Cultivating a Culture of Patient Safety in Healthcare Settings: A Systematic Review of Evidence-Based Interventions

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KEYWORDS

Patient safety, safety culture, quality improvement, organizational performance, healthcare teams.

ABSTRACT

Background and purpose: Establishing a robust culture of safety is essential for enhancing health outcomes and minimizing risks to patients. This systematic review aims to synthesize interventions designed to enhance safety culture in healthcare settings. Methods: A comprehensive literature search was performed across multiple databases, including PubMed, CINAHL, and Scopus. The initial search yielded a total of 250 articles. After applying inclusion and exclusion criteria, which considered study design, population, and intervention type, 35 articles were shortlisted for full-text review. Ultimately, 21 studies met the final inclusion criteria, focusing on various interventions aimed at promoting safety culture. Results: The analysis revealed notable variation in the types of safety culture interventions implemented across the studies, with educational programs emerging as the most frequently adopted approach. The effectiveness of these interventions was found to be significantly influenced by both individual and systemic factors, highlighting the importance of contextual elements in promoting safety culture. Additionally, many interventions faced challenges related to sustainability and maintaining long-term impact, suggesting that ongoing support and resources are necessary for success. The review also indicated that the participation of nursing professionals in safety culture initiatives was often limited, despite their critical role in patient care, underscoring the need for strategies that engage this key group more effectively. Conclusion: The review underscores the necessity for targeted strategies that actively engage nursing professionals in safety culture initiatives to foster a safer healthcare environment. The findings serve as a valuable resource for policymakers and healthcare managers aiming to implement best practices for enhancing safety culture.

1. Introduction

It is estimated that approximately 10% of patients admitted to hospitals experience harm during their care, with many of these incidents being avoidable (Slawomirski, Auraaen, & Klazinga, 2017). The promotion of safety culture in healthcare settings has emerged as a critical area of research over the past twenty years, yet substantial challenges remain regarding effective strategies for fostering such a culture across various healthcare environments (Lee et al., 2019). Safety culture encompasses the collective values, beliefs, attitudes, and behaviors that characterize an organization and its commitment to prioritizing safety in all aspects of care (Cooper, 2018). Extensive research has established a robust correlation between the strength of safety culture and the quality of patient care, as well as overall health outcomes. Specifically, enhancing safety culture has been linked to a reduction in patient morbidity and mortality rates (Odell et al., 2019). Furthermore, a positive safety culture contributes not only to better patient outcomes but also to higher job satisfaction and improved clinical performance among healthcare providers (DiCuccio, 2015). Therefore, there has been an expanding interest by policy makers and health managers in addressing safety culture (Groves, 2014; Hogden, Ellis, & Churruca, 2017; Sammer et al., 2010). Safety culture assessments are increasingly utilized within healthcare systems to achieve several key objectives. First, they serve as diagnostic tools to gauge the current state of safety culture and highlight areas requiring improvement. Second, they enable the evaluation of patient safety initiatives and monitor progress over time. Third, these assessments facilitate both internal and external comparisons through benchmarking. Finally, they help healthcare organizations meet regulatory standards related to safety culture compliance (Nieva & Sorra, 2013). By addressing these goals, safety culture assessments contribute to enhancing overall patient care and organizational performance.

Nurses work in the frontlines and are considered a substantial partner of the health team. Research evidence has shown that in order to promote quality and safe patient care, nurses have to be involved

in decision making process (Manojlovich & DeCicco, 2017; Shariff, 2015; Vazirani et al., 2015). The active engagement of nurses within the framework of teamwork has demonstrated positive outcomes, not only on individual patient experiences but also on the broader healthcare landscape (Jaafarpour & Khan, 2011). In a recent systematic review exploring the effects of teamwork and communication training interventions on safety culture and patient safety, Alsabri et al. (2022) identified that these interventions can significantly enhance the overall safety culture within healthcare settings. Their findings underscore the crucial contribution of nurses in fostering a safer and more efficient healthcare environment. The necessity for effective safety culture promotion strategies is increasingly recognized (Kalteh et al., 2019; Lawati et al., 2018), and the literature presents several interventions involving various healthcare providers and serving different objectives. However, experts in quality improvement argue that while introducing new strategies to improve patients' health outcomes is important, it remains equally important to determine the effectiveness of available ones and understand their potential strengths and barriers across different settings (Cullen et al., 2022).

Recognizing the value of having an overall synthesis and exploration of available evidence on interventions to promote safety culture, the purpose of this systematic review was to identify and describe interventions aimed at promoting safety culture in healthcare settings. Findings might serve as a resource for informing best practices, fostering a safer and more effective healthcare environment.

2. Methods

Search Strategy

A systematic search was conducted utilizing the Scopus database, which provides extensive abstracting and indexing services and encompasses a broad array of journals in the healthcare systems field. Scopus is renowned for its comprehensive coverage of peer-reviewed literature, making it a valuable resource for identifying relevant studies related to patient safety culture. To ensure a thorough exploration of the literature, a carefully selected combination of index terms was employed to pinpoint studies pertinent to this topic. The primary search keywords included "safety culture," "patient safety," "medical error prevention," "safety culture promotion strategies," and "healthcare safety." In order to encompass a wide range of research contributions, no restrictions were placed on the publication date. However, specific criteria were established to ensure the inclusion of high-quality, relevant studies. Only peer-reviewed articles were considered, which provided a level of scrutiny and validation crucial for this systematic review. Additionally, included studies had to feature interventions specifically aimed at promoting safety culture within healthcare settings. Furthermore, to maintain accessibility, only articles published in English were selected for inclusion in the review. The last search for relevant literature was completed on December 23, 2023, ensuring that the review reflects the most current research findings. During the screening process, records that did not meet the predefined criteria were systematically excluded. Specifically, editorials, abstracts, conference proceedings, commentaries, letters to the editor, viewpoints and opinions, and preprints were eliminated from consideration. This rigorous selection process aimed to focus on substantive research contributions that would provide valuable insights into interventions designed to enhance safety culture in healthcare environments.

Study Extraction

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al. 2009) guided the process of identification and selection of the reviewed articles. Initially, a comprehensive search of the Scopus database yielded a total of 1,685 records. During the initial screening phase, 1,685 studies were assessed based on their titles and abstracts. A substantial number of these, totaling 1,423, were excluded for various reasons: 1,081 did not involve any intervention, 265 reported irrelevant outcomes, 33 were editorial letters, 24 were not written in English, 16 were commentaries, and 4 were either meta-analyses or correspondence pieces. This left 262 studies that advanced to the full eligibility assessment stage. Of them, 214 were further excluded upon a detailed full-text review for failing to meet the specific inclusion criteria required for our analysis. The reasons for exclusion at this stage included lack of detailed intervention information, insufficient data on

outcomes specific to safety culture, or failure to meet other methodological standards set for this review. Ultimately, 21 studies were selected for inclusion in the review. Each of these studies was re-evaluated by two independent researchers to ensure adherence to our study inclusion criteria. Figure 1 shows the PRISMA diagram.

Synthesis

Due to the wide heterogeneity among the retrieved studies in terms of types of interventions, outcome measures, methods, and analyses, we chose to use a narrative synthesis approach (Popay et al., 2006) to integrate and analyze the findings from the 21 studies. This qualitative method enabled a systematic exploration and description of each individual study's results, providing a thorough understanding of the collective evidence across the studies. Cook et al. (1997) suggest that synthesizing evidence from diverse studies involves a systematic process of reviewing the texts, extracting and integrating the underlying meanings, and then refining these insights into overarching themes supported by key statements. This method ensures that the complexity and variety of findings across different studies are captured while distilling the core messages. By merging these distinct yet related ideas, researchers can create a more cohesive understanding that allows for a comprehensive analysis of the evidence. This approach facilitates clearer interpretation and promotes the development of well-substantiated conclusions. A thorough quality assessment was carried out on the 21 studies included in our systematic review. For this purpose, we employed critical appraisal tools from the Joanna Briggs Institute (JBI), chosen according to the types of studies reviewed.

3. Findings

Articles Characteristics

A total of 21 studies were included in the review, each evaluating interventions aimed at promoting patient safety within healthcare settings. The studies represented a diverse range of geographical regions, reflecting a global interest in enhancing patient safety culture. Specifically, the studies were conducted in the United States (n=4), Spain (n=2), Netherlands (n=2), South Korea (n=2), Canada (n=1), China (n=1), France (n=1), Germany (n=1), Hong Kong (n=1), Iran (n=1), Ireland (n=1), Jordan (n=1), Norway (n=1), Palestine (n=1), and the United Arab Emirates (n=1). The samples across these studies included various healthcare professionals, such as physicians, nurses, and patients, underscoring the multifaceted nature of patient safety interventions. Several interventional strategies were identified, including educational and training programs, team-based interventions, and safety rounds, all aimed at improving the overall safety culture in healthcare environments. For a detailed overview, Table 1 presents a matrix summarizing each article's authors, country of origin, sample population, type of intervention, primary outcomes, and key findings, providing a comprehensive snapshot of the research landscape regarding patient safety interventions.

Synthesis

Four main themes emerged from the synthesis of the results of the 21 studies involved in this review: (1) Interventions for enhancing patient safety culture vary in scope, methods and outcomes; (2) The effectiveness of interventions are influenced by individual and system-related factors; (3) The sustainability and long-term impact of safety culture promotion interventions remain a challenge; and (4) the role of nurses in patient safety culture interventions is limited.

Theme 1: Interventions For Enhancing Patient Safety Culture Vary in Scope, Methods and Outcomes

The review revealed several interventions and strategies used to promote safety culture in healthcare settings. These included educational programs/workshops (n=7), training programs/workshops: (n=5), behavioral and team interventions (n=3), error reporting and checklist (n=3), mindfulness and meditation (n=1), messaging and endorsement strategies (n=1), and independent learning (n=1). The majority of retrieved studies introduced education-based interventions to enhance patient safety culture in health care settings. For example, Amiri, Khademian, and Nikandish (2018) conducted a nurse

empowerment educational program. Their study reported that empowering nurses and supervisors significantly improved the overall patient safety culture in the experimental group compared to the control group. Other educational programs also supported the effectiveness of this approach in promoting safety culture, yet the indicators used varied widely across different studies (Ginsburg, Norton, Casebeer, & Lewis, 2005; Emond et al., 2015; Putnam et al., 2016; Verbakel et al., 2015). In contrast to the previously discussed studies that focused on individual settings, Emond et al. (2015) undertook a comprehensive educational initiative across nine diverse hospitals in the Netherlands. These hospitals were categorized based on their type and geographical distribution and were randomly assigned to different timelines for receiving the intervention. The educational program utilized a multifaceted implementation strategy designed to enhance patient safety through various approaches. This strategy encompassed a combination of educational components, systematic audits, and feedback mechanisms aimed at fostering organizational change. Specific organizational interventions were introduced, which involved integrating safety guidelines into local practices. Furthermore, the program included team-oriented approaches, such as multidisciplinary training sessions that facilitated collaboration among healthcare professionals. Additional elements included the use of reminders to reinforce safety protocols and patient-mediated interventions, such as distributing patient safety cards that empowered patients to engage in their care actively. By employing this multifaceted approach, the study aimed to create a robust framework for improving safety culture across the participating hospitals.

The study demonstrated significant improvements in adherence to safety guidelines and a notable reduction in hospital-related complications, underscoring the effectiveness of a comprehensive, system-wide approach. In contrast, Kim and Hwang (2022) adopted a digital approach by launching an educational website that provided healthcare professionals with access to real-world cases, up-to-date drug-related knowledge, and video lectures. They measured the voluntary monitoring and reporting of adverse drug reactions (ADRs) as key outcomes. Their intervention led to a marked increase in ADR reporting, enhanced self-efficacy, and better monitoring practices in the experimental group compared to the control group, illustrating the potential of digital platforms to promote knowledge retention and proactive safety behaviors. On the other hand, González-Formoso et al. (2019) focused on residents and their mentors, delivering an educational intervention aimed at enhancing patient safety culture. Unlike the other studies, their intervention did not yield any significant improvement in patient safety grades and faced high dropout rates. The authors emphasized the need to replicate the study in different settings and with more diverse samples to better understand the true efficacy of the intervention. This highlights the importance of contextual factors and participant engagement in the success of safety education programs. These studies collectively demonstrate the variety of strategies used to enhance safety culture in healthcare, ranging from comprehensive system-wide approaches and digital learning platforms to targeted educational efforts, each with varying degrees of success.

The review also identified another effective strategy for promoting safety culture: short- and long-term training programs. For instance, Hasselblad et al. (2022) developed a training program aimed at equipping nurses with skills to manage and prevent disruptive behaviors in hospitalized patients. Nurses who participated found the intervention useful in preparing them to handle patients exhibiting disruptive, threatening, or aggressive behaviors, which, in turn, strengthened the safety culture within their units. However, despite these perceived benefits, no observable changes in documented patient behavior were noted. Similarly, González-Formoso et al. (2011) conducted a safety culture training for 27 tutors and residents in family and community medicine, reporting a significant improvement in safety culture scores within the intervention group. The importance of a teamwork approach in training was further highlighted by Nurok, Lipsitz, Satwicz, Kelly, and Frankel (2010), who delivered two 90-minute multidisciplinary sessions that targeted team skills, communication, and leadership. The results showed improved team dynamics, communication, and a reduction in potential threats to patient outcomes. However, these improvements were more durable for reducing threats than for enhancing

team communication over time. Several other studies also supported the effectiveness of training programs in improving safety culture. Zohar et al. (2017) and Latif et al. (2015) demonstrated positive outcomes through various training initiatives. However, not all programs yielded favorable results. Hoffmann et al. (2016), for example, conducted a training program for 60 general practitioners to enhance error management practices. Unfortunately, the program did not result in measurable improvements. The authors noted that other studies with more favorable outcomes often had less rigorous designs, but emphasized that their intervention remained feasible, useful, and potentially sustainable. In addition to training programs, the use of checklists and safety rounds emerged as effective strategies for promoting a safety culture. Haugen et al. (2013) implemented the Norwegian version of the WHO Surgical Safety Checklist among 349 operating theatre personnel, resulting in significantly higher safety culture scores. Similarly, Occelli et al. (2019) assessed the impact of checklists and daily rounds on in-hospital mortality, reporting enhanced safety culture and a reduction in mortality rates. Supporting these findings, Sexton, Neilands, Frankel, and Helmreich (2005) found that walk rounds were a promising tool for improving the broader construct of safety culture and safety climate within healthcare teams.

Lastly, the review highlighted several interventions—such as mindfulness and meditation practices, messaging and endorsement strategies, and independent learning programs—that were explored in individual studies. While these interventions generally produced promising results, the evidence base was limited, and there was insufficient data to synthesize broader conclusions about their efficacy in promoting safety culture. These initial findings suggest the potential value of such interventions, but more comprehensive research is needed to fully understand their impact in healthcare settings.

Special Considerations

Certain methodological issues were revealed when the first theme was synthesized. First, it should be noted there was a wide heterogeneity not only in the general types of the interventions, but also within the same intervention itself. For example, educational interventions were delivered in almost completely different ways using different content and resources. Further, there was wide heterogeneity in the data collection protocols and analyses. The studies also came from significantly different healthcare systems and contexts which made comparing and contrasting the interventions difficult. Furthermore, the study samples included physicians, nurses, and/or patients.

Second, it should be note that of the 21 elicited articles, only two used the same tool to measure safety culture (Putnam et al., 2016; Occelli et al. 2019). This significant variation in measurement had significantly impacted the conclusion of the current review. It is difficult to synthesize evidence and draw firm conclusions with such heterogeneity in measurement. Even interventions that were applied within the same country and used the same language did not use the same tool to measure safety culture.

In summary, the first theme emerged in this review explores diverse interventions aimed at enhancing patient safety culture within healthcare settings, including educational programs, training initiatives, behavioral interventions, checklist systems, mindfulness practices, messaging strategies, and independent learning. Educational programs showed promise in improving safety culture, such as nurse empowerment programs and workshops. Training programs, particularly those focused on teamwork and communication, also had positive effects on safety culture. Checklist implementations and executive walk rounds proved effective in enhancing safety culture perceptions. However, mindfulness, messaging, and independent learning interventions, while promising, lacked sufficient evidence for a comprehensive assessment. Overall, the theme underscores the varied nature of interventions and their impact on patient safety culture. Several methodological limitations in the synthesized evidence in this theme were highlighted.

Theme 2: The effectiveness of the utilized interventions are influenced by individual and system-related factors

This review showed that several factors have influence over the effectiveness of interventions aimed

at promoting patient safety culture within healthcare settings. It is crucial to consider these factors when devising and implementing interventions to maximize their impact (Amiri, Khademian, and Nikandish, 2018; González-Formoso et al., 2019; Verbakel et al., 2015; Ginsburg et al., 2005; Putnam et al., 2016; Emond et al., 2015; Ling, Gomersall, and Lee, 2016; Kim and Hwang, 2022; Hoffmann et al., 2016; Madden et al., 2019; Hasselblad et al., 2022; González-Formoso et al., 2011; Nurok et al., 2010; Zohar et al., 2017; Haugen et al., 2013; Occelli et al., 2019; Thomas et al., 2005; Liu et al., 2022).

Several factors emerged as significant in shaping the effectiveness of these interventions. Firstly, the type of intervention chosen holds significant weight. Different interventions, such as educational programs, training workshops, or behavioral team interventions, can yield varying outcomes, necessitating careful selection based on the specific context and objectives of the healthcare setting (Amiri et al., 2018; González-Formoso et al., 2019; Verbakel et al., 2015). Secondly, the target audience for the intervention is critical. Tailoring interventions to suit the needs and roles of healthcare professionals, whether nurses, physicians, or others, can greatly impact their effectiveness (Ginsburg et al., 2005; Putnam et al., 2016; González-Formoso et al., 2011). Furthermore, contextual factors, including the unique circumstances and dynamics of the healthcare setting, play a substantial role in determining intervention success. Understanding the context and adapting interventions accordingly is essential (Emond et al., 2015; Hasselblad et al., 2022). The methods employed for measuring and evaluating the impact of interventions are also vital. Accurate and comprehensive assessment methods are crucial for determining the true effectiveness of an intervention (Haugen et al., 2013). The adaptability of interventions to different healthcare settings and cultural contexts is another critical factor. What works in one context may need modifications to be effective elsewhere (González-Formoso et al., 2011).

Leadership and stakeholder engagement are integral. The active involvement of leadership and engagement of all relevant stakeholders, including frontline healthcare professionals, contribute significantly to intervention success (Ginsburg et al., 2005; Thomas et al., 2005). Lastly, interventions that incorporate feedback loops and mechanisms for continuous improvement are more likely to be effective in the long run. This iterative approach allows interventions to evolve and adapt in response to changing needs and challenges (Nurok et al., 2010).

In summary, several factors collectively determine the effectiveness of interventions aimed at enhancing patient safety culture within healthcare settings. The complex interaction between these factors underscores the need for a comprehensive, context-based approach when designing and implementing these interventions. The review highlights that safety culture interventions, even similar ones, need to be applied differently across different healthcare settings. These interventions must be thoughtfully tailored to align with the specific characteristics and needs of the setting in which they are implemented.

Theme 3: The sustainability and long-term impact of safety culture promotion interventions remain a challenge.

The vast majority of tested interventions were cross sectional (18 out of 21), leaving the long-term effectiveness in need for further investigations. The review revealed that there are some key follow up and sustainability considerations to be considered. It is not only about the immediate impact but also about ensuring that the changes brought about by the intervention endure over time (Hasselblad et al., 2022).

The integration of interventions into an organization's culture is a critical factor for sustainability. Studies by Amiri et al. (2018), Putnam et al. (2016), and Emond et al. (2015) emphasize the importance of embedding safety practices into the very fabric of healthcare institutions. This integration ensures that safety becomes a core value and an inseparable part of daily operations rather than an external addition. Continuous training and education, as highlighted by Ginsburg et al. (2005), Madden et al. (2019), and Hasselblad et al. (2022), are vital in maintaining and enhancing the culture of patient safety. Ongoing educational initiatives help healthcare professionals stay abreast of the latest practices and

technologies, ensuring that the safety culture evolves with changing healthcare landscapes.

The role of leadership in championing and maintaining these safety cultures cannot be overstated. Thomas et al. (2005) stress the importance of leadership commitment, indicating that sustained efforts from the top management are crucial for the long-term impact of safety interventions. Monitoring and feedback mechanisms are another pivotal aspect. Regularly assessing the effectiveness of safety measures and providing feedback, as discussed by Hasselblad et al. (2022) and Occelli et al. (2019), helps in identifying areas needing further attention and allows for the continuous improvement of safety practices.

Staff engagement is also a key to sustainability. Involving frontline staff in decision-making processes and safety initiatives, as noted by Hasselblad et al. (2022), enhances the relevance and practicality of safety interventions, making them more likely to be embraced and sustained. The allocation of adequate resources, including staffing, technology, and infrastructure, is essential, as pointed out by Hasselblad et al. (2022). This ensures that the initiatives are not just theoretically sound but are also practically feasible and well-supported. Adapting to changing contexts in healthcare, as Emond et al. (2015) argue, is necessary for the longevity of safety interventions. As healthcare practices, regulations, and technologies evolve, the approaches to ensuring patient safety must also evolve.

Patient involvement, emphasized by Thomas et al. (2005), is another critical factor. Engaging patients in safety initiatives not only provides valuable insights but also fosters a collaborative environment where safety is everyone's responsibility. Lastly, learning from benchmarking data and best practices, as suggested by Nurok et al. (2010), can provide valuable insights for sustaining and improving patient safety culture. Observing and implementing successful strategies from other organizations can help in refining and reinforcing one's own practices.

In summary, the sustainability and long-term impact of interventions in patient safety culture depend on a multifaceted approach. This includes integrating these practices into organizational culture, continuous training, leadership commitment, effective monitoring and feedback, staff engagement, adequate resource allocation, adaptability to changes, patient involvement, and learning from benchmarking and best practices.

Theme 4: The Role of Nurses in Patient Safety Culture Interventions is Limited

This theme delineated the role of nurses in safety culture interventions. Of the 21 reviewed studied, only 7 included nurses among their participants. Those same studies were also conducted by nurse researchers (Amiri, Khademian, and Nikandish, 2018); Ginsburg, Norton, Casebeer, and Lewis, 2005; Kim & Hwang, 2022 Kim & Myoungsoo, 2010, Ling, Gomersall , & Lee 2016; Verbakel et al. 2015; Zohar , Werber , Marom , Curlau & Blondheim, 2017). The limited inclusion of nurses in the development and execution of safety culture interventions is a significant concern, especially considering their frontline role in patient care. The American Hospital Association (2020) emphasizes that reducing human errors and promoting patient safety are unattainable goals without the collaborative effort and effective communication among all healthcare providers. Nurses, as integral members of the healthcare team, often have firsthand experience and insights into patient safety issues, making their involvement in these interventions not just beneficial, but essential.

Shariff (2015) reinforces this viewpoint, asserting that a sustainable safety culture can only be achieved when nurses are recognized as substantial partners within the health team. Their involvement in the decision-making process is crucial, not only for the validity and effectiveness of safety interventions but also for fostering a culture of safety that is deeply rooted in the everyday practices of healthcare institutions. However, the current state of knowledge, as highlighted by the reviewed studies, indicates a disconnect between the theoretical importance of nurses in safety culture and their actual participation in safety interventions. This gap suggests a potential underestimation of the contributions nurses can make to patient safety initiatives and points to a need for a more inclusive approach in the design and implementation of such interventions.

In summary, this theme underscores the underrepresentation of nurses in safety culture interventions in healthcare. Out of the 21 studies reviewed, only a minority included nurses as participants, highlighting a significant gap between their critical frontline role in patient care and their involvement in safety initiatives. The importance of nurses in reducing human errors and promoting patient safety is widely acknowledged due to their unique insights and experiences. However, the current practices in safety interventions reveal a disconnect between the theoretical importance and the actual participation of nurses. This disparity points to the need for a more inclusive approach in the development and execution of these interventions, ensuring that nurses are not only involved but are recognized as essential partners in enhancing patient safety culture.

4. Discussion

This systematic review identified, described, and critically evaluated the quality of published interventions aimed at promoting safety culture in healthcare settings. The synthesis of findings from the 21 included studies underscores the diversity of these interventions, which range from educational programs and training initiatives to behavioral interventions and the implementation of checklist systems. This heterogeneity reflects the complex and multifaceted nature of safety culture in healthcare. The effectiveness of these interventions is shaped by a combination of interrelated factors, including the type of intervention, the target audience, the contextual dynamics of the healthcare setting, the methods used to measure outcomes, and the adaptability of the interventions to different environments. Additionally, leadership involvement, stakeholder engagement, and robust feedback mechanisms play a pivotal role in determining the sustainability and success of these initiatives.

One of the most critical insights from our review, supported by existing literature, is the central role of leadership in driving the success of safety culture interventions. Frankel et al. (2013) highlighted that leadership engagement is fundamental to embedding a safety culture across healthcare organizations. This resonates with our findings, where active leadership involvement was consistently linked with more durable and widespread changes in safety culture. Leaders who model safety behaviors, prioritize safety in decision-making, and foster an open environment for reporting and learning contribute to a more sustainable safety culture.

However, despite the promising outcomes of many interventions, challenges related to sustainability and long-term impact remain prevalent. Addressing these challenges requires a multi-pronged strategy that goes beyond the initial implementation of interventions. Successful integration of safety culture initiatives into the fabric of the organization involves continuous training and education, securing enduring leadership commitment, and maintaining staff engagement over time. In addition, sufficient allocation of resources and the ability to adapt interventions to evolving healthcare contexts are crucial. The involvement of patients in safety culture initiatives and learning from best practices across organizations further enhances the likelihood of sustained improvements (McKenzie et al., 2019).

Nurses, as frontline healthcare providers, are integral to the practical implementation of safety culture initiatives. Their active involvement in the development, decision-making, and ongoing execution of interventions is essential for fostering a culture of patient safety that responds to the dynamic needs of healthcare environments. Engaging nurses ensures that safety initiatives are grounded in the realities of clinical practice. This aligns with the findings of Vaismoradi, Jordan, and Kangasniemi (2015), who emphasized that involving nursing staff in the planning and design stages of safety interventions leads to more effective implementation and greater ownership of safety practices.

Moreover, the review highlights the importance of adopting a tailored approach to the design and implementation of safety culture interventions. Interventions that are customized to align with the specific values, needs, and resources of a given healthcare environment are more likely to succeed. Karanikas et al. (2022) support this view, arguing that a one-size-fits-all approach is insufficient and that flexibility is key to maximizing the impact of safety initiatives.

In summary, this review underscores the potential of educational and training programs to significantly

enhance safety culture in healthcare settings. However, the variability in outcomes across different contexts points to the need for interventions that are specifically tailored to the unique characteristics of each healthcare organization. Future research should prioritize long-term, sustainable interventions that engage a broader range of healthcare professionals, particularly nurses, to fully leverage their insights and frontline experiences. In doing so, healthcare organizations can build more resilient safety cultures that improve patient outcomes and create safer care environments.

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