriate interventions. When conducted by trained nursing staff, this assessment provides a dual benefit: it allows more efficient allocation of resources by focusing intensive interventions on highly anxious patients, and it conveys to the patient that their emotional experience is acknowledged and integrated into the care process.

The second key aspect is therapeutic communication, in which radiographers play a fundamental role. Qualitative studies [1,6] highlight that patients place great importance on how the examination is explained, the opportunity to ask questions, the tone of voice used, and the time dedicated to addressing their concerns. Radiographers and nurses act as mediators between the technological complexity of MRI and the patient's need for understanding. Effective communication is not limited to the transmission of technical information but provides a "framework of meaning" for the experience, helping patients contextualise their fears, anticipate what will happen, and feel supported throughout the procedure.

A particularly relevant finding of this review is therefore the central role of the technical-nursing team. The MRI team emerges as a key factor in risk assessment, therapeutic communication, patient education, and the implementation of non-pharmacological support strategies. However, despite its recognised importance in clinical practice, this role remains underexplored in the scientific literature.

Based on the findings, several priorities for future research can be identified:

- development of multicentre randomised controlled trials directly comparing different non-pharmacological interventions (e.g., leaflet vs VR vs music vs combined approaches);
- development and validation of standardised care protocols integrating educational, relational, and psychological interventions;
- use of mixed-methods designs (quantitative + qualitative) to explore both objective outcomes and patients' subjective experiences;
- exploration of artificial intelligence-based predictive models capable of identifying patients at high risk of anxiety/claustrophobia prior to the examination;
- systematic inclusion of nursing-related indicators (type and duration of interventions, specific training, advanced competencies) in future studies.

In conclusion, Magnetic Resonance Imaging should not be considered solely a technical procedure, but rather a complex care experience in which the management of patients' emotional dimensions represents an essential component of care quality. In this context, the contribution of healthcare professionals involved in the MRI pathway may play a decisive role in promoting safety, diagnostic effectiveness, and patient-centred care.

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