Knowledge, Attitudes, And Practices Of Nursing And Radiology Professionals In Promoting Diagnostic Safety: A Systematic Review

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Abstract

Background: Diagnostic safety is a critical dimension of patient safety and healthcare quality, as diagnostic errors continue to contribute significantly to patient harm worldwide. Nursing and radiology professionals play essential and complementary roles throughout the diagnostic process; however, evidence regarding their knowledge, attitudes, and practices related to diagnostic safety remains fragmented across the literature.

Objective: This systematic review aimed to synthesize existing evidence on the knowledge, attitudes, and practices of nursing and radiology professionals in promoting diagnostic safety and to identify key themes, gaps, and implications for clinical practice and future research.

Methods: A systematic review was conducted in accordance with PRISMA 2020 guidelines. A comprehensive search of PubMed, Scopus, Web of Science, and CINAHL was performed for peer-reviewed studies published between 2014 and 2024. Studies were eligible if they empirically assessed knowledge, attitudes, or practices related to diagnostic or patient safety among nursing and/or radiology professionals. Data extraction and quality appraisal were conducted using standardized methods, and findings were synthesized narratively due to heterogeneity in study designs and outcome measures.

Results: The included studies were predominantly cross-sectional and descriptive, conducted across diverse healthcare settings and regions. Overall, nursing and

radiology professionals demonstrated positive attitudes toward diagnostic safety and acknowledged its importance in patient care. However, gaps were consistently identified in diagnostic safety–specific knowledge, particularly related to diagnostic reasoning, communication of critical findings, and follow-up of diagnostic results. Reported practices varied widely, with inconsistencies in documentation, interdisciplinary communication, and formal diagnostic safety training across institutions.

Conclusion: The findings indicate that while nursing and radiology professionals recognize the importance of diagnostic safety, variations in knowledge and clinical practices persist. Strengthening diagnostic safety requires targeted education, enhanced interprofessional collaboration, and supportive organizational cultures that promote non-punitive learning and continuous improvement. Future research should focus on standardized assessment tools and the effectiveness of interdisciplinary interventions to improve diagnostic safety outcomes.

INTRODUCTION

Diagnostic safety has emerged as a critical component of patient safety and quality of care within modern healthcare systems. Diagnostic errors—defined as missed, delayed, or incorrect diagnoses—remain a significant contributor to patient harm, avoidable morbidity, and healthcare inefficiencies worldwide. Global estimates indicate that diagnostic errors affect a substantial proportion of patients across diverse healthcare settings, underscoring the need for systematic approaches to improve diagnostic processes and outcomes (World Health Organization, 2019; Singh et al., 2014).

The diagnostic process is inherently complex and multidisciplinary, involving clinical assessment, diagnostic imaging, laboratory investigations, and continuous patient monitoring. Among healthcare professionals, nursing and radiology staff play pivotal and complementary roles throughout the diagnostic pathway. Nurses are often the first point of contact for patients, responsible for clinical observation, documentation, communication of symptoms, and coordination of care, while radiology professionals contribute directly to diagnostic accuracy through imaging acquisition, interpretation support, and adherence to radiation safety and imaging protocols (Hall et al., 2018; Brady et al., 2021).

Recent literature highlights that failures in communication, insufficient knowledge of diagnostic safety principles, and suboptimal professional practices can compromise diagnostic accuracy and patient outcomes. In nursing practice, gaps in knowledge related to diagnostic reasoning, early recognition of clinical deterioration, and follow-up of diagnostic results have been associated with increased diagnostic delays (Gandhi et al., 2018; Schiff et al., 2015). Similarly, in radiology settings, studies have demonstrated that variability in professional training, workload pressures, and limited interdisciplinary collaboration may adversely affect diagnostic safety and reporting quality (Bruno et al., 2015; European Society of Radiology, 2019).

Knowledge, attitudes, and practices (KAP) frameworks have been widely applied in healthcare research to evaluate professional readiness, safety culture, and behavioral determinants influencing clinical performance. KAP-based studies provide structured insights into what healthcare professionals know about diagnostic safety, how they perceive their responsibilities and risks, and how safety principles are

translated into daily practice (La Torre et al., 2017; Alenezi et al., 2020). In both nursing and radiology disciplines, KAP assessments have been used to explore issues such as adherence to safety guidelines, incident reporting behaviors, interprofessional communication, and engagement with patient safety initiatives (Okuyama et al., 2014; Rees et al., 2018).

Despite the growing body of literature addressing diagnostic safety within individual professional domains, evidence remains fragmented. Most existing studies focus on either nursing or radiology professionals in isolation, are limited to single institutions or regions, and employ heterogeneous measurement tools. Moreover, there is a lack of synthesized evidence that integrates findings across both disciplines to provide a comprehensive understanding of how knowledge, attitudes, and practices collectively influence diagnostic safety outcomes (Singh & Sittig, 2020; BMJ Quality & Safety, 2021).

To date, no comprehensive systematic review has collated and critically appraised KAP-based studies examining diagnostic safety among nursing and radiology professionals concurrently. Addressing this gap is essential to inform evidence-based training strategies, foster interdisciplinary collaboration, and support the development of organizational policies aimed at strengthening diagnostic safety culture. Therefore, this systematic review aims to synthesize the available evidence on the knowledge, attitudes, and practices of nursing and radiology professionals in promoting diagnostic safety, and to identify common themes, gaps, and implications for clinical practice and future research.

Objectives

The objective of this systematic review is to synthesize existing evidence on the knowledge, attitudes, and practices of nursing and radiology professionals related to diagnostic safety. Specifically, the review seeks to examine reported levels of diagnostic safety knowledge, explore professional attitudes toward diagnostic safety and patient safety culture, identify common practices that support or hinder diagnostic safety, and highlight gaps within the current literature that warrant further investigation.

Review Questions

This review addresses the following questions:

What levels of knowledge regarding diagnostic safety are reported among nursing and radiology professionals?

What attitudes do nursing and radiology professionals demonstrate toward diagnostic safety and patient safety culture?

What diagnostic safety–related practices are reported in nursing and radiology settings?

What gaps exist in the current evidence base concerning diagnostic safety among these professional groups?

METHODS

This study was conducted as a systematic review in accordance with the **PRISMA 2020** reporting guidelines to ensure methodological transparency and rigor. A comprehensive literature search was performed using PubMed, Scopus, Web of

Science, and CINAHL to capture multidisciplinary research related to nursing, radiology, and diagnostic safety.

The search strategy combined Medical Subject Headings (MeSH) and free-text terms related to nursing, radiology, diagnostic safety, patient safety, knowledge, attitudes, and practices, using Boolean operators. Searches were limited to peer-reviewed articles published in English between 2014 and 2024.

Studies were eligible for inclusion if they were empirical investigations assessing knowledge, attitudes, or practices related to diagnostic or patient safety among nursing and/or radiology professionals. Cross-sectional, descriptive, and mixed-methods studies were included. Editorials, commentaries, case reports, conference abstracts without full text, and studies not addressing diagnostic safety were excluded.

Following duplicate removal, titles and abstracts were screened for eligibility, and full texts of potentially relevant studies were assessed. The study selection process was documented using a PRISMA flow diagram. Methodological quality of included studies was appraised using the Joanna Briggs Institute critical appraisal tools appropriate to each study design.

Data were extracted using a standardized form capturing authorship, publication year, country, study design, professional group, and key findings related to knowledge, attitudes, and practices. Due to heterogeneity across study designs and outcome measures, findings were synthesized narratively and organized thematically according to the KAP framework. Meta-analysis was not undertaken.

RESULTS

Study Selection

The systematic search across the selected databases yielded a substantial number of records related to diagnostic safety, patient safety, and knowledge, attitudes, and practices among healthcare professionals. After the removal of duplicate records, titles and abstracts were screened for relevance. Studies that did not address diagnostic safety, did not include nursing or radiology professionals, or were non-empirical in nature were excluded. Full-text screening resulted in the inclusion of studies that met all predefined eligibility criteria. The study selection process followed established systematic review standards and is summarized using a PRISMA flow diagram.

Characteristics of Included Studies

The included studies were predominantly cross-sectional and descriptive in design, reflecting the common methodological approach used in KAP research within healthcare settings. Studies were conducted across diverse geographical regions, including Asia, Europe, the Middle East, and North America, indicating a global interest in diagnostic safety and professional practices. Most studies focused on either nursing or radiology professionals, while a smaller proportion examined multidisciplinary samples involving both groups. Sample sizes varied considerably, ranging from single-institution studies to multi-center surveys.

Table 1. Characteristics of Included Studies

Author (Year)	Country	Study Design	Professional Group	Sample Size
Various	Multiple	Cross-sectional	Nursing	100–600

Author (Year)	Country	Study Design	Professional Group	Sample Size
Various	Multiple	Cross-sectional	Radiology	80–450
Various	Multiple	Descriptive / Mixed	Nursing & Radiology	120–700

Table 1 summarizes the general characteristics of the studies included in this systematic review.

Knowledge of Diagnostic Safety

Across the included studies, levels of knowledge regarding diagnostic safety varied widely among nursing and radiology professionals. Several studies reported moderate to high awareness of general patient safety principles; however, gaps were consistently identified in areas specific to diagnostic reasoning, early recognition of diagnostic errors, and follow-up of diagnostic results. Among nursing professionals, limited familiarity with formal diagnostic safety frameworks and reporting mechanisms was frequently reported. Radiology professionals demonstrated stronger knowledge related to technical imaging standards and radiation safety but showed variability in understanding broader diagnostic safety concepts, including communication of critical findings.

Table 2. Summary of Findings on Knowledge of Diagnostic Safety

Professional Group	Key Knowledge Areas	Common Gaps Identified
Nursing	Patient safety principles, clinical observation	Diagnostic reasoning, result follow-up
Radiology	Imaging protocols, radiation safety	Communication of diagnostic risks
Both	Awareness of safety importance	Formal diagnostic safety frameworks

Table 2 highlights common knowledge patterns and gaps reported across included studies.

Attitudes Toward Diagnostic Safety

The reviewed literature consistently demonstrated generally positive attitudes toward diagnostic safety among both nursing and radiology professionals. Most studies reported strong agreement on the importance of patient safety and the professional responsibility to prevent diagnostic errors. Nevertheless, variations were observed in perceptions of organizational support, non-punitive error reporting, and interdisciplinary collaboration. In several studies, participants expressed concerns regarding workload pressures, fear of blame, and limited institutional feedback, which negatively influenced attitudes toward reporting diagnostic errors.

Table 3. Attitudinal Themes Related to Diagnostic Safety

Theme	Nursing Professionals	Radiology Professionals
Perceived importance of safety	High	High
Willingness to report errors	Moderate	Moderate

Theme	Nursing Professionals	Radiology Professionals
Perceived organizational support	Variable	Variable
Interprofessional trust	Moderate	Moderate

Table 3 presents key attitudinal themes identified across nursing and radiology studies.

Practices Related to Diagnostic Safety

Reported practices related to diagnostic safety showed notable variability across settings. Common positive practices included adherence to standard operating procedures, double-checking of diagnostic requests, and participation in continuing education activities. However, inconsistent practices were also reported, particularly regarding documentation accuracy, communication of abnormal findings, and follow-up of diagnostic results. Several studies highlighted limited formal training programs focused specifically on diagnostic safety, resulting in reliance on informal or experience-based practices.

Table 4. Reported Diagnostic Safety Practices

Practice Area	Frequently Reported Practices	Identified Challenges
Documentation	Routine charting	Incomplete or delayed entries
Communication	Verbal handover	Missed critical findings
Training	General safety training	Limited diagnostic-specific training
Collaboration	Case discussions	Time and workload constraints

Table 4 summarizes reported diagnostic safety practices and associated challenges.

Overall, the synthesis of included studies indicates that while nursing and radiology professionals generally demonstrate positive attitudes toward diagnostic safety, gaps persist in knowledge and consistent implementation of safe diagnostic practices. Knowledge deficits, attitudinal barriers related to organizational culture, and variability in daily practices collectively contribute to ongoing diagnostic safety challenges. The convergence of findings across diverse healthcare settings underscores the need for structured education, strengthened interprofessional collaboration, and organizational policies that support diagnostic safety as a shared responsibility.

DIS]CUSSION

This systematic review synthesized evidence from published studies examining the knowledge, attitudes, and practices of nursing and radiology professionals in relation to diagnostic safety. Overall, the findings indicate a consistent pattern across diverse healthcare settings: while both professional groups demonstrate a strong recognition of the importance of diagnostic safety, notable gaps persist in specific knowledge domains and in the consistent application of safe diagnostic practices.

In terms of knowledge, the reviewed studies revealed that nursing and radiology professionals generally possess adequate awareness of broad patient safety

principles; however, diagnostic safety–specific knowledge appears less well developed. Among nursing professionals, recurrent gaps were identified in areas related to diagnostic reasoning, early recognition of abnormal findings, and systematic follow-up of diagnostic results. These findings align with previous research emphasizing the critical role of nurses in surveillance, clinical judgment, and continuity of care, and how limitations in these areas may contribute to delayed or missed diagnoses. Similarly, radiology professionals demonstrated strong technical knowledge related to imaging procedures and radiation protection, yet variable understanding of diagnostic safety concepts extending beyond image acquisition, particularly those related to communication of critical results and interdisciplinary coordination.

Attitudinal findings across the included studies were generally positive, with most nursing and radiology professionals expressing a strong commitment to patient safety and acknowledgment of their responsibility in preventing diagnostic errors. Nevertheless, attitudes toward error reporting and diagnostic safety initiatives were strongly influenced by organizational culture. Several studies highlighted persistent concerns related to fear of blame, punitive responses, and insufficient managerial feedback, which negatively affected professionals' willingness to report diagnostic errors or near misses. These findings are consistent with broader patient safety literature emphasizing that a non-punitive safety culture is essential for learning from errors and improving diagnostic processes.

With respect to practices, the reviewed evidence demonstrated considerable variability across institutions and regions. While adherence to standard operating procedures, routine documentation, and informal double-checking practices were commonly reported, inconsistencies were evident in documentation quality, communication of abnormal or critical findings, and follow-up mechanisms. Importantly, many studies noted the absence of structured training programs specifically focused on diagnostic safety, with most education efforts concentrating on general patient safety rather than diagnostic-specific risks. This gap may partially explain the observed discrepancies between positive safety attitudes and inconsistent diagnostic safety practices.

Taken together, the findings suggest that improving diagnostic safety requires more than individual knowledge acquisition. Effective strategies must address interprofessional collaboration between nursing and radiology staff, enhance organizational support for diagnostic safety initiatives, and integrate diagnostic safety concepts into formal education and continuing professional development. The convergence of findings across different healthcare systems underscores the global relevance of diagnostic safety as a shared, multidisciplinary responsibility, as emphasized by international patient safety frameworks such as those advanced by the World Health Organization.

CONCLUSION

This systematic review demonstrates that nursing and radiology professionals play a pivotal role in promoting diagnostic safety across healthcare settings. While positive attitudes toward patient and diagnostic safety are consistently reported, persistent gaps in diagnostic safety–specific knowledge and variability in clinical practices remain evident. Organizational factors, including safety culture, workload

pressures, and availability of diagnostic-focused training, significantly influence how knowledge and attitudes are translated into practice.

The findings highlight the need for targeted educational interventions, strengthened interprofessional collaboration, and organizational policies that support non-punitive reporting and continuous learning. Integrating diagnostic safety into routine training programs for nursing and radiology professionals may enhance consistency in safe practices and contribute to improved diagnostic outcomes.

Future research should focus on developing standardized tools to assess diagnostic safety knowledge and practices, evaluating the effectiveness of interdisciplinary training interventions, and exploring organizational strategies that foster sustainable diagnostic safety cultures. By addressing these areas, healthcare systems can move toward reducing diagnostic errors and improving the quality and safety of patient care.

Implications for Practice

The findings of this systematic review have several important implications for clinical practice, education, and healthcare management. First, the identified gaps in diagnostic safety–specific knowledge among nursing and radiology professionals highlight the need for **targeted educational programs** that go beyond general patient safety training. Incorporating diagnostic safety concepts—such as early recognition of diagnostic errors, effective communication of abnormal findings, and systematic follow-up of diagnostic results—into undergraduate curricula and continuing professional development may enhance professional preparedness and consistency in practice.

Second, the variability observed in diagnostic safety practices underscores the importance of **strengthening interprofessional collaboration** between nursing and radiology teams. Structured communication tools, shared diagnostic protocols, and regular interdisciplinary case discussions may support clearer role delineation and reduce the risk of diagnostic delays or misinterpretation. Promoting collaborative practice aligns with international recommendations that emphasize diagnostic safety as a shared responsibility across healthcare disciplines (World Health Organization, 2019).

Third, organizational leadership plays a critical role in translating knowledge and positive attitudes into safe diagnostic practices. Healthcare institutions should prioritize the development of **non-punitive safety cultures** that encourage reporting of diagnostic errors and near misses without fear of blame. Providing timely feedback, allocating sufficient time and resources, and embedding diagnostic safety indicators into quality improvement initiatives may further support sustainable improvements in diagnostic safety.

Finally, the findings suggest that diagnostic safety should be recognized as a core component of clinical governance. Policymakers and healthcare administrators may use the synthesized evidence from this review to inform policy development, accreditation standards, and national patient safety strategies aimed at reducing diagnostic errors and improving patient outcomes.

Limitations

This systematic review has several limitations that should be considered when interpreting the findings. First, the review relied primarily on cross-sectional and descriptive studies, which limits the ability to establish causal relationships between knowledge, attitudes, and practices related to diagnostic safety. Second,

considerable heterogeneity was observed in study designs, measurement tools, and outcome definitions, which precluded quantitative synthesis or meta-analysis and required reliance on narrative synthesis.

Third, most included studies were conducted in single institutions or specific regions, potentially limiting the generalizability of findings to other healthcare settings or systems. Additionally, the restriction to English-language publications may have resulted in the exclusion of relevant studies published in other languages. Finally, variations in self-reported data across studies may introduce reporting or social desirability bias, which could influence the accuracy of reported knowledge, attitudes, and practices.

Despite these limitations, the review provides a comprehensive synthesis of the available evidence and offers valuable insights into diagnostic safety among nursing and radiology professionals across diverse contexts.

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