



The Impact of Patient Care Practices and Radiation Safety on Clinical Outcomes in Radiologic Technology in the Philippines: A Systematic Review

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Abstract

Background: Patient care practices and radiation safety are fundamental components of radiologic technology that influence the quality, safety, and effectiveness of diagnostic imaging services. In the Philippines, studies examining these areas remain fragmented, with limited synthesized evidence regarding their impact on clinical outcomes.

Objective: This systematic review aimed to evaluate the impact of patient care practices and radiation safety on clinical outcomes in radiologic technology in the Philippines.

Methods: A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Electronic databases, including PubMed/MEDLINE, Scopus, Web of Science, CINAHL, ScienceDirect, and Google Scholar, were searched, supplemented by manual searches of relevant references and gray literature. Studies conducted in the Philippines that investigated patient care practices, radiation safety, or their influence on clinical outcomes in radiologic technology were included. Fourteen studies published between 2011 and 2026 met the inclusion criteria and were subjected to qualitative synthesis.

Results: The included studies demonstrated that patient-centered care, communication, worker attitudes, service quality, and mental well-being significantly influenced patient satisfaction and perceived quality of care. Radiation safety studies reported generally favorable attitudes, knowledge, and compliance with radiation protection practices among radiologic personnel. Quality assurance, infection control, and occupational safety were identified as important components of safe radiologic practice. However, deficiencies in radiation monitoring, safety culture, continuing education, and workplace conditions were also reported. Most studies relied on self-reported measures, and few directly evaluated objective clinical outcomes.

Conclusion: Patient care practices and radiation safety are essential determinants of safe and effective radiologic services in the Philippines. Strengthening patient-centered care, radiation protection programs, occupational safety measures, and continuing professional development may improve clinical outcomes and the overall quality of radiologic practice.

Keywords: Radiologic technology, Patient-centered care, Radiation safety, Clinical outcomes, Philippines, Systematic review.

1. INTRODUCTION

Radiologic technology plays an essential role in modern healthcare by providing diagnostic imaging that supports disease detection, clinical decision-making, treatment planning, and patient follow-up through modalities such as conventional radiography, computed tomography (CT), magnetic resonance imaging (MRI), fluoroscopy, mammography, ultrasonography, and interventional radiology [1,2]. Beyond technical image acquisition, radiologic technologists are responsible for ensuring patient safety, delivering compassionate patient-centered care, and implementing radiation protection measures that maximize diagnostic benefit while minimizing unnecessary radiation exposure to

patients, healthcare workers, and the public [3,4]. High-quality radiologic practice requires more than technical competence. It also involves effective communication, careful patient assessment, proper positioning, infection prevention, patient education, emotional support, and continuous monitoring before, during, and after imaging procedures [5,6]. At the same time, radiation safety principles guide imaging professionals in selecting appropriate examinations, optimizing radiation doses, and complying with internationally accepted protection standards to reduce unnecessary exposure [7]. The effectiveness of these practices is commonly evaluated using indicators such as patient satisfaction, quality assurance performance,

radiation dose monitoring, occupational exposure records, compliance audits, and imaging quality outcomes [8,9].

Advances in imaging technology and the increasing prevalence of both chronic and infectious diseases have resulted in a substantial rise in the global demand for diagnostic imaging services [10,11]. Billions of radiologic examinations are now performed annually, making medical imaging indispensable to disease diagnosis, treatment planning, and clinical monitoring [12–14]. Despite these benefits, the expanding use of imaging has heightened concerns regarding unnecessary radiation exposure, repeat examinations, patient safety, and variations in the quality of radiologic care, reinforcing the need for continuous improvement in clinical practice and radiation protection [14,15].

Several international studies have demonstrated that effective patient care practices positively influence patient satisfaction, cooperation, anxiety reduction, and adherence to imaging procedures [16]. Communication between radiologic technologists and patients has been shown to improve patient experiences and decrease procedural anxiety, particularly among vulnerable populations such as pediatric and elderly patients [17]. Similarly, compassionate care and patient-centered communication have been associated with improved diagnostic accuracy and reduced rates of repeated examinations [18]. Contemporary radiologic practice increasingly acknowledges that technical proficiency must be complemented by effective communication and patient-centered care to achieve favorable healthcare outcomes [19].

Radiation safety practices likewise have substantial implications for clinical outcomes. Studies conducted in Europe, North America, and Asia have reported that adherence to radiation protection protocols reduces unnecessary patient exposure, lowers occupational risks, and enhances overall healthcare quality [20, 21]. Educational interventions, quality assurance programs, dose optimization strategies, and safety culture initiatives have been shown to improve compliance with radiation protection standards among radiologic personnel [22]. The International Atomic Energy Agency and the World Health Organization continue to advocate for strengthening radiation safety programs globally to reduce preventable radiation-related risks [23].

In the Philippines, radiologic technology has become increasingly important due to expanding healthcare services, greater accessibility of imaging facilities, and the growing prevalence of chronic diseases requiring diagnostic imaging [24, 25]. The country has established regulatory frameworks governing radiation protection and professional practice through agencies such as the Department of Health and the Philippine Nuclear Research Institute [26]. The Professional Regulation Commission also oversees the licensure and professional standards of radiologic technologists. Nevertheless, variations in healthcare resources, infrastructure, staffing, and institutional compliance may influence the implementation of patient care and radiation safety practices across healthcare settings [27,28].

Existing Philippine studies have primarily focused on radiation protection awareness, knowledge, and compliance among radiologic technologists and students [29, 30, 31]. Research conducted by Dayo et al. [32] demonstrated varying levels of radiation safety knowledge among healthcare professionals, emphasizing the need for continuous education and training. Other local studies have examined occupational radiation exposure, adherence to protective measures, and quality assurance practices in selected healthcare institutions [33, 34]. However, these investigations are often limited to single institutions, specific imaging modalities, or localized populations, thereby restricting the generalizability of their findings [35].

Furthermore, studies examining patient care practices within Philippine radiologic settings remain relatively limited. Most local investigations emphasize technical performance, equipment utilization, and radiation protection compliance while giving less attention to patient-centered care and its influence on clinical outcomes [36, 37, 38, 39]. Consequently, there is limited synthesized evidence that simultaneously evaluates both patient care practices and radiation safety as determinants of clinical outcomes in radiologic technology [31]. This gap is particularly important because international evidence suggests that these two domains are closely interconnected and collectively influence patient satisfaction, diagnostic quality, safety, and healthcare effectiveness [39,40].

Although research on patient care and radiation safety in Philippine radiologic practice remains fragmented and geographically limited, local studies have increasingly examined radiation protection, patient-centered care, infection control, occupational safety, service quality, and patient satisfaction. However, these findings remain dispersed across institutions and regions, limiting a comprehensive understanding of their impact on clinical outcomes. Therefore, there is a need to synthesize the available Philippine evidence to better understand how patient care practices and radiation safety influence clinical outcomes in radiologic technology. Such evidence may provide valuable insights for improving the quality, safety, and effectiveness of radiologic services in the Philippine healthcare system.

Therefore, this systematic review aims to evaluate the impact of patient care practices and radiation safety on clinical outcomes in radiologic technology in the Philippines. Specifically, the study seeks to: (1) identify patient care practices employed in radiologic technology; (2) examine radiation safety measures and compliance strategies implemented in radiologic settings; (3) assess the effects of these practices on clinical outcomes, patient satisfaction, diagnostic quality, and safety; and (4) Identify gaps in existing Philippine evidence and provide recommendations for improving radiologic practice, patient care, and radiation safety.

2. METHODOLOGY

2.1 Study Design

This study was conducted as a systematic review to comprehensively evaluate published evidence on the influence of patient care practices and radiation safety on clinical outcomes in radiologic technology in the Philippines. A systematic review methodology was selected because it enables the organized identification, critical appraisal, and synthesis of evidence addressing a focused research question [41]. The review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement to promote methodological transparency and reproducibility [42]. The review protocol was prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO) under registration number CRD420261440325.

2.2 Search Strategy

A systematic search of the literature was performed using PubMed/MEDLINE, Scopus, Web of Science, CINAHL, ScienceDirect, and Google Scholar. To maximize study retrieval, manual screening of reference lists and relevant gray literature was also undertaken. Search terms consisted of Medical Subject Headings (MeSH) and free-text keywords related to radiologic technology, patient care, patient-centered care, radiation safety, radiation protection, diagnostic imaging, clinical outcomes, occupational safety, patient satisfaction, and the Philippines. Boolean operators ("AND" and "OR") were applied to combine search terms and refine the search strategy. The overall search process followed accepted systematic review methods to ensure a comprehensive and unbiased identification of relevant literature [43].

2.3 Eligibility Criteria

Studies were eligible for inclusion if they were conducted in the Philippines and investigated patient care practices, radiation safety, or their relationship with clinical outcomes in radiologic technology. Eligible study designs included quantitative, qualitative, mixed-methods, descriptive, correlational, cross-sectional, and observational research involving radiologic technologists, radiographers, radiologic technology interns, healthcare workers, radiology personnel, or patients receiving radiologic services. Studies focusing on patient-centered care, infection prevention, occupational safety, quality assurance, radiation protection, patient satisfaction, or other aspects of radiologic practice were considered.

Only full-text articles published in English were included in the review. Review articles, editorials, conference abstracts, commentaries, case reports, studies conducted outside the Philippines, and investigations that focused exclusively on educational outcomes, workforce distribution, radiotherapy access, or topics unrelated to patient care, radiation safety, or clinical outcomes were excluded.

2.4 Study Selection

All records identified during the literature search were imported into reference management software, where duplicate citations were identified and removed. Two reviewers independently screened titles and abstracts according to the predefined eligibility criteria. Articles considered potentially relevant underwent full-text assessment to determine final eligibility. Any disagreements between reviewers were resolved through discussion, and when necessary, consultation with a third reviewer was undertaken. The overall study selection process is summarized using the PRISMA 2020 flow diagram [42].

The search strategy identified 221 records, comprising 177 studies from electronic databases and 44 additional records obtained through manual searches and other sources. Following the removal of 36 duplicates, 185 articles remained for title and abstract screening. Of these, 148 were excluded because they failed to satisfy the eligibility criteria. Thirty-seven full-text articles were subsequently assessed, with 23 excluded due to insufficient relevance, inadequate data, or failure to meet the inclusion criteria. Ultimately, 14 studies fulfilled all eligibility requirements and were included in the qualitative synthesis.

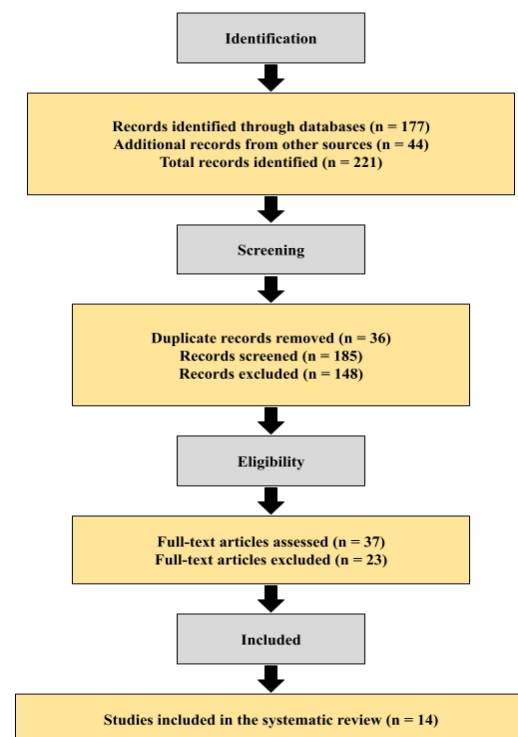


Figure 1. PRISMA 2020 flow diagram of study identification, screening, eligibility assessment, and inclusion

2.5 Data Extraction

Data from the included studies were extracted using a standardized data extraction form prepared by the research team. Information collected included study authors, publication year, study location, design, participant characteristics, sample size, patient care interventions, radiation safety measures, reported clinical outcomes, principal findings, and study limitations.

To ensure consistency and accuracy, extracted information was independently reviewed and verified by the investigators before synthesis.

2.6 Quality Assessment

The methodological quality of each included study was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Tools appropriate for the respective study design [41]. Independent assessments were performed by two reviewers to evaluate the potential risk of bias and overall methodological rigor. Differences in assessment were resolved through discussion until consensus was achieved.

2.7 Data Synthesis

Owing to variations in study design, participant characteristics, and reported outcomes, the findings were synthesized using a narrative approach rather than quantitative meta-analysis. Studies were organized into major thematic categories, including patient care practices, radiation safety, quality assurance, infection control, occupational safety, and clinical outcomes. Recurring themes, similarities, differences, and patterns across studies were identified to provide an integrated interpretation of the available Philippine evidence.

2.8 Ethical Considerations

Ethical approval was not required because this review analyzed data obtained exclusively from previously published studies. Nevertheless, the review was conducted in accordance with accepted principles of research integrity by accurately representing the findings of the included studies, acknowledging original sources, and maintaining transparency throughout the review process [44].

3. RESULTS

3.1 Characteristics of Included Studies

A total of 14 Philippine studies published between 2011 and 2026 were included in this systematic review. The studies employed various research designs, including descriptive, correlational, cross-sectional, mixed-methods, qualitative, and descriptive-correlational approaches. Sample sizes ranged from 15 to 144 participants and involved radiologic technologists, radiographers, radiologic technology interns, radiologic support personnel, healthcare workers, and patients receiving radiologic services.

The included studies investigated several aspects of radiologic practice, including patient care practices, radiation safety, quality assurance, infection control, occupational safety, service quality, patient satisfaction, and clinical outcomes. Most studies were conducted in single institutions or specific geographic regions within the Philippines, with participants drawn from hospitals, radiology departments, and healthcare facilities.

Table 1. Characteristics of Included Studies (n = 14)

Author (Year)	Study Design	Participants/ Sample	Location	Main Focus	Major Findings
Manalo et al. (2011)	Descriptive-correlational	Radiologic and X-ray technologists	Oriental Mindoro	Quality assurance	Most QA practices consistently performed; some patient care activities less frequent.
Coling et al. (2012)	Descriptive	Radiologic and X-ray technologists	Batangas and Oriental Mindoro	Patient-centered care	Communication skills consistently demonstrated; education and safety practices less consistent.
Dominguez et al. (2015)	Descriptive	144 RT interns	Philippines	Patient care attitudes	Positive attitudes toward patient care and safety.
Avento et al. (2018)	Correlational	116 radiologic technologists	Cavite	Radiation protection	Very high safety attitudes and practices; significant relationship between attitudes and practices.
Ablin et al. (2021)	Cross-sectional	74 radiographers	Northern Mindanao	Infection control	Positive attitudes but inadequate knowledge and unsafe aseptic practices.
Dean et al. (2022)	Observational	Medical radiation workers	Philippines	Occupational radiation exposure	Limited extremity and eye lens monitoring; potential underestimation of exposure.
Espiritu et al. (2023)	Descriptive	95 support personnel	Cavite	Radiation awareness	High radiation safety awareness; age influenced awareness levels.
Piansay et al. (2024)	Qualitative	15 radiographers	Philippines	Occupational hazards	Radiation exposure, stress, and workplace hazards identified.
Gringco-Llegue (2025)	Descriptive	102 radiologic technologists	Davao Region	Radiation safety culture	Moderate knowledge and neutral safety culture perceptions.
Rollon and Sison (2025)	Cross-sectional	74 radiologic technologists	Metro Manila	Mobile radiography safety	Knowledge and awareness improved safety compliance.
Abis and Felizarte (2025)	Mixed-methods	Radiologic technologists	Davao Region	Radiation safety adherence	High attitudes and adherence toward radiation safety protocols.
Valencia and Sison (2026)	Descriptive-correlational	56 radiologic technologists	Batangas	Radiation protection culture	Positive attitudes and training improved safety practices.
Anwar et al. (2026)	Explanatory mixed-methods	50 RTs + 10 interviews	Iligan City	Mental health and patient care	Depression negatively affected quality of care and patient satisfaction.
Pangkat et al. (2026)	Cross-sectional	120 patients	Iligan City	Patient satisfaction	Worker attitude and communication predicted patient satisfaction.

3.2 Patient Care Practices

Several studies examined patient-centered care practices among radiologic personnel in the Philippines. Dominguez et al. [38] reported generally positive attitudes toward patient care and safety among radiologic technology interns, emphasizing the importance of patient care education during clinical training. Similarly, Coling et al. [37] found that communication skills among radiologic and X-ray technologists were consistently demonstrated,

whereas educational and safety-related practices were implemented less consistently. Educational practices were significantly influenced by the respondents' areas of practice.

Patient-centered care was likewise associated with patient satisfaction and service quality. Pangkat et al. (2026) found that worker attitude, punctuality, and clarity of diagnostic information significantly predicted patient satisfaction, collectively explaining 68% of the variance in satisfaction scores.

The authors emphasized the importance of culturally sensitive and patient-centered radiologic care. Anwar et al. [46] demonstrated that depression and stress among radiologic technologists were associated with lower patient satisfaction, poorer perceived clinical outcomes, and reduced care coordination. Conversely, higher levels of well-being were associated with improved quality of care. Qualitative findings highlighted emotional strain, commitment to patient safety, and reliance on informal coping strategies due to limited institutional support.

3.3 Radiation Safety Practices

Radiation safety practices were generally favorable among Filipino radiologic personnel. Avento et al. [29] reported very high levels of radiation protection attitudes and practices among radiologic technologists and identified a significant relationship between safety attitudes and radiation protection behaviors. Similarly, Espiritu et al. [47] found high levels of radiation safety awareness among radiologic support personnel, with age significantly influencing awareness levels.

Rollon and Sison [48] reported that greater knowledge and awareness of radiation safety principles contributed to improved compliance with radiation safety practices in mobile radiography. The authors emphasized the importance of ALARA training, continuing professional education, and institutional support.

Likewise, Abis and Felizarte [49] found high levels of positive attitudes toward radiation safety and strong adherence to radiation protection protocols. A significant positive relationship was observed between safety attitudes and adherence to radiation safety practices ($r = 0.62$, $p < 0.001$). Barriers to compliance included discomfort associated with protective equipment, limited resources, and institutional constraints.

However, some studies identified areas requiring improvement. Gringco-Llegue [50] reported moderate knowledge levels and neutral perceptions of radiation safety culture among radiologic technologists, suggesting the need for enhanced professional development and institutional support. Similarly, Valencia and Sison [31] emphasized the importance of positive safety attitudes, clinical experiences, and regular radiation protection training programs to strengthen radiation safety culture.

3.4 Quality Assurance and Infection Control Practices

Quality assurance practices were evaluated by Manalo et al. [53], who found that most radiologic technologists consistently performed quality assurance activities. However, certain patient care activities and examination-related procedures were implemented only occasionally. The authors emphasized the need for continuous monitoring and interventions to improve patient care, quality assurance, and diagnostic safety.

Infection control practices were examined by Ablin et al. [51], who investigated aseptic techniques among radiographers involved in emergency and trauma imaging. Although respondents generally demonstrated positive attitudes toward infection prevention, deficiencies in knowledge and unsafe practices were identified among some participants. Older, more experienced, and postgraduate-trained radiographers exhibited safer practices. The study recommended additional training programs to improve infection prevention and reduce the risk of cross-contamination.

3.5 Occupational Safety

Occupational safety concerns were highlighted in several studies. Dean et al. [33] reported limited extremity and eye lens dose monitoring among healthcare workers exposed to radiation. Extremity doses were substantially higher than whole-body doses, indicating possible underestimation of occupational exposure. The study recommended strengthening occupational radiation monitoring programs to improve worker safety.

Similarly, Piansay et al. [52] identified multiple occupational hazards among Filipino radiographers, including radiation exposure, musculoskeletal disorders, workplace stress, chemical exposure, and unfavorable environmental conditions. Participants identified barriers such as limited resources, inadequate training opportunities, organizational constraints, and systemic inefficiencies that negatively affected workplace safety and well-being.

3.6 Clinical Outcomes

Although relatively few studies directly measured clinical outcomes, the available evidence suggests that patient care practices and radiation safety influence the quality and safety of radiologic services. Studies examining patient-centered care demonstrated significant associations between effective communication, worker attitude, service quality, and patient satisfaction [37, 45]. Likewise, the mental health and well-being of radiologic technologists significantly affected perceived quality of care and patient outcomes [46].

Studies focusing on radiation protection consistently indicated that positive safety attitudes, adequate knowledge, and compliance with safety protocols contribute to safer radiologic practices and reduced occupational risks [29, 31, 48, 49]. Although most studies did not directly evaluate objective patient outcomes, improvements in radiation safety practices may contribute to enhanced patient protection, reduced unnecessary radiation exposure, and improved quality of radiologic services.

3.7 Evidence Gaps

Despite increasing research interest, the available Philippine literature remains fragmented and geographically limited. Most studies were conducted within single institutions or specific regions and frequently relied on self-reported measures. Direct assessments of clinical outcomes such as diagnostic accuracy, radiation dose reduction, repeat examination rates, and long-term patient safety remain limited.

Furthermore, few studies simultaneously examined patient care practices and radiation safety despite their potential combined influence on clinical outcomes. The limited use of objective clinical indicators and the predominance of descriptive designs indicate important gaps in the existing evidence base.

The findings demonstrate that patient-centered care, radiation safety practices, quality assurance, infection control, and occupational safety are interrelated factors that contribute to safer and higher-quality radiologic services in the Philippines.

3.8 Methodological Quality Assessment

The methodological quality of the included studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools appropriate for each study design. Of the 14 included studies, nine were rated as high quality and five were considered to have moderate methodological quality. Common limitations included small sample sizes, single-institution settings, convenience sampling, and the use of self-reported measures. Nevertheless, the overall quality of the included studies was considered adequate to support the findings of this systematic review.

Table 2. Methodological Quality Assessment of Included Studies Using the Joanna Briggs Institute (JBI) Critical Appraisal Tools

Author (Year)	Study Design	JBI Rating	Overall Quality
Manalo et al. (2011)	Descriptive-correlational	7/9	Moderate
Coling et al. (2012)	Descriptive	7/9	Moderate
Dominguez et al. (2015)	Descriptive	8/9	High
Avento et al. (2018)	Correlational	8/9	High
Ablin et al. (2021)	Cross-sectional	7/8	Moderate
Dean et al. (2022)	Observational	7/8	Moderate
Espiritu et al. (2023)	Descriptive	8/9	High
Piansay et al. (2024)	Qualitative	8/10	High
Gringco-Llegue (2025)	Descriptive	7/9	Moderate
Rollon and Sison (2025)	Cross-sectional	8/8	High
Abis and Felizarte (2025)	Mixed-methods	8/10	High
Valencia and Sison (2026)	Descriptive-correlational	8/9	High
Anwar et al. (2026)	Mixed-methods	9/10	High
Pangkat et al. (2026)	Cross-sectional	8/8	High

Final Assessment: Of the 14 included studies, nine were rated as high quality and five were rated as moderate quality. Common methodological limitations included single-institution settings, small sample sizes, convenience sampling, and reliance on self-reported measures. However, the overall methodological quality of the included studies was considered adequate to support the findings of this systematic review.

4. DISCUSSION

This systematic review integrated evidence from 14 studies conducted in the Philippines to examine how patient care practices and radiation safety influence radiologic services. Collectively, the findings indicate that patient-centered care, effective radiation protection, quality assurance, infection prevention, and occupational health function as complementary elements of high-quality radiologic practice. Although direct measures of clinical outcomes were limited, the available evidence consistently suggests that these domains contribute to patient satisfaction, service quality, workplace safety, and the overall effectiveness of diagnostic imaging services.

One of the most consistent findings across the included studies was the importance of patient-centered care in promoting positive healthcare experiences. Philippine studies reported that radiologic technology interns and practicing technologists generally demonstrated favorable attitudes toward communication, patient safety, and compassionate care, although patient education and safety counseling were implemented less consistently [37,38]. These findings align with international evidence showing that effective communication and empathetic interactions reduce patient anxiety, improve cooperation during imaging procedures, and enhance the overall patient experience [16,19]. Strengthening patient education may therefore represent an important opportunity for improving the quality of radiologic services in the Philippines.

Patient satisfaction also emerged as a recurring indicator of service quality. Studies included in this review demonstrated that factors such as professional attitude, timely service delivery, and clear communication significantly influenced patients' perceptions of radiologic care [45]. Likewise, the psychological well-being of radiologic technologists affected perceived quality of care and care coordination, with higher levels of stress and depression being associated with poorer patient experiences [46]. These findings highlight that high-quality radiologic practice depends not only on technical competence but also on workforce well-being and interpersonal skills. Supporting the mental health of radiologic personnel may therefore produce indirect benefits for patient care and service delivery. Radiation protection was another area in which the reviewed studies demonstrated generally positive findings. Most investigations reported high levels of awareness, favorable attitudes, and good compliance with radiation safety protocols among Filipino radiologic professionals [29,31,47-49]. These observations are consistent with internationally accepted radiation protection principles emphasizing justification, optimization, and dose limitation [4]. A strong safety culture appears to promote adherence to radiation protection practices and may contribute to reducing unnecessary radiation exposure for both patients and healthcare workers.

Despite encouraging levels of compliance, several studies identified persistent gaps that warrant attention. Moderate knowledge of radiation safety, neutral perceptions of institutional safety culture, and inconsistent access to continuing education suggest that improvements remain necessary [31,50]. These findings indicate that maintaining effective radiation protection requires ongoing professional development, regular competency assessments, institutional commitment, and supportive leadership to reinforce safe clinical practice.

The review also underscored the importance of quality assurance and infection prevention in maintaining safe radiologic services. While quality assurance activities were routinely performed in many institutions, some patient care procedures and examination-related practices were implemented inconsistently [53].

Likewise, although radiographers generally recognized the importance of aseptic techniques, knowledge gaps and variations in practice remained evident [51]. Continuous education, routine audits, and institutional monitoring may therefore help strengthen consistency in these essential components of radiologic practice.

Occupational health challenges continue to affect the radiologic workforce in the Philippines. Evidence from the included studies identified concerns related to inadequate radiation monitoring, musculoskeletal strain, workplace stress, and other occupational hazards [33,52]. These issues may influence employee well-being, productivity, and ultimately the quality of patient care. Expanding occupational health programs, improving workplace conditions, and strengthening radiation monitoring systems could enhance both staff safety and healthcare quality.

An important limitation of the current evidence base is the scarcity of studies that directly measured objective clinical outcomes, including diagnostic accuracy, repeat examination rates, radiation dose reduction, and long-term patient outcomes. Most available research relied primarily on self-reported attitudes, knowledge, perceptions, or satisfaction measures. Although these outcomes provide valuable insights into clinical practice, future investigations incorporating objective performance indicators would provide stronger evidence regarding the effectiveness of patient care and radiation safety interventions.

The available Philippine literature also presents several methodological limitations. Most studies were conducted within single institutions, included relatively small sample sizes, and frequently used convenience sampling or self-administered questionnaires. In addition, relatively few investigations examined patient care practices and radiation safety simultaneously despite their complementary roles in influencing healthcare quality. These limitations highlight the need for larger multicenter studies employing standardized outcome measures and more rigorous study designs. The findings of this review reinforce the importance of integrating patient-centered care, radiation protection, quality assurance, infection prevention, and occupational health into routine radiologic practice. Continued investment in professional development, institutional support, and evidence-based safety initiatives has the potential to improve both patient outcomes and workforce well-being. Future multicenter studies using objective clinical indicators will further strengthen the evidence available to guide policy, education, and clinical practice in radiologic technology.

5. CONCLUSION

This systematic review synthesized evidence from 14 Philippine studies evaluating the influence of patient care practices and radiation safety on radiologic technology services. The available evidence indicates that patient-centered care, effective communication, radiation protection, quality assurance, infection prevention, and occupational health collectively contribute to safer and higher-quality radiologic

practice. Positive attitudes toward patient care and compliance with radiation safety measures were consistently associated with improved patient satisfaction, enhanced service quality, and safer working environments. Despite these encouraging findings, important challenges remain. Gaps in radiation safety culture, continuing professional education, occupational monitoring, infection prevention practices, and institutional support continue to affect the delivery of optimal radiologic services. Furthermore, the existing evidence is largely derived from single-center studies using self-reported measures, with relatively few investigations evaluating objective clinical outcomes such as diagnostic accuracy, repeat imaging rates, radiation dose optimization, or long-term patient outcomes. Strengthening patient-centered care, promoting a culture of radiation safety, expanding continuing professional development, improving occupational health programs, and reinforcing institutional quality assurance systems may further enhance the quality and safety of radiologic services in the Philippines. Future multicenter research incorporating objective clinical outcome measures is needed to strengthen the evidence base and support policy development, professional education, and evidence-based clinical practice.

7. RECOMMENDATIONS

Based on the findings of this systematic review, the following recommendations are proposed for relevant authorities and stakeholders in the Philippines to improve patient care practices, radiation safety, and clinical outcomes in radiologic technology.

Department of Health (DOH)

The Department of Health should continue strengthening national policies, quality assurance systems, and monitoring programs that promote patient-centered radiologic care and radiation safety. Standardized quality indicators for patient satisfaction, radiation protection, and clinical performance should be implemented across healthcare facilities.

Philippine Nuclear Research Institute (PNRI)

The Philippine Nuclear Research Institute should expand occupational radiation monitoring, strengthen compliance audits, and support healthcare facilities through regular radiation safety assessments and technical guidance to improve radiation protection practices nationwide.

Professional Regulation Commission and the Board of Radiologic Technology

The Professional Regulation Commission and the Board of Radiologic Technology should strengthen continuing professional development programs focusing on patient-centered care, radiation protection, infection prevention, quality assurance, occupational health, and emerging best practices in radiologic technology.

Commission on Higher Education (CHED)

The Commission on Higher Education should further integrate patient communication, radiation protection, occupational safety, quality assurance, infection prevention, and evidence-based practice into undergraduate radiologic technology curricula and clinical training programs.

Hospital Administrators and Radiology Departments

Healthcare institutions should provide regular competency training, maintain adequate radiation protection resources, promote quality assurance activities, support staff well-being, and establish non-punitive safety reporting systems that encourage continuous quality improvement.

Professional Organizations

Professional organizations should continue promoting evidence-based practice through scientific meetings, continuing education programs, collaborative research, and initiatives that strengthen patient care and radiation safety among radiologic professionals.

Researchers and Academic Institutions

Future studies should involve multicenter designs, larger and more representative populations, and objective clinical outcome measures such as diagnostic accuracy, repeat imaging rates, radiation dose optimization, patient safety indicators, and healthcare quality metrics. Simultaneous evaluation of patient care and radiation safety will provide a more comprehensive understanding of their combined influence on clinical outcomes.

Collectively, these recommendations provide practical strategies for strengthening patient care, radiation safety, and the overall quality of radiologic services while supporting evidence-based policy, education, and professional practice in the Philippines.

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