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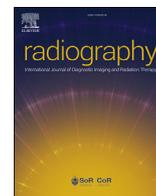
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Review article

Enhancing safety culture in radiology: Key practices and recommendations for sustainable excellence

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ABSTRACT

Objectives: This review aims to explore and thematically synthesize the existing literature on safety culture within the context of radiology. The primary objective is to identify key practices that effectively strengthen safety culture, highlighting the pivotal roles of leadership, effective teamwork, and inter-professional collaboration in these efforts. The review intends to showcase actionable recommendations that are particularly relevant to the radiology setting.

Key findings: The study highlights that effective leadership is fundamental in establishing and nurturing a safety-first approach within radiology departments. Key practices for promoting a safety culture include safety huddles, leadership walkarounds, quality learning boards, intentional patient rounding (frequent patient-care provider interactions), morbidity and mortality meetings, and multidisciplinary team rounds. These practices have been found to facilitate open communication and transparency, which are crucial elements in creating a sustainable safety culture. Additionally, the study underscores the significant role of radiology managers in driving these safety initiatives and acting as facilitators for a culture of safety, focused on long-term excellence and continuous improvement.

Conclusion: The study concludes that a multifaceted and comprehensive approach is vital for fostering a safety culture in radiology departments, with a focus on sustainable excellence in patient care. The leadership role is critical in this process, with radiology managers being instrumental in implementing and maintaining effective safety practices.

Implications for practice: This study provides best practices for sustainable safety culture in radiology departments. It advocates for healthcare managers to adopt and integrate these identified practices into their operational strategies. Continuous professional development, focusing on safety and quality in patient care, and fostering a collaborative environment for open discussion and learning from safety incidents are essential for the continued advancement and excellence of healthcare services.

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Introduction

Approximately one in ten patients suffers harm in healthcare environments, leading to over three million deaths each year due to unsafe care worldwide.¹ In response, in April 2024, the World Health Organization (WHO) has introduced the Patient Safety Rights Charter, an essential tool supporting the execution of the Global Patient Safety Action Plan 2021–2030: Towards eliminating avoidable harm in healthcare.² The Charter, developed to coincide with World Patient Safety Day 2023, is dedicated to incorporating

vital principles such as patient and family engagement, equity, dignity, access to information, and risk management into the fundamental practices of patient safety.² The Charter advocates for safer practices and the reduction of avoidable harm, thereby enhancing patient health outcomes and well-being. It also emphasizes the importance of education and training for the health workforce and strengthens the capacity of nations to handle significant healthcare safety risks through a rights-based, risk management approach. The Charter outlines ten essential patient safety rights to mitigate risks and prevent harm in healthcare settings.² These rights address multiple factors impacting patient safety, including health workforce management, the availability of safe medical products, and the socioeconomic and physical environments, including:

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1. Right to timely, effective, and appropriate care
2. Right to safe health care processes and practices
3. Right to qualified and competent health workers
4. Right to safe medical products and their rational use
5. Right to safe and secure health care facilities
6. Right to dignity, respect, non-discrimination, privacy, and confidentiality
7. Right to information, education, and supported decision-making:
8. Right to access to medical records
9. Right to be heard and fair resolution
10. Right to patient and family engagement

These rights collectively aim to create a safer healthcare environment, recognizing that safety culture in healthcare is a complex ecosystem of shared values, beliefs, and norms concerning the importance of safety within a clinical environment.^{1,2} Safety culture is defined as a dynamic and multi-faceted construct comprising of collective norms, values and assumptions.³ Safety culture is not just about implementing interventions but also about establishing underlying factors that make safety behaviours sustainable.^{3,4} This comprehensive approach ensures a more robust, adaptable, and effective safety culture that can significantly enhance patient safety and organizational performance in healthcare settings.⁵ Kilcullen and colleagues conducted a comprehensive review of safety culture across several industries and proposed 'The Safety Culture Framework' for healthcare.⁵ This framework establishes the concept of a safety culture by outlining the factors that create an environment where individual employees can embrace safety values within an organization.⁵ The fundamental beliefs, principles, and accepted behaviours associated with safety culture are reflected in the actions of employees, which subsequently influence safety results. Employees, therefore, gain insights from these safety outcomes, which contribute to strengthening the overall safety culture.⁵

Leadership plays a pivotal role in fostering a safety culture. It is within the healthcare leaders' responsibility to translate organizational visions and strategies into actionable safety initiatives.^{6,7} The bridging role of managers highlights the importance of communication and transparency in enhancing safety culture.^{6,7} Leaders instil a sense of psychological safety, where staff are encouraged to voice concerns and ideas without fear of retribution, promoting an open chain of communication.^{6,7} This approach significantly contributes to creating a workplace environment where staff feel safe.⁸

Despite the critical role that safety culture plays in enhancing patient safety and organizational performance across healthcare settings, there remains a limited understanding of how these practices are adapted and operationalized in the unique context of radiology.⁹ Radiology departments are integral to patient care, offering diagnostic and therapeutic services that involve complex technologies and multidisciplinary teamwork.⁹ The specialized nature of these services, combined with the rapid pace of technological advancements and the high volume of patient interactions, presents distinct challenges for safety culture implementation. Furthermore, existing studies predominantly focus on safety culture in healthcare more broadly, often neglecting the specificities that characterize radiology departments, such as the integration of advanced imaging technologies, the coordination between various professional groups, and the critical importance of precise communication to prevent diagnostic errors. This review aims to fill this gap by providing an overview of the existing literature on safety culture within the context of radiology, identifying key practices, outcomes, and recommendations that are uniquely pertinent to this field. By doing so, it endeavours to provide an overview that can inform future strategies and interventions to

foster a robust safety culture in radiology departments, ultimately contributing to enhanced patient safety and quality of care.

Methods

Narrative review approach

This narrative literature review examines the existing body of research on key practices and recommendations for achieving sustainable excellence in safety culture within radiology departments, covering literature from the earliest available records up to December 2023. Given the multifaceted nature of safety culture in healthcare, particularly in the context of radiology, a narrative approach was deemed most suitable for its comprehensive ability to "describe the history or development of a problem or its management".¹⁰

Narrative reviews offer researchers an opportunity to present the existing knowledge on a subject, by engaging in a subjective review and analysis of the literature.¹¹ This method allows for a broad exploration of the topic, enabling the identification and synthesis of diverse evidence related to safety practices, outcomes, and recommendations within radiology departments. Therefore, this methodology serves a valuable purpose by delving into less explored areas or by offering fresh perspectives and approaches to fields that are thoroughly investigated and well-established.¹¹ A thematic synthesis of the literature was employed to generate common themes and recommendations for safety culture.

Search strategy and eligibility criteria

PubMed and Medline databases were searched using the following keywords: "safety culture" AND ("radiology" OR "medical imaging" OR "radiation therapy" OR "radiotherapy" OR "radiography" OR "nuclear medicine"). These terms were combined using Boolean operators to refine the search outcomes, focusing on articles that directly addressed safety culture, radiology practices, and leadership roles in promoting safety. The review included peer-reviewed articles, guidelines, government reports and consensus documents published in English. Exclusions were made for articles outside the scope of safety culture, non-peer-reviewed literature, and conference proceedings. A decision was made to also include articles focusing on safety culture in a broader context, i.e. in a hospital setting as this closely relates to radiology departments. After completing the initial database search, a 'snowball' search technique was employed. This involved reviewing the reference lists of relevant articles and conducting a citation search to identify additional studies that may not have been captured in the initial search. This two-stage approach ensured a thorough exploration of the literature, capturing both directly and indirectly related articles to the research question.

Key practices of safety culture in radiology departments

In a highly advanced and complex radiology department, where a range of radiation sources and imaging techniques are utilized for both diagnostic and therapeutic purposes, the role of multiple modalities is crucial in handling a large influx of both inpatients and outpatients, including emergency cases.¹² This department is characterized by complex communication within a rapidly evolving technological landscape, where radiographic technology is essential even in hybrid procedures.^{13,14} In such an environment, the potential for patient safety incidents is present at every step of the radiological process, necessitating the development of targeted safety strategies. The effective use of medical imaging in this setting requires a collaborative, interprofessional approach, involving a

range of healthcare professionals such as radiologists, radiographers, sonographers, nurses, medical physicists, and others, all dedicated to meeting both the medical objectives and the specific needs of patients.^{15,16} However, it is important to recognize that patient safety is not solely the result of individual competence; it also relies on a multitude of factors within the workplace that collectively foster a safety culture, where both individuals and the systems they work within are integral to maintaining safe and effective care.¹⁷

Safety culture, particularly in radiology departments, is a dynamic landscape that is shaped and refined by all stakeholders, including healthcare executives, managers, professionals, patients and their families.^{3,4} Six initiatives have been identified as the pathways to foster a safety culture, which can be effectively implemented in radiology departments. In Australia, these initiatives are adapted from New South Wales (NSW) Government and Clinical Excellence Commission.¹⁸ In NSW, The NSW Ministry of Health serves as the 'system manager' for the NSW public health system, overseeing more than 220 public hospitals along with a range of community health and other public health services.¹⁹ These services are delivered to the NSW community through an extensive network of local health districts, specialty networks, and affiliated non-government health organizations, collectively known as NSW Health. This system is divided into 15 local health districts, with six catering to the greater Sydney metropolitan regions and nine addressing the needs of rural and regional NSW. This structure facilitates the delivery of health services across a diverse array of settings, from remote outback primary care posts to advanced metropolitan tertiary health centres.¹⁹ Integral to the NSW public health system's commitment to safety and quality is the Clinical Excellence Commission. Established in 2004 as a board-governed statutory health corporation, the CEC's mandate is to lead safety and quality improvement across the state's public health system. It aims to reduce adverse events in public hospitals, enhance the transparency and review of such events, and promote improved clinical care, safety, and quality in health services throughout NSW. The role of the Commission is crucial in setting standards, providing guidance, and implementing initiatives to foster a culture of safety and excellence in clinical care, making it a pivotal component of the healthcare landscape in NSW.¹⁹ These initiatives can be summarised in Fig. 1, involving safety huddles, leadership walkarounds, quality learning boards, intentional patient rounding, multidisciplinary rounds and mobility and mortality meetings.

Safety huddles

The implementation of safety huddles has been markedly effective in promoting safety culture within healthcare settings.²⁰ These huddles are brief, regular and informal meetings that multidisciplinary healthcare teams gather to communicate, discuss, collaborate and strategize on safety-related issues. When built into the organizational routine, safety huddles foster an environment of open communication between staff members from various roles and this initiative highlights the collective responsibility of all team members in ensuring patient and staff's safety.²⁰ Safety huddles provide a platform for rapid response, enabling teams to share updates on patient's conditions, adapt their practices to address emerging safety issues and allow their perspectives to be considered.²⁰ In 2016, Donnelly and colleagues introduced a novel approach to improving management and accountability in paediatric radiology services conducted at Department of Radiology, Texas Children's Hospital, Houston, USA.²¹

The study employed a structured process for the Daily Readiness Huddle, comprising four elements: metrics review, clinical volume review, daily readiness assessment, and problem accountability.

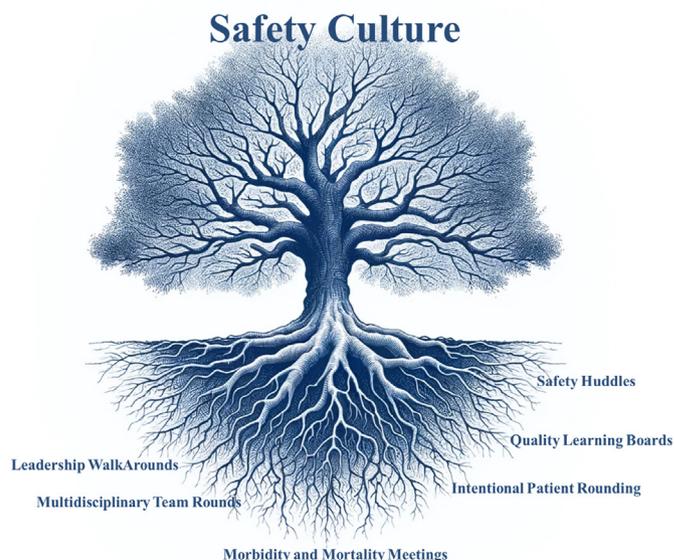


Figure 1. Six practical initiatives (or roots) that can grow a safer environment for staff, patients, families, and carers.

These elements were designed to identify and categorize problems into "quick hits" (resolved within 24–48 h without requiring project management) and "complex issues" (requiring more time and possibly project management). Data were visually displayed on erasable whiteboards, and the daily readiness assessment used queues to determine concerns or outlier data regarding Safety, Methods, Equipment, Supplies, or Associates (S-MESA). Off-site participants were also encouraged via virtual means. Through this process, problems were rapidly identified, categorized, and addressed. Complex issues were assigned an owner, a quality coach, and a report-back date. Projects were defined as strategic improvements taking more than 60 days and did not necessarily arise from the huddle's identified issues. The study's baseline involved comparing the problem-solving effectiveness and team coordination before and after the implementation of the Daily Readiness Huddle. Statistical analysis included tracking and calculating the mean, median, and range of days to resolution and completion for complex issues and projects during the first full year of implementing this process. Specifically, during the first 12 months, 91 complex issues were identified and resolved, and 33 projects were completed, with an additional 23 projects active or in planning. The mean time to resolution of complex issues was 37.5 days, with a median of 34.0 days and a range of 1–105 days. For projects, the mean time to completion was 86.0 days, with a median of 84.0 days and a range of 5–280 days.²¹ It was found that the Daily Readiness Huddle process has not only improved the department's problem-solving capability and accountability but has also positively impacted team-building, communication, and coordination. It emphasizes that such system could be a valuable model for other departments looking to enhance daily operations and foster a culture of safety and continuous improvement.²¹

Leadership walkarounds

Leadership walkarounds (LW) were first introduced in 1999 and have been a positive approach for healthcare staff to identify, discuss and resolve matters relating to safe care delivery.²² There is growing evidence that LW contribute to improved patient safety, preparedness for quality improvement and positive outlooks of leadership

team.²³ Moreover, such approach is also linked to enhanced key performance parameters in workforce well-being such as improved work-life balance and emotional exhaustion.²⁴ This connection between LW and staff wellbeing is relevant, particular in the era of post COVID-19 pandemic, a time when healthcare worker burnout is on the rise, adversely affecting both employees and patients. Such burnout can lead to significant costs for the healthcare system.²² Historically, LW typically involved senior leaders proactively identifying and mitigating potential risks to patient safety in clinical environments. The new form of LW, termed 'positive LW, steers away from deficiencies and fears, and focuses on what is going well. This has therefore promoted positive emotions such as pride and hope, and is shown to link to the feeling of greater purpose.'²² The meta-analysis conducted by Howell, Kern, and Lyubomirsky (2007) focused on integrating findings from 150 studies to explore the impact of subjective well-being on objective health outcomes. This extensive analysis revealed that subjective well-being positively influences health.²⁵ Notably, the benefits of well-being were observed across both short-term and long-term health outcomes, suggesting that the positive effects of well-being on health can be immediate and accumulate over time.²⁵ Among various health domains, the impact of well-being was particularly significant on immune system response and pain tolerance, highlighting specific biological pathways through which well-being may bolster the body's defence mechanisms and modulate pain experience.²⁵ When radiology leaders visited imaging divisions and discussed frontline employees' concerns, it was reported that multiple patient safety and other issues were identified and remedied. These walkarounds have also increased quality of care, operational efficiency as well as patient safety.²⁶ For example, a study conducted in Department of Radiology at Cincinnati Children's Hospital Medical Centre introduced the operational rounds process as part of their comprehensive safety program, involving radiology leaders visiting imaging divisions to discuss frontline employees' concerns about patient safety, quality of care, and patient and family satisfaction. This initiative aimed to leverage the knowledge of frontline workers to identify areas needing improvement and to foster a culture of safety within the department.²⁶ One significant outcome of the operational rounds was the identification and resolution of multiple patient safety and other operational issues, leading to improvements in patient safety, care quality, and operational efficiency.²⁶ The findings also established the mean number of days between serious safety events in their radiology departments has increased two-fold since the walk-around program started.²⁶ Before the implementation of the operational rounds and other components of the safety program, the frequency of serious safety events served as a baseline for measuring improvements in patient safety. A "serious safety event" is defined by the institution as an adverse event that results in significant harm to a patient due to deviation from best-practice care, encompassing all "never events" as defined by the National Quality Forum. The paper provides concrete examples of how operational rounds led to practical solutions for identified issues.²⁶ For instance, one issue involved the matching of radiography cassettes with patients in the neonatal intensive care unit, which was resolved by introducing dry-erase marker-compatible stickers on cassettes for accurate patient identification. Another example highlighted the optimization of patient tracking in the radiology waiting area through an electronic tracking system, improving communication and reducing unnecessary waiting times for patients.²⁶

Quality learning boards

Quality Learning Boards (QLBs) serve as a vital tool in clinical settings, effectively communicating the quality and safety activities within a unit to staff, patients, and visitors.²⁷ They display critical

information such as outcomes of safety indicators, staff and patient experience data, and ongoing quality and safety activities. Unlike static information boards hidden away in back offices, QLBs are dynamic and engaging, placed in accessible areas and updated regularly to ensure relevance and encourage interaction. Their purpose is to provide at-a-glance measurable indicators of performance, highlight areas for improvement, and foster continuous learning and improvement.²⁸ Key types of information displayed on QLBs often start with a few critical areas such as hand hygiene performance, hospital-acquired infections, and medication incidents. By showcasing this data, QLBs help in monitoring and improving these essential aspects of healthcare delivery. In addition to quantitative data, QLBs also incorporate qualitative data to provide context and deeper meaning to the measures displayed. This includes patient experience data, which can offer insights into the patient's perspective on the care they receive, and staff awards and recognition, highlighting and celebrating the achievements and contributions of healthcare staff. This approach not only demonstrates accountability but also reinforces the team's commitment to continuous learning. QLBs promote engagement, teamwork, communication, and risk awareness among staff and provide patients and visitors with insights into the unit's performance and improvement efforts.²⁷

Intentional patient rounding

This approach surrounds how to conduct purposeful and regular communication with patients.²⁹ It involves hourly interaction by a healthcare team member with each patient and/or their family or carer, with the goal of keeping them informed about their care, supporting the delivery of safe, quality care, regularly evaluating care quality, and creating trust while reducing anxiety.²⁹ Intentional Patient Rounding is integrated into routine tasks such as administering medications or taking observations, enabling the assessment of the effectiveness of care strategies. It promotes proactive workload management and the information collected during rounds informs clinical handovers.³⁰

The principles of Intentional Patient Rounding emphasize individual attention without making patients feel like they are taking up staff's time, taking into account each patient's risk factors, and documenting each round.³¹ Key behaviours in Intentional Patient Rounding include using specific greeting keywords, accomplishing and documenting scheduled tasks, assessing personal needs, patient position, the environment, discomfort, devices, and documentation. Additionally, it involves updating patient care boards and informing patients when the healthcare professional will return.³²

The expected results from this approach include building a trusting therapeutic relationship, improving communication and individualized care, contributing to safety and efficiency, and delivering planned care tailored to each patient's needs.²⁹ This contributes to better patient outcomes, quality indicators, and reduced risk.

Multidisciplinary team (MDT) rounds

MDT with Patient Rounds bring together healthcare workers from various disciplines, such as nursing, allied health, medical, and pharmacy, to collaborate at the point of care.³³ This collaboration aims to coordinate patient care, identify current risks, establish patient goals, develop plans for risk reduction, and plan transitions of care.³³ These rounds are conducted at the patient's bedside, chairside, or in community settings, ensuring the patient's treatment progresses with input from a senior decision-making clinician.³⁴ The process aims to ensure everyone, including the patient,

understands the care plan. It encourages shared decision-making, which can prevent delays in treatment and reduce the risk of adverse events. There is, however, a scarcity of research examining involvement and benefits of such involvement from radiology staff, including radiologists, radiographers, and radiology nurses, in MDT. It is still unclear how frequently the inclusion of subspecialised radiologists in MDT alters patient care, especially in hospitals where radiologists already routinely report on all imaging studies prior to the MDT. A recent study by Kasalak and colleagues confirmed that in multidisciplinary team meetings (MDTs), radiologists only modify patient management in a limited number of instances.³⁵ In breast imaging, consultant breast radiographer play a critical role in MDT meetings by bringing expert opinions which significantly enhance the diagnostic pathway for breast cancer patients.³⁶ This collaborative approach not only streamlines patient care by enabling most diagnostic procedures to be completed in a single outpatient visit but also ensures the delivery of a high-quality, patient-centred service. Through this synergy, patients benefit from a fast-tracked diagnostic process, reduced anxiety from waiting times, and a more personalized care plan, ultimately improving patient outcomes and satisfaction. The consultant radiographer also felt a sense of professional satisfaction.³⁶ Williams and colleagues suggested that radiographers in established MDT fluoroscopic and theatre settings expressed more job satisfaction due to successful power dynamics and reciprocal relationships.³⁷ In hospital settings, it has been established that units that regularly practice MDT rounds have seen reduced hospital stays, reduced patient harm, improved communication, and enhanced experiences for patients and staff.³⁴

Morbidity and mortality (M&M) meetings

M&M meetings within healthcare settings focus on six core principles to support system improvement and patient safety.^{38,39} These principles include creating a safe space for learning, fostering multidisciplinary participation, establishing a systematic meeting framework, promoting comprehensive discussions, documenting lessons learned, and maintaining robust governance structures.³⁸ Key features of these meetings are the promotion of a non-judgemental, blame-free environment, multidisciplinary collaboration, and a structured agenda supported by clinical analytics.³⁸ Discussions are aimed at generating actionable learning and system improvements, with a focus on systems and processes rather than individuals.^{38,39} In radiology settings, there lacks consensus on standards of practices and guidelines to embed M&M meetings in daily operations of radiology departments to prevent medical errors. A study conducted in interventional radiology department emphasised the beneficial impact of M&M on their practices.⁴⁰ Conducted through an online survey distributed to members of the Cardiovascular and Interventional Radiology Society of Europe, the study found that while 47% of the respondents reported having interventional radiology M&M meetings in their departments, a significant majority (94%) of those without such meetings expressed interest in incorporating them in the future.⁴⁰ Monthly meetings were most common among those who conducted them, with 68% rating the quality as good or excellent. The main reasons cited for not holding interventional radiology M&M meetings included lack of time and small practice groups.⁴⁰ The study highlighted a strong interest in learning more about interventional radiology M&M meetings and suggested a need for guidelines to integrate M&M meetings into radiology departments to enhance patient safety and outcomes.⁴⁰ The study also noted that as the complexity of procedures performed by interventional radiologists increases, the discussion and analysis of medical errors

become crucially important for ensuring patient safety and advocacy.⁴⁰

The role of radiology managers

Radiology managers play a critical role in promoting, maintaining, and improving safety culture within radiology departments.^{3,4} The term 'radiology manager' refers to the professional responsible for overseeing the operations, personnel, and safety protocols within radiology departments. It is acknowledged that the exact job title and scope of responsibilities for this role may vary internationally, encompassing titles such as Radiology Department Manager, Director of Radiology, Campus Operations Manager, Imaging Services Manager, Lead superintendent Radiographer, and others. Despite these variations, the core functions related to managing safety culture, operational efficiency, and staff coordination in radiology settings are universally applicable. Therefore, for the purpose of clarity and consistency, the term 'radiology manager' will be used throughout this paper to denote individuals in these roles, regardless of the specific title used in different countries or healthcare systems. Radiology managers must establish a clear safety vision that outlines the organization's commitment to safety.³ This vision should also reflect the healthcare organisation's policies and procedures and be shared with all staff members. This comes with good governance where individual staff issues, and support needs are recognised.⁴¹

Radiology managers drive safety culture by translating organizational strategies into practical actions and serving as a bridge between senior leaders and frontline staff.^{6,7} Therefore, radiology managers are positioned to act as knowledge brokers, facilitating the flow of information, ideas, and best practices between different levels and functions within the healthcare organization.⁴² They cultivate an environment where insights are shared, challenges are collectively addressed, and solutions are collaboratively constructed.⁷ This ensures that safety culture is not a top-down imposition but a collective ethos from all staff members.⁴³

Inspirational leaders can foster a balance of exploration and exploitation in staff learning to facilitate radical change.⁴⁴ Radiology managers can promote safety culture by fostering a supportive learning environment, and promoting communication and collaboration across different organizational levels. This approach comprises of experimentation, risk-taking and interaction with external environments.⁴⁴ Experimentation refers to facilitating new ideas and solutions in ways that work. Risk-taking refers to proactivity, i.e. showing initiative to tolerate errors, and interaction with the external environment can be seen as multifaceted relationships between the economic, social and legal systems.⁴⁴ Opportunities for peer learning and interdisciplinary learning should also be encouraged. This has direct benefits of building a team identity in the workplace as well as improving communications within, and external to the team.²¹

To maintain safety culture, radiology managers must ensure that safety remains a top priority and that staff are held accountable for their learning and practice. To do this, radiology managers can encourage a reporting culture by treating errors and near-misses as opportunities for learning and improvement in practice, instead of blame and punishment.⁴ This will allow staff members to feel comfortable with the reporting practices and overall improve safety culture, avoid blame culture and support just culture.⁴⁵ Just Culture, a concept of safety in the medical field promoted by David Marx since the early 2000s, stems from his development of systems for investigating human errors. Initially designed for the aviation industry and adopted by airlines globally, these systems were later introduced to the healthcare sector under the name Just Culture.⁴⁶ Moreover, radiology managers could ensure that staff members are

equipped with contemporary knowledge on safety protocols, through regular and comprehensive training.⁴⁷ This training should cover topics such as infection control, medication safety, and patient handling.

Besides maintaining safety, radiology managers should be proactive in identifying and addressing potential safety risks. This includes performing regular risk assessments, implementing evidence-based practices and guidelines, and using feedback to identify areas for improvement.^{3,7} Using data and feedback means that radiology managers have a responsibility to monitor and evaluate their organisations to promote staff safety and are willing to make changes for improvement. Furthermore, regular safety audits must be conducted by train safety professionals to identify potential hazards and areas for improvement.^{3,7} To further support radiology managers, a range of workplace/occupational health and safety regulations, policies and procedures have been introduced by the federal government. These practical strategies help organisations to sustain patient safety culture change over the long term.⁷

Another approach for radiology managers to improve safety culture is through continuous improvement processes. This is achieved by encouraging staff members to identify areas for improvement and by providing the necessary resources to implement changes.⁸ [Evidence suggests that healthcare professionals who prioritize continuous quality improvement tend to experience higher levels of psychological safety, including reduced workplace violence and aggressive, reduced work overload, better workplace relationships.](#)⁶ [Psychological safety plays a vital role in connecting an environment that focuses on continuous quality improvement, with staff engagement in experimentation and recommending improvements to routine practices.](#)⁸ By establishing a culture of continuous improvement, radiology managers can ascertain that the healthcare organizations provide safe and high-quality care to staff and patients.⁸ Furthermore, radiology managers juggle multiple roles and balancing their responsibilities with administrative, operational and/or clinical duties. It is therefore important for radiology managers to optimise their adaptability, manage their time efficiency and prioritize tasks while navigating this complex landscape.^{3,6,7}

With an increasing utilisation of artificial intelligence (AI) tools and applications in various sectors, it is recognised that AI technologies are beginning to play a role in safety culture.⁴⁸ There is limited evidence in how AI technologists could enhance key practices of safety culture in radiology departments. There have been several findings in other specialised areas.⁴⁸ An example of AI's potential in healthcare is highlighted by a study conducted by Swaminathan et al., where a machine learning algorithm was specifically designed to anticipate flare-ups in patients suffering from chronic obstructive pulmonary disease (COPD).⁴⁹ This algorithm not only provided crucial at-home decision support for patients but also demonstrated remarkable accuracy in triaging patients, ensuring their safety. In a rigorous validation study involving 101 individuals, the algorithm consistently made safe triage recommendations.⁴⁹ Notably, it never failed to escalate cases that required a doctor's attention and only under-triaged patients for emergency room visits in fewer than 14% of instances. This performance starkly contrasts with the decision-making of physicians in the study, who under-triaged patients at higher rates of 22% and 30% for similar decision.⁴⁹

Another example for safety is found in the work of Zhang and colleagues which investigates the integration of AI and machine vision technology in improving safety management systems for construction personnel.⁵⁰ The study highlights the development of a real-time detection and early warning platform capable of automatically identifying predefined dangerous scenarios, thus aiming to mitigate construction accidents.⁵⁰ Drawing parallels to radiology

departments, this study's methodology and outcomes hint at the untapped potential of AI and machine vision in enhancing safety protocols and practices. The research identifies the main factors affecting safety in construction, such as human, mechanical, environmental, and management factors, and applies AI technology to monitor and manage these elements effectively, achieving a significant improvement in safety management levels.⁵⁰ As in civil engineering, the application of AI in radiology could involve the analysis of complex datasets to predict potential safety issues, automate the monitoring of safety compliance, and offer real-time alerts to prevent accidents. However, Zhang's study also acknowledges the challenges and limitations of applying AI technology, such as the need for further research to validate these applications and address recognition errors due to environmental factors. These considerations are equally relevant to the radiology context, where the complexity of medical imaging and patient safety requires tailored AI solutions.⁵⁰

While the field is still evolving, it is clear that these AI applications could significantly impact safety management and safety culture in radiology departments. We could anticipate that such applications can offer radiology managers and organisations more sophisticated tools for ensuring workplace safety. However, further research is necessary to confirm the effectiveness of these applications.

Recommendations

Enhancing radiology managers as knowledge brokers

The radiology managers' role as knowledge broker is undeniably integral but there are still several barriers and a lack of transparency that negatively influence radiology managers' knowledge brokering.⁷ These include resource shortages, absence of support from higher management, resistance from staff members and time constraints. Lack of resources were found to be the most common barrier for radiology managers, according to a critical interpretative synthesis in 2022.⁷ Furthermore, radiology managers often face difficulties with their execution as knowledge brokers due to inadequate staff, poor time allocation to gather and analyse data and issues with achieving a balanced work-life balance.⁷ Radiology managers also struggle with inadequate funds to maintain desired standards of care. Their transformation into catalysts of innovation and improvement within healthcare safety culture requires a systemic and dynamic framework:

Capacity building

Radiology managers must be adept at navigating the complex clinical, operational and policy landscapes. This requires extensive training programs, certifications designed to enhance their analytical and communication competencies.^{7,51}

Collaborative networks

Interdisciplinary forums, committees and working groups must be established to allow radiology managers to facilitate dialogue, collaborations and integrations between administrative, clinical and policy stakeholders.^{7,51}

Political literacy

Development of political literacy can enable radiology managers to understand, analyse and react to political dynamics influencing healthcare policies and practices.^{7,51}

Partners in action to transform safety culture through engagement and empowerment

The integration of patients in the narrative of safety culture improvements remains weak, particularly in some tertiary hospitals due to several reasons. These include cultural norms, the absence of identified patient advocates or committee groups, insufficient leadership, organizational inadequacies in governance structures, and financial constraints. This recommendation is also in-line with the global patient safety action plan 2021–2023 by World Health Organisation.⁵² The following objectives and actions could be recommended:

Engage patients, family and caretakers in the development of policies, strategies and guidelines for safer care

It is important for radiology managers to be aware that patients and their families, being the ultimate recipients of healthcare, are best positioned to provide feedback on the results of their journey.⁵² Current literature still highlights the sentiment of detachment and reduced empathy between healthcare providers and their patients.⁵³ In some cases, only the complaints or grievances are taken as the 'voices' of the patients. By giving the patients, families and caretakers an equal seat at the table in strategic and planning forums for patient safety, this recognises these stakeholders as our partner.⁵³

Even though the importance of involving patients and their families in healthcare planning and decision-making is acknowledged, this practice is not consistently managed and operated across all healthcare organisations.⁵² There are still gaps in transparency, communication, education, and collaboration, leading to missed opportunities to harness this initiative.⁵² It is unfortunately common in some countries that there are still existing patient society groups advocating for the patient's voice in silos and this partnership with health organisations could be further enhanced.

Including patients or family members who have encountered avoidable harm in healthcare is crucial for contributing to the formulation and refinement of mitigation measures.⁵⁴ Their first-hand experiences provide valuable insights that can significantly enhance the effectiveness of safety strategies. Furthermore, appointing patient representatives on the institution's boards and committees can bridge the gap between healthcare providers and patients, ensuring that the patient's voice is heard and considered in decision-making processes.⁵⁴ This appointment and engagement should be transparent and accessible to the public, promoting trust and accountability. Additionally, developing institutional standards for patient engagement and empowerment is essential. By fostering a culture of continuous improvement, healthcare institutions can leverage feedback received from patient experiences to further refine and enhance safety protocols. This approach not only improves the quality of care but also reinforces a commitment to patient-centered practices.⁵⁴

Strengthen capability of patient advocates in patient safety

Strategies should be implemented to further integrate patient safety advocates as educators for both staff and students, providing a unique perspective and enriching the educational experience. It is also vital to create, evaluate, and monitor communication mechanisms that aid clinicians in understanding and addressing patients' concerns and viewpoints.⁵² The development and implementation of patient-centered applications can facilitate effective information sharing, decision-making, and care planning, involving patients more directly in their healthcare journey. Additionally, the creation and distribution of educational and training materials on various aspects of patient safety, along with active participation in public awareness campaigns, can enhance overall safety awareness.⁵²

Collaboration with government agencies, such as the Australian Commission on Safety and Quality in Health Care, is essential to align and support national patient safety programs and initiatives, ensuring a cohesive and effective approach to patient safety across the healthcare system.⁵²

Strengthen transparency through patient safety incident disclosure

Strengthening transparency through patient safety incident disclosure involves several key initiatives. Firstly, it's important to develop institutional policies for informed consent, patient access to medical records, and emergency initiation systems, all in collaboration with patients as partners.⁵² This collaborative approach ensures that policies are patient-centered and consider the needs and rights of patients in critical healthcare decisions. Additionally, designing clear policies and processes for notifying patients and families of incidents related to patient safety is crucial.⁵² Such transparency is vital for maintaining trust and ensuring that patients and their families are fully informed about their care. Finally, committing to providing continuous psychological and additional assistance to patients, families, and staff members following a significant patient safety incident is essential. This support is not only a critical aspect of patient care but also crucial for the wellbeing and resilience of all involved during the recovery process.⁵²

Conclusion

This review paper emphasizes the multifaceted nature of safety culture in radiology departments. Central to this is the role of leadership in fostering an environment of open communication and psychological safety. Through the examination of practices such as safety huddles, leadership walkarounds, quality learning boards, intentional patient rounding, multidisciplinary rounds and mobility and mortality meetings rounds, it is evident that fostering a safety culture in radiology departments is both a complex and dynamic endeavour, necessitating ongoing commitment and innovation. Notably, the exploration of AI tools in healthcare presents a promising avenue for advancing safety management, despite the current lack of specific literature within the radiology context.

The review further illuminates the pivotal role of radiology managers in acting as knowledge brokers, translating organizational strategies into actionable initiatives that promote safety culture. Moreover, it calls attention to the importance of engaging patients and families in safety initiatives, recognizing them as crucial partners in the quest for safer healthcare delivery. As the field continues to evolve, the insights derived from this review lay the groundwork for a more integrated approach to safety culture in radiology, where leadership, technology, and patient partnership collaborate to create a safe environment.

Conflict of interest statement

None.

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QUESTIONNAIRE

A7(25) Part 1 of 2

Enhancing safety culture in radiology: Key practices and recommendations for sustainable excellence

INSTRUCTIONS

- Read through the article and answer the multiple-choice questions provided below.
- **Some questions may have more than one correct answer;** in which case you must mark **all** the correct answers.

Abstract

Question 1: What plays pivotal roles in enhancing safety culture in radiology?

- A:** Reducing the cost of radiology services
- B:** Leadership, effective teamwork and interprofessional collaboration
- C:** Achieving sustainable excellence in patient care
- D:** Implementing new technologies in radiology

Question 2: Which one of the following is highlighted as fundamental for promoting a safety culture in radiology departments?

- A:** Technical training sessions
- B:** Safety huddles
- C:** Rotating staff
- D:** Recruitment of new staff

Question 3: What role does radiology managers play in enhancing safety culture?

- A:** Mainly managing administrative tasks – the better the admin the easier it is to ensure safety
- B:** Driving safety initiatives and acting as facilitators for a culture of safety
- C:** Focusing on budget management
- D:** Mainly training new employees – better trained employees equal a safety culture

Introduction

Question 4: Approximately how many patients suffer harm in health care?

- A:** One in five
- B:** One in a thousand
- C:** One in ten

Question 5: What initiative introduced by the World Health Organization (WHO) in 2024 supports the Global Patient Safety Action Plan?

- A:** The Radiology Safety Charter
- B:** The Patient Safety Rights Charter
- C:** The Radiology Excellence Framework
- D:** The Global Imaging Safety Standard

Question 6: The Safety Culture Framework proposed by Kilcullen and colleagues, establishes the concept of a safety culture by outlining the factors that create an environment where individual employees can embrace safety values withing an organisation?

Is this statement **TRUE** or **FALSE**?

- A:** TRUE
- B:** FALSE

Key practices of safety culture in radiology departments

Question 7: Which two of the following form part of the six practical initiatives that can grow a safer environment for staff, patients, families and carers?

- A:** Monthly audit of adverse events in practice
- B:** Leadership walkarounds (LW)
- C:** Incentive(s) for “safest employee(s) of the month”
- D:** Safety huddles
- E:** Quality learning boards (QLB)

Safety huddles

Question 8: Safety huddles are what type of meeting

- A:** Formal
- B:** Brief
- C:** Regular
- D:** One which fosters an environment of open communication between staff members

Question 9: The approach by Donely and colleagues employed a structured process for the Daily Readiness Huddle. This comprised which of the following elements?

- A:** Daily readiness assessment
- B:** Clinical volume review
- C:** Leadership performance
- D:** Problem accountability

Question 10: It was found that the Daily Readiness Huddle process has not only improved the department's problem-solving capability and accountability but has also positively impacted team-building, communication, and coordination.

Is this statement **TRUE** or **FALSE**?

- A: TRUE
- B: FALSE

Leadership walkaround (LW)

Question 11: There is growing evidence that leadership walkarounds (LW) contribute to

- A: A perceived increased workload
- B: An increase in work-related stress
- C: An improved work-life balance
- D: Improved patient safety
- E: Preparedness for quality improvement

Question 12: Which of the following are **TRUE** regarding the new form of LW, namely "positive LW"?

- A: Steers away from deficiencies and fears
- B: Focusses on what is going well
- C: Links to the feeling of greater purpose

Question 13: The benefits of well-being

- A: Were observed across both short-term and long-term health outcomes
- B: Was particularly significant on immune system response and pain tolerance
- C: Decreased dramatically the larger the interval between LW

Question 14: Is it **TRUE** that a study found that the mean number of days between serious safety events in their radiology departments (Dept of Radiology at Cincinnati Children's Hospital Medical Centre) increased two-fold since the LW program started?

- A: YES
- B: NO

Quality learning boards (QLBs)

Question 15: The main purpose of Quality Learning Boards (QLBs) in clinical settings is

- A: Displaying financial information
- B: Communicating quality and safety activities
- C: Tracking the performance of individual staff members
- D: Scheduling staff shifts

THE END

QUESTIONNAIRE

A7(25) Part 2 of 2

Enhancing safety culture in radiology: Key practices and recommendations for sustainable excellence

INSTRUCTIONS

- Read through the article and answer the multiple-choice questions provided below.
- **Some questions may have more than one correct answer;** in which case you must mark **all** the correct answers.

Question 1: QLBs display

- A:** Outcomes of safety indicators
- B:** Patients' experience data
- C:** Ongoing quality and safety activities
- D:** Staff rotation

Intentional patient rounding

Question 2: Key behaviours in Intentional Patient Rounding include

- A:** Using specific greeting words
- B:** Accomplishing scheduled tasks
- C:** Assessing personal needs and patient position
- D:** Motivating staff members

Multidisciplinary Team (MDT) rounds

Question 3: Multidisciplinary Team (MDT) rounds contribute to patient care in radiology through

- A:** Lessening administrative tasks
- B:** Reducing the need for additional radiology staff in patient care
- C:** Better coordination of patient care

Morbidity and Mortality (M&M) meetings

Question 4: Morbidity and Mortality (M&M) meetings within healthcare settings focus on which of the following core principles?

- A:** Creating a safe space for learning
- B:** Fostering multidisciplinary learning
- C:** Documenting lessons learnt
- D:** Mentorship

Question 5: What is one of the challenges in implementing Morbidity and Mortality (M&M) meetings in radiology?

- A:** Lack of interest among radiologists
- B:** Lack of time and small practice groups
- C:** Overabundance of such meetings
- D:** No challenges reported

The role of radiology managers

Question 6: Radiology managers drive safety culture by translating organizational strategies into practical actions and serving as a bridge between senior leaders and frontline staff.

Is this statement **TRUE** or **FALSE**?

- A:** TRUE
- B:** FALSE

Question 7: To maintain a safety culture radiology managers must ensure that.....?

- A:** Safety remains a top priority
- B:** Staff are held accountable for their learning and practice
- C:** Errors and near-misses are documented, and the responsible staff member(s) receive written warnings

Question 8: Which key factor is identified as essential for maintaining a robust safety culture in radiology?

- A:** Limiting small talk among staff and encouraging work-related discussions
- B:** By continuous improvement processes
- C:** Increasing the number of safety protocols to cover all eventualities
- D:** Reducing the number of safety audits

Question 9: Evidence suggests that healthcare professionals who prioritise continuous quality improvement

- A:** Tend to experience higher levels of psychological safety
- B:** Reports feeling emotionally drained
- C:** Experience reduced work overload and better workplace experience

Question 10: What is the role of psychological safety in connecting continuous quality improvement with staff engagement?

- A:** It decreases staff engagement
- B:** It is irrelevant to safety culture
- C:** It plays a vital role in fostering staff engagement in experimentation and recommending improvements
- D:** It only applies to management roles

Question 11: What emerging technology is recognized for its potential impact on safety culture in radiology?

- A:** Electronic patient records linked to a central database
- B:** Artificial Intelligence (AI)
- C:** Robotics
- D:** Quantum computing

Question 12: Is it **TRUE** that extensive evidence exists on how AI can impact on a safety culture?

- A:** YES
- B:** NO

Recommendations

Question 13: What factors negatively influence radiology managers' knowledge brokering?

- A:** Resource shortages
- B:** Absence of support from higher management
- C:** Resistance from staff members
- D:** Time constraints

Question 14: Which one of the following is a critical action for radiology managers to take when engaging patients in safety culture improvements?

- A:** Screening patient feedback for decision-making processes
- B:** Engaging patients, families, and caretakers in the development of safety policies and strategies
- C:** Structuring and guiding the patient in terms of their feedback

Question 15: What is a key benefit of involving patients who have encountered avoidable harm in healthcare?

- A:** It reduces the number of safety protocols
- B:** It is crucial for contributing to the formulation and refinement of mitigation measures
- C:** It limits the scope of safety discussions

Conclusions

Question 16: What is the overall message of the article regarding the role of leadership in enhancing safety culture in radiology?

- A:** Leadership should be clearly defined in terms of roles and responsibilities to avoid "unstructured involvement" in day-to-day activities
- B:** Leadership is central to fostering an environment of open communication and psychological safety
- C:** Leadership should be deserved and not appointed

THE END



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ANSWER SHEET

A7(25)

Enhancing safety culture in radiology: Key practices and recommendations for sustainable excellence

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