SCIENTIFIC CULTURE
www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 4, (2026), pp. 5923-5934
Open Access. Online & Print

DOI: 10.5281/zenodo.12426622

RISK MANAGEMENT IN NURSING EDUCATION: AN INTEGRATIVE REVIEW OF CURRENT PRACTICES AND CHALLENGES

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Received: 19/11/2025
Accepted: 16/02/2026

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ABSTRACT

Broadly, risk management in the field of nursing education has expanded from a narrow focus on prevention of clinical errors, to a more expansive view that acknowledges the dimensions of student well-being, institutional protection, and technology. This integrative review attempts to summarize the current literature on risk in nursing education, including the dimensions of risk and the strategies to mitigate risk. Using the framework developed by Whittemore and Knafl, a comprehensive search of major databases was conducted, resulting in the inclusion of 33 peer-reviewed articles that reflect the complexity of contemporary education. Findings illustrate meeting four primary dimensions, including: clinical placement and patient safety, psychosocial and occupational health for students, institutional and regulatory standards compliance, and the ever-present risk associated with technology and simulation. While clinical placement risks remain significant to the profession, academia has become more aware of the "hidden curriculum" and psychosocial risks that undermine student performance and professional socialization. In addition, the rapid integration of various generative artificial intelligence (AI) and high-fidelity simulation into learning has created new ethical (i.e., empathy) and pedagogical (i.e., data privacy) risks. This integrative review suggests a move from a punishment-based "blame culture" to a pro-active "safety culture" that embeds the unique characteristics of risk management into nursing curricula. Addressing the phenomenon of "failure to fail" and providing students with psychological safety can assist nursing programs in preparing safe practitioners to engage in contemporary complexities of healthcare practice. This synthesis provides a foundation for educational leadership to develop rigorous evidence-based risk mitigation strategies to protect: patients, students, and the survivability of nursing.

KEYWORDS: risk management, nursing education, patient safety, clinical competence, safety management, integrative review

1. INTRODUCTION

Risk management in nursing education is a complicated, layered construct that goes beyond the immediate prevention of clinical errors. The conversation about risk in health care has historically centered on patient harm and mitigation of legal risk, however in the context of an academic setting the stage must be broadened to risk management of a student's course of learning, risk management of a faculty's professional credibility, and risk management of an institution's accreditation and reputation. Nursing education is specifically unique, as it engages in a "dual-target" safety model, anticipating balancing the safety of the patient from errors made by students, while also ensuring the safety of the student from physical, psychological, or educational harm.

Fragility in nursing education has created further definition of risk due to the increasing clinical acuity of the population, a global workforce crisis, and the swift integration of high-technology. The pressure to keep students retained in the program can conflict with the ethical obligation to fail students who do not demonstrate competencies related to safety. More explicitly, this "failure to fail" phenomenon creates a systemic risk of graduating incompetent practitioners which is exacerbated by the long-term consequences of such actions to both public health and the nursing profession (McKeown, 2023). In addition, the global transition to digital learning environments and the use of generative artificial intelligence (e.g., Large Language Models) creates new questioning around academic integrity, and the preservation of core nursing values such as empathy and compassion (Abdulai, 2023).

Although these issues are vital, risk management in nursing education tends to remain fragmented, with institutions attending to individual occurrences rather than systemic weaknesses. Thus, there is a serious need for a comprehensive overview of current practices and issues in relation to policy and curriculum. This integrative review seeks to address this gap, and as such, will examine the four dimensions of risk- clinical, psychosocial, institutional, and technological-examining approaches to risk management in nursing education. By shifting away from the focus of individual blame to systemic "risk as safety", risk management could work to develop an environment where "near-misses" can serve as a learning opportunity instead of a focus on punishment.

2. METHODOLOGY

2.1 Integrative Review Framework

An integrative review framework based on Whittemore and Knafl allowed for the simultaneous inclusion of more than one methodology, whether it was experimental or non-experimental research, to create understanding of the phenomenon (García-Peñalvo, 2022). This type of review is helpful for nursing education research, because our evidence base often consists of a combination of quantitative performance measures, qualitative student experiences, and theoretical analyses of policy. The method followed five essential stages; (a) identification of the problem, (b) literature search, (c) evaluation of data, (d) analysis of data (including abstraction and synthesis), and (e) presentation. Utilizing this process allows the review to follow a rigorous process to ensure transparency and reproducibility, which aligns with the FAIR principles of findability, accessibility, interoperability, and reusability (García-Peñalvo, 2022).

2.2 Literature Search Strategy and Data Sources

A thorough and systematic literature search strategy was undertaken in presenting relevant literature from 2004-2024. The search strategy was developed using the PRISMA-S (Figure 1) for effectively constructing an account of the literature search (Rethlefsen, 2021). The search strategy concentrated on three main thematic foci, which were nursing education, risk management, and student/patient safety (Rethlefsen, 2021). Literature sources included MEDLINE, PubMed, Academic Search Premier, and CINAHL (via Health Source: Nursing/Academic Edition), and the Cochrane Library. Terms utilized during the search included combinations of MeSH headings, and keywords "nursing education," "clinical risk," "student burnout," "simulation safety," "institutional liability,", and "artificial intelligence."

A global perspective was an important consideration when constructing the search, and as such offered studies across a broad array of geographical and economic contexts reflecting the international crisis of the nursing workforce and educational issues (Meara, 2015).

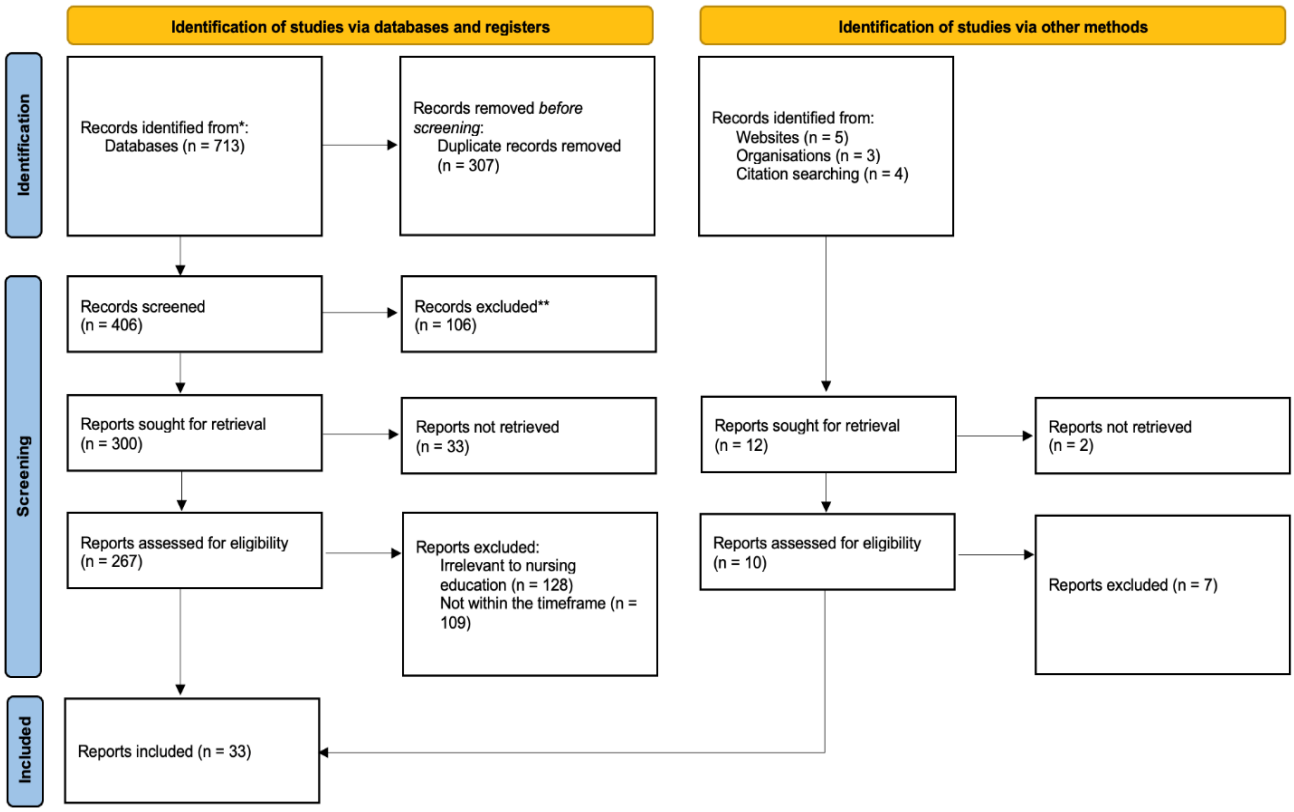

Figure 1: PRISMA 2020 flow diagram

2.3 Inclusion and Exclusion Criteria

To ensure rigor around the review, specific criteria for inclusion and exclusion were set. Studies were included if they; (1) had a focus on either pre-registration or graduate nursing education, (2) addressed at one theme of risk (clinical, psychosocial, institutional, or technological), (3) published in peer-reviewed journal, and (4) were published in English. Exclusion criteria were applied for studies that focused on risk management in general healthcare, that did not explicitly tie to the educational process, commentaries or editorials that did not present an analytic or systematization to approach with data. The selection process involved an initial screening of titles and abstracts, and a second pass to review full-text articles that might align with the review (Moagi, 2021).

2.4 Data Evaluation and Synthesis

The data evaluation occurred to ensure that the full literature was assessed for quality and was relevant. Due to the heterogeneity of the methodological approach, we utilized a data extraction form to elicit standard information from each paper, which included the study design, sample characteristics, findings, and any risk or risk mitigation noted. The synthesis was approached using thematic analysis; this means that the data were categorized in an iterative approach into recurring patterns, or dimensions of risk. This was combined with "constant comparison" to ensure that the themes were an accurate representation of the vastness of the literature. The "hidden curriculum" of nursing education was given special attention; implicit risks such as horizontal violence and moral distress do not tend to evoke any attention in the formal risk management processes (McKeown, 2023). The final synthesis presents a multi-dimensional mapping of risk management in the education of nursing students.

3. FINDINGS AND SYNTHESIZING THE LITERATURE

3.1 Summary of Studies

As shown in Table 1, there were 33 studies included in this integrative review that represent a global body of research published between 2004 and 2024, reflecting a broad temporal evolution from early clinical safety protocols (Dellit, 2006) to recent explorations of generative artificial intelligence (Bettayeb, 2024; Elendu, 2024). Geographically, the research spans diverse contexts including Europe (Bagnasco, 2018; Meštrović, 2020), North America (Linnard-Palmer, 2012; Miller, 2020),

and Africa (Moagi, 2021), highlighting universal challenges in nursing education such as the workforce crisis and clinical placement scarcity (Murphy, 2022). Methodologically, the sample includes systematic reviews on burnout and blended learning (Salvagioni, 2017; Vallée, 2019), cross-sectional studies on student well-being (Usher, 2020; Green, 2020), and experimental designs evaluating simulation and serious games (Tuma, 2021; Graafland, 2012; Jenson, 2012).

Table 1: Literature Matrix: Risk Management in Nursing Education (n=33)

Author (Year)	Study Design	Focus of Study	Key Findings/Contributions
Abdulai (2023)	Commentary	AI Ethics	Explores how ChatGPT affects ethical values and integrity in nursing education and research.
Bagnasco (2018)	Cross-sectional	Patient Safety	Assesses patient safety knowledge among European nursing students, identifying gaps in curricula.
Bettayeb (2024)	Review	AI Integration	Analyzes the pedagogical risks and opportunities of integrating AI tools in healthcare training.
Broetje (2020)	Quantitative	Occupational Health	Uses the Job Demands-Resources model to link work environments to nurse well-being and burnout.
Chen (2020)	Meta-analysis	Technology (VR)	Confirms that Virtual Reality significantly improves knowledge and skill acquisition compared to traditional methods.
Dean (2016)	Qualitative	Assessment Risk	Investigates why clinical educators "fail to fail" underperforming students, citing emotional and institutional barriers.
Dellit (2006)	Guidelines	Clinical Safety	Establishes early protocols for antimicrobial stewardship to mitigate infectious disease risks.
Elendu (2024)	Review	Generative AI	Discusses the transformative impact and academic integrity challenges of generative AI in healthcare.
Fealy (2015)	Theoretical	Socialization	Explores how professional socialization and the "hidden curriculum" shape nursing student identity and safety habits.
Graafland (2012)	Systematic Review	Serious Games	Evaluates the validity of using serious games for training medical and nursing professional skills.
Green (2020)	Cross-sectional	Psychosocial Risk	Documents high levels of anxiety and psychological distress in nursing students during the COVID-19 pandemic.
Halm (2017)	Review	Safety Culture	Advocates for moving from a "blame culture" to a "just culture" to improve error reporting and patient safety.
Jauch (2013)	Guidelines	Clinical Safety	Provides evidence-based standards for the early management of acute ischemic stroke.
Jenson (2012)	Experimental	Technology (Games)	Demonstrates that educational video games can enhance clinical decision-making and critical thinking.
Linnard-Palmer (2012)	Case Study	Clinical Safety	Develops "Safety Road Maps" to prevent medication errors in pediatric oncology settings.
Lloyd-Jones (2022)	Review	Blended Learning	Examines the effectiveness of combining online and face-to-face instruction in nursing curricula.
Maslach (2016)	Review	Burnout	Provides the foundational framework for understanding the three dimensions of burnout: exhaustion, cynicism, and inefficacy.
McKeown (2023)	Policy Analysis	Institutional Risk	Critiques the shift toward "generic" nursing degrees, arguing it may dilute specialized clinical competencies.
Meštrović (2020)	Cross-sectional	Safety Culture	Measures the perception of safety culture among nursing students, highlighting the need for earlier education.
Miller (2020)	Review	Simulation	Maps the standards and best practices for high-fidelity simulation in North American nursing schools.
Moagi (2021)	Qualitative	Clinical Placement	Identifies challenges such as lack of support and resources in clinical placements in developing contexts.
Murphy (2022)	Global Report	Workforce Risk	Details the global shortage of nurses and the resulting pressure on educational institutions and student safety.
Olasveengen(2021)	Guidelines	Clinical Safety	Updates European standards for basic and advanced life support training and implementation.
Salvagioni (2017)	Systematic Review	Psychosocial Risk	Synthesizes the long-term physical and mental health consequences of burnout on healthcare professionals.
Sinclair (2015)	Qualitative	Ethics/Compassion	Defines compassion in healthcare and explores the risks of "compassion fatigue" in nursing education.
Swift (2020)	Qualitative	COVID-19 Impact	Explores the sense of loss and isolation experienced by nursing students during pandemic-related shutdowns.
Thomas (2020)	Review	Institutional Risk	Discusses strategies for embedding a safety culture within the nursing curriculum to reduce clinical errors.
Timmins (2015)	Review	Holistic Care	Emphasizes the importance of spiritual care training to manage the psychosocial risks of patient care.
Tuma (2021)	Experimental	Simulation	Shows that high-fidelity simulation significantly improves technical skills and confidence in emergency scenarios.
Umpierrez (2012)	Clinical Trial	Clinical Safety	Establishes standardized protocols for managing hyperglycemia to reduce inpatient mortality risks.

Usher (2020)	Review	Psychosocial Risk	Analyzes the mental health implications of frontline nursing during global health crises.
Vallée (2019)	Meta-analysis	Blended Learning	Finds that blended learning is more effective than traditional learning for knowledge acquisition in health education.
Voorberg (2014)	Systematic Review	Social Innovation	Analyzes how co-creation between students, faculty, and clinical partners drives educational innovation.

Key thematic findings across the literature categorize risk into four primary dimensions. Clinical risk management is centered on adherence to evidence-based protocols in areas like pediatric oncology (Linnard-Palmer, 2012), glycemic control (Umpierrez, 2012), and resuscitation (Olasveengen, 2021; Jauch, 2013). The psychosocial dimension is documented through the lens of occupational burnout (Maslach, 2016; Salvagioni, 2017), the role of job resources (Broetje, 2020), and the impact of the COVID-19 pandemic on student mental health (Swift, 2020; Usher, 2020; Green, 2020). Institutional risks focus on the 'failure to fail' phenomenon (Dean, 2016), curriculum genericization (McKeown, 2023), the importance of co-creation (Voorberg, 2014), and professional socialization (Fealy, 2015). Finally, the technological dimension highlights the efficacy of virtual reality and blended learning (Lloyd-Jones, 2022) alongside the emerging ethical dilemmas posed by AI integration. Synthesis of these works, including perspectives on compassion (Sinclair, 2015) and spirituality (Timmins, 2015), supports a shift toward a holistic safety culture (Halm, 2017; Thomas, 2020).

3.2 Dimensions of Risk in Nursing Education

3.2.1 Clinical Placement Risk and Patient Safety

Clinical placements are the most immediate and visible dimension of risk in nursing education. During the clinical placements, the gap in supervision, the difference between a student's perceived competence versus their true ability to perform in a high-pressure situation, creates a significant safety risk. Research shows that nursing students are a critical asset in the prevention of healthcare associated infections as long as they follow the standard precautions (Meštrović, 2020). For example, a cross-sectional study found that nursing students in an education program grossly failed to follow the standard precautions with compliance at only 58.4%, with evidence that students were particularly negligent with the disposal of sharps boxes (Meštrović, 2020).

The clinical environment creates systemic risks to the student's "deployment" and safety when public health emergencies occur. During the COVID19 pandemic, in many jurisdictions nursing students were asked to voluntarily opt-in to extended placements specifically to help alleviate pressures on the healthcare system. The hybrid nature of the student and employment rendered an increasingly blurred "duty of care" to both the educational institution and healthcare organization, at times with students placed as unregulated providers in complex and high-acuity contexts with little or no supervision (Swift, 2020). This increased the risk of clinical error and needle-stick injury, along with the possibility of a significantly impaired student if they are not able to speak up, nor admit other threats to safety or competence in an inevitably high-pressure, service-oriented culture.

3.2.2 Psychosocial and Occupational Health Risks for Students

In addition to physical safety, the psychosocial welfare of nursing students emerges as a key risk factor that influences clinical practice. It has been shown that the "stress-error loop" indicates a relationship between high anxiety/burnout levels and decline in psychomotor skills and clinical judgement. The degree of psychosocial risk associated with nursing programs increased significantly during the COVID-19 pandemic with heightened despair, hopelessness, and lack of purpose reported by pre-registration students (Usher, 2020). The implementation of isolation strategies and cancelling face-to-face learning resulted in a loss of peer support, which is a crucial resource to deal with the arduousness of nursing curricula (Usher, 2020).

Occupational burnout should not be viewed simply as an individual health risk; it is a systemic risk that leads to absenteeism, job dissatisfaction, and future attrition from the profession (Salvagioni, 2017). For students, burnout is often the result of a perceived imbalance between "job demands" (for example, high-stakes testing and intense clinical practice) and "job resources" (for example, faculty support and autonomy) (Broetje, 2020). In addition, students from marginalized backgrounds, such as LGBT individuals, face other psychosocial risks related to stigmatization and discrimination within the health care hierarchy (Moagi, 2021). These stressors can be considered antecedents to clinical failure because they disrupt the student's professional socialization and ability to partake in the "therapeutic relationship" (McKeown, 2023).

3.2.3 *Institutional and Regulatory Compliance Risks*

Institutional risk management typically considers the legal, regulatory, and reputational frameworks that govern nursing programs. A major emerging institutional risk is the "genericization" of nursing education, where changes to regulations may ultimately dilute the specialized training in nursing disciplines (such as mental health nursing) and replace it with a generic nursing curriculum (McKeown, 2023). This trend has the potential to create a skills deficit in the graduating workforce, which may open the door for liabilities for the educational institution, and their future employer (McKeown, 2023).

One of the most challenging institutional risks is the "failure to fail." Faculty face the inherent pressure to pass students who may not meet the required competency due to threats of litigation, institutional pressures regarding the retention rates of students, or the emotional burden of failing a student with whom they have a positive relationship. The failure to pass judgement on student competency is a violation of the "social contract" between the nursing school and the community. In addition, institutions face complex mandates such as reporting child abuse where failure to ensure a student follows protocols results in grave legal consequences for the university (Green, 2020). Effective risk management within an institution is contingent upon there being defensible, clear protocols for assessing students, as well as a culture that supports faculty in making difficult grading decisions.

3.2.4 *Risks of Technological and Simulation-Based Learning*

While the rapid incorporation of various technologies has provided benefits to pedagogy, it has also introduced risks. High-fidelity mannequins and virtual reality are no longer just used to supplement clinical hours, but many have begun to replace them. This has led to what has been termed "fidelity paradox." Simulations provide a safe setting to practice skills and develop competency as a learner; however, they can create a climate of "simulation-induced overconfidence" or focus solely on the physiological data, rather than the humanistic care (Dean, 2016). Research activities in simulation labs have shown that students would care for the "patient," monitoring a "cardiac" event, while ignoring emotional or psychological care for the person in the bed (Dean, 2016).

The emergence of generative artificial intelligence (AI), such as ChatGPT, has added another risk to educational integrity and clinicians' judgment. The risk remains that AI tools cannot encapsulate the empathy or compassion or tacit knowledge that is encompassed in nursing (Abdulai, 2023). The academic use of AI tools, as a mechanism for processing sensitive health information, is contrary to the principles of privacy and confidentiality that students must adhere to (Abdulai, 2023). There are also institutional risks in terms of privacy in collecting student data, information breaches, and potentially inappropriate use of performance analytic data. As institutions adopt web-based intelligent systems, what is disclosed about students and their performance with acuity is another risk (Chen, 2020). It is feasible to disrupt learner development through technological risks, requiring educators to balance the innovativeness vs the human-centred core of nursing practice.

3.3 *Risk Mitigation Strategies Review*

3.3.1 *Safety Protocols in the Curriculum*

The presence of safety protocols in nursing curriculum has shifted from a topic for conversation to a bedrock of clinical education. New educational frameworks are prioritizing the embedding of standardized safety protocols into the course level of the curriculum, so that students can value risk mitigation as a core competency of nursing. These include strategies such as the use of specialized mnemonics, and "Chemotherapy Road Maps" in pediatric oncology nursing as being the most effective educational strategy for ensuring competent practice in high-risk environments (Linnard-Palmer, 2012). This type of cognitive assistance helps to decrease reliance on memory, during complex nurse-related procedures, in order to mitigate the potential for medication errors.

Standardized subcutaneous insulin order sets have been implemented in clinical teaching environments, which reinforce the practice of scheduled basal and nutritional insulin therapy for hyperglycemia management in non-critical care environments (Umpierrez, 2012). By requiring students to practice using standardized protocols, educational programs can advance student practices to align with evidence-based clinical guidelines, which also decreases the potential for adverse glycemic events. This type of alignment is also evident in simulations for Basic Life Support (BLS) training, where adherence to the current European Resuscitation Council guideline ensures BLS learners are using the most up-to-date evidence-based techniques for the care of patients during a cardiac arrest (Olasveengen, 2021). In addition, institutional

programs also emphasize principles of antimicrobial stewardship, where learners are taught the appropriate selection, dosing, and duration of therapy with antimicrobials to optimize clinical outcomes and minimize the emergence of resistance (Dellit, 2006). The integration of safety practices across the curriculum ensures safety is not viewed as an isolated independent task, but rather inherent to professional nursing practice. The shift to a model of integrated care, asks nursing learners examine their own related competencies and practice within a safe, efficient, and cost-effective manner (Fealy, 2015).

3.3.2 *Faculty Supervision and Mentorship Practice Models*

The faculty supervision of nursing learners remains the most significant safeguard against clinical errors, however, the supervision practice is changing substantially. The degree of faculty supervision has been identified as a barrier to effective risk management because of the traditionally high student-to-faculty clinical ratio (Jenson, 2012). New programs of supervised practice have identified the role of supervision as a shift away from direct content delivery, but rather as a role of assistance and support, especially with the use of digital tools (AI and virtual reality) becoming more prevalent in the clinic and classroom (Bettayeb, 2024).

Mentorship quality is a significant factor in student success, and safety, but also the researchers identified the "dark side" of development through negative mentorship experiences (Tuma, 2021). These experiences may include a range of leadership issues between students and faculty, or a lack of supervision at the organizational level (Fealy, 2015). Negative mentorship experiences can be detrimental to a nursing student's professional development, and an increased risk of disengagement from the clinical experience. As such, developing civility in the educational environment is important (Bagnasco, 2018). Civility is demonstrated by authentic respect and a willingness to engage in authentic dialogue that creates a psychologically safe learning environment for students to disclose and report mistakes and ask for clarification.

Within the context of the COVID-19 pandemic, the learning environment for nursing students became even more complicated, with institutions balancing the necessary clinical education amidst health risks for students and their families (Miller, 2020). Faculty had to balance student willingness to incur risk against assurance that safety precautions, including personal protective equipment (PPE), would be put in place. This time emphasized the important role of faculty as gatekeepers for educational integrity and physical safety.

3.3.3 *Incident Reporting and Feedback Systems*

Strong incident reporting and feedback systems are an essential component of a proactive risk management approach in nursing education. One of the most innovative tools for nursing education has been Simulation-Based Training (SBT). SBT affords students a safe and controlled environment to practice their skills and obtain immediate feedback without the risk to patients (Elendu, 2024). High-fidelity mannequins and virtual environments are used to evaluate and analyze "near-misses," as they are viewed as actual serious failures in terms of potential clinical patient care failure.

In any protocol there is a structured debrief following a simulation or clinical incident, at which point students can reflect on their decision-making and begin to understand the cause of the error. For instance, in aggression management education, nurses and students are taught to pay strict attention to cues and body language of patients, thus incorporating de-escalation techniques as part of an effort to minimize workplace violence (Halm, 2017). The effectiveness of aggression education can be easily monitored using the Kirkpatrick 4-level model to assess learner satisfaction, knowledge, behavior, and clinical outcome as part of the learning continuum.

The findings suggest that while education improved knowledge (Level 1) and confidence (Level 2), transfer to clinical or real-life behavioral change (Level 4) is only sustainable when the institution takes a supporting role in learning and providing feedback (Halm, 2017). In addition, virtual reality simulation allows students to practice multiple times without patient risk and obtain feedback on clinical decision making without failure while building their experience (Jenson, 2012). Technology allows a more objective assessment of student performance than perhaps observed in the clinical environment alone.

3.3.4 *Ethical Considerations for Risk Management*

Risk management in nursing education is ultimately an ethical exercise to balance the student's right to learn and the patient's right to safe care. The discussion about "compassion deficit," for example, points to the ethical risks of poor care in baseline competencies and "callous indifference" that professionals may observe (Timmins, 2015).

Educational institutions have an ethical responsibility to develop processes to screen and prepare students for not only clinical expertise but to be compassionate clinicians.

The issue of the "impostor phenomenon" and perfectionism also poses ethical dilemmas as these psychological states can contribute to burnout and mental health concerns among students (Thomas, 2020). If students place pressure on themselves to be perfect, they might not feel able to report errors, placing patients at undisclosed risk. For this reason, it is imperative to address the interplay between medical culture, the development of a professional identity, and mental health as an aspect of ethical risk management.

Ethics surrounding student involvement during COVID-19 was particularly important. Some believed students should be shielded from risks of viral transmission, while others asserted that medical and nursing students constitute an "essential, emerging workforce" that has to have clinical education that continues with adequate precautions (Miller, 2020). The voluntary aspect of clinical involvement during any crisis provides an ethical safety net in that students are in control of what level of risk they are willing to assume. Ultimately, the ethical aim of risk management is to ensure that program graduates are both clinically competent and have ethical resilience to engage in patient advocacy.

3.4 Best Practices in Nursing Education

When synthesizing the existing literature, the most effective risk management strategies in nursing education and learning are the modalities that a multi-modal, integrated approach. In nursing education, blended learning - online learning plus traditional face-to-face education - has consistently been shown to have a larger effect on knowledge outcomes of students than traditional learning alone (Vallée, 2019). A significant benefit of a blended learning approach is the degree of flexibility and self-directed learning material designed for busy, professional healthcare workers committed to lifelong learning and continuing competency (Sinclair, 2015).

Simulation-based training (SBT) continues to be the gold standard for acquiring high stakes skills, bridging the gap between theory and practice (Elendu, 2024). Best practice SBT includes multiple modalities to support varied clinical experiences, and should include high-fidelity mannequins, virtual or augmented reality, and standardized patients to expose students to crucial clinical practice experiences for safe and effective care. Integration of games for learning (serious games) are gaining traction in nursing programs, as an effective method to teach both technical and non-technical skills to students in a fun, safe environment (Graafland, 2012).

Applying "Life's Essential 8" framework (diet, physical activity, sleep health, etc.) can be a great strategy for nursing programs that prioritize the mental and physical health of their students (Lloyd-Jones, 2022). When the health of the student is prioritized, then institutes can help reduce the psychosocial risks that cause patient errors. A holistic approach to risk management includes both technical training and ethical grounding, while attending to the health and wellness of the student.

3.5 Barriers to Effective Risk Management Implementation

While advanced strategies are an important part of risk management in nursing education, there are barriers to effective implementation. One key barrier is the critical level of staffing shortages, which were exacerbated by COVID-19 (Murphy, 2022). When a clinical environment is short-staffed, the quality of supervision is reduced for students, and both faculty and student feel an increase in pressure providing the "perfect storm" for errors.

Burnout is another important obstacle which impacts both students and staff. Burnout is often associated with the stressful nature of working in health care including working with challenging or violent clients. Many nurses have reported experiencing high levels of occupational stress and burnout in the aftermath of the pandemic, which will eventually lead to a feeling of defeat and a decrease in clinical performance. Burnout in faculty may lead to their inability to provide the high quality mentorship and supervision necessary for students to have safe practice.

Another barrier includes financial and resource constraints. High-fidelity simulation and other high-tech educational offerings requires significant initial and ongoing expenditures for equipment and trained personnel. Many institutions perceive the ongoing expense of maintaining simulator programs as a barrier. The "academic-practice gap" (i.e., barriers between theory and action) remains a persistent barrier in nursing education. Students are often taught safety protocols, yet these are difficult to operationalize in an unpredictable clinical environment within limited resources.

3.6 *Implications for Policy and Educational Leadership*

The findings of this review suggest relevant implications for policy and educational leadership. Nursing education is at a "crossroads" and calls for action to explore the systemic vulnerabilities of the workforce. Instead of continuing to focus on individual resilience, leaders should advocate for organizational strategies to support the mental health and wellness of the nursing workforce. Such strategies could involve adopting a "no-fault" reporting culture and supporting staff with the resources they need to supervise students and assume supportive roles.

There is also a need for policy intervention to address the nursing shortage and assure a sustainable workforce of the future. The quality of working conditions for nurses will require increased funding for nursing programs to improve working conditions and develop a clear pathway forward for professional development. Educational leaders must also support the digital transformation of health care, prepared students to practice telemedicine and e-health technologies in a safe and effective manner.

Development of institutional programs are also warranted, which engage students in improving antimicrobial stewardship and other patient safety programs. It is important to align educational policy with national and international patient safety white papers to ensure nursing graduates are prepared to participate and address patient safety challenges in a complex health care environment. Leadership in this space entails a commitment to transparency and accountability, to improve educational practice continuously.

3.7 *Identified Gaps in Current Literature*

The literature related to risk management in nursing education is quite comprehensive, however, there continues to be significant gaps. There is a conspicuous absence of longitudinal studies to track potential long-term impacts on clinician behavior and patient outcomes from e-learning and simulation experiences. Moreover, the majority of studies seek to quantify immediate knowledge gain or student satisfaction rather than longer duration studies to verify if educational interventions led to longer duration reductions in clinical errors.

Additionally, while the benefits of simulation are well-documented, there is a need for additional research examining how skills transfer from simulated environments to actual clinical practice (Elendu, 2024). The "fidelity paradox," which is when simulations are high fidelity but do not necessarily replicate the complexities of real practice, should be refined with more research. There is also very little evaluative research about possible interventions to treat or prevent burnout in the context of nursing education (Maslach, 2016).

Finally, much of the research in risk management is based on limited studies in specific geographic areas, indicating that more research should be conducted in varying, diverse, and global contexts (Jauch, 2013). Future research should also include consideration of following the outcomes of co-creation and co-production processes in nursing education. More nuanced studies can explore how students, patients, and families can be more engaged in co-creating a solution when nurses use safety protocols (Voorberg, 2014). Addressing these gaps is fundamental to achieving a better overall framework for risk management in nursing education.

4. CONCLUSION

This integrative review has demonstrated that risk in nursing education is a multi-faceted construct that includes clinical safety, psychosocial well-being, institutional compliance, and technology integration. The analysis of current strategies reinforces that while standardized protocols and simulation training are useful strategies for risk mitigation, their success is predicated on a foundation of faculty support, ethical approaches to practice, and a culture of civility. The challenges posed by the COVID-19 pandemic serve to reinforce the need for resilience in teaching practice and educational systems to respond to a crisis while maintaining a vigorous commitment to safety.

In order to move forward in nursing education, systems that promote resilience can be fostered by addressing the systemic barriers of burnout and staffing shortages with concerted proactive leadership and policy reformial changes. By closing the academic-practice gap and building a psychologically safe classroom space, educators can graduate future generations of nurses who are technically sound and committed to advocating for patient safety. Moving forward in health care, continuing to integrate evidence-based risk management strategies will be necessary for sustaining social licensure and protecting the safety of patients.

This integration of risk management requires a multi-faceted approach that addresses the underlying systemic vulnerabilities currently burdening the nursing workforce. Specifically, prioritizing the removal of practice barriers and valuing the diverse contributions of nursing

professionals is essential for strengthening institutional capacity and expertise (Hassmiller, 2022). By fostering these structural supports, educational and healthcare systems can mitigate the risks of moral injury and burnout while ensuring that graduates are prepared to navigate complex clinical challenges effectively.

Furthermore, achieving this level of systemic robustness necessitates a paradigm shift in how nursing competency is defined and assessed within the educational environment. This involves refining pedagogical frameworks to ensure that nurses are not only prepared for technical tasks but are also equipped with the cognitive flexibility to manage unpredictable clinical risks. Consequently, integrating these structural improvements provides a necessary foundation for maintaining high standards of care delivery in increasingly strained healthcare environments.

REFERENCE

Abdulai, A., & Hung, L. (2023). Will ChatGPT undermine ethical values in nursing education, research, and practice? Nursing Inquiry. https://doi.org/10.1111/nin.12556

Bagnasco, A., Aleo, G., Timmins, F., Catania, G., Zanini, M., & Sasso, L. (2018). Educating our future generation—The role of nurse managers in encouraging civility. Journal of Nursing Management. https://doi.org/10.1111/jonm.12724

Bettayeb, A. M., Talib, M. A., Altayasinah, A. Z. S., & Dakalbab, F. (2024). Exploring the impact of ChatGPT: conversational AI in education. Frontiers in Education. https://doi.org/10.3389/feduc.2024.1379796

Broetje, S., Jenny, G. J., & Bauer, G. F. (2020). The key job demands and resources of nursing staff: An integrative review of reviews. Frontiers in Psychology. https://doi.org/10.3389/fpsyg.2020.00084

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. IEEE Access. https://doi.org/10.1109/access.2020.2988510

Dean, S., Williams, C., & Balnaves, M. (2016). Living dolls and nurses without empathy. Journal of Advanced Nursing. https://doi.org/10.1111/jan.12891

Dellit, T. H., Owens, R. C., McGowan, J. E., Gerding, D. N., Weinstein, R. A., Burke, J. P., Huskins, W. C., Paterson, D. L., Fishman, N. O., Carpenter, C., Brennan, P. J., Billeter, M., & Hooton, T. M. (2006). Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship. Clinical Infectious Diseases. https://doi.org/10.1086/510393

Elendu, C., Amaechi, D. C., Okatta, A. U., Amaechi, E. C., Elendu, T. C., Ezeh, C. P., & Elendu, I. D. (2024). The impact of simulation-based training in medical education: A review. Medicine. https://doi.org/10.1097/md.0000000000038813

Fealy, G., & McNamara, M. (2015). Transitions and tensions: The discipline of nursing in an interdisciplinary context. Journal of Nursing Management. https://doi.org/10.1111/jonm.12282

García-Peñalvo, F. J. (2022). Desarrollo de estados de la cuestión robustos: Revisiones sistemáticas de literatura. Education in the Knowledge Society (EKS). https://doi.org/10.14201/eks.28600

Graafland, M., Schraagen, J. M., & Schijven, M. P. (2012). Systematic review of serious games for medical education and surgical skills training. British Journal of Surgery. https://doi.org/10.1002/bjs.8819

Green, M. (2020). Nurses' adherence to mandated reporting of suspected cases of child abuse. Journal of Pediatric Nursing. https://doi.org/10.1016/j.pedn.2020.06.007

Halm, M. A. (2017). Aggression management education for acute care nurses: What's the evidence? American Journal of Critical Care. https://doi.org/10.4037/ajcc2017984

Hassmiller, S. B., & Wakefield, M. (2022). The future of nursing 2020–2030: Charting a path to achieve health equity. https://doi.org/10.1016/j.outlook.2022.05.013

Jauch, E. C., Saver, J. L., Adams, H. P., Bruno, A., Connors, J. J., Demaerschalk, B. M., Khatri, P., McMullan, P. W., Qureshi, A. I., Rosenfield, K., Scott, P., Summers, D., Wang, D. Z., Wintermark, M., & Yonas, H… (2013). Guidelines for the early management of patients with acute ischemic stroke. Stroke. https://doi.org/10.1161/str.0b013e318284056a

Jenson, C. E., & Forsyth, D. M. (2012). Virtual reality simulation: using three-dimensional technology to teach nursing students. CIN: Computers, Informatics, Nursing. https://doi.org/10.1097/nxn.0b013e31824af6ae

Linnard-Palmer, L. (2012). The use of simulation for pediatric oncology nursing safety principles: ensuring competent practice through the use of a mnemonic, chemotherapy road maps and case-based learning. Journal of Pediatric Nursing. https://doi.org/10.1016/j.pedn.2012.02.001

Lloyd-Jones, D. M., Allen, N. B., Anderson, C. A., Black, T., Brewer, L. C., Foraker, R. E., Grandner, M. A., Lavretsky, H., Perak, A. M., Sharma, G., & Rosamond, W. D. (2022). Life's essential 8: updating and enhancing the American Heart Association's construct of cardiovascular health: a presidential advisory from the American Heart Association. Circulation. https://doi.org/10.1161/cir.0000000000001078

Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: recent research and its implications for psychiatry. World Psychiatry. https://doi.org/10.1002/wps.20311

McKeown, M… (2023). Resisting genericization: towards the renewal of mental health nursing. Journal of Advanced Nursing. https://doi.org/10.1111/jan.15598

Meara, J. G., Leather, A., Hagander, L., Alkire, B. C., Alonso, N., Ameh, E. A., Bickler, S. W., Conteh, L., Dare, A., Davies, J., Mérisier, E. D., El-Halabi, S., Farmer, P. E., Gawande, A. A., Gillies, R., Greenberg, S., Grimes, C., Gruen, R. L., Ismail, E. A., Kamara, T. B., Lavy, C., Lundeg, G., Mkandawire, N., Raykar, N., Riesel, J. N., Rodas, E. B., Rose, J., Roy, N., Shrime, M. G., Sullivan, R., Verguet, S., Watters, D., Weiser, T. G., Wilson, I. H., Yamey, G., & Yip, W. (2015). Global surgery 2030: evidence and solutions for achieving health, welfare, and economic development. The Lancet. https://doi.org/10.1016/s0140-6736(15)60160-x

Meštrović, T., Neuberg, M., & Kozina, G. (2020). Compliance with standard precautions among university nursing students from Croatia: a cross-sectional study. Infection Control and Hospital Epidemiology. https://doi.org/10.1017/ice.2020.713

Miller, D., Pierson, L., & Doernberg, S. N. (2020). The role of medical students during the COVID-19 pandemic. Annals of Internal Medicine. https://doi.org/10.7326/l20-1195

Moagi, M. M., Wath, A. V. D., Jiyane, P. M., & Rikhotso, R. (2021). Mental health challenges of lesbian, gay, bisexual and transgender people: an integrated literature review. Health SA Gesondheid. https://doi.org/10.4102/hsag.v26i0.1487

Murphy, G. T., Sampalli, T., Bearskin, L. B., Cashen, N., Cummings, G. G., Rose, A. E., Etowa, J., Grinspun, D., Jones, E. W., Lavoie-Tremblay, M., MacMillan, K., MacQuarrie, C., Martin-Misener, R., Oulton, J. A., Ricciardelli, R., Silas, L., Thorne, S., & Villeneuve, M. (2022). Investing in Canada's nursing workforce post-pandemic. FACETS. https://doi.org/10.1139/facets-2022-0002

Olasveengen, T. M., Semeraro, F., Ristagno, G., Castrén, M., Handley, A. J., Кузовлев, A. N., Monsieurs, K. G., Raffay, V., Smyth, M. A., Soar, J., Svavarsdóttir, H., & Perkins, G. D. (2021). European resuscitation council guidelines 2021: basic life support. Resuscitation. https://doi.org/10.1016/j.resuscitation.2021.02.009

Rethlefsen, M. L., Kirtley, S., Waffenschmidt, S., Ayala, A. P., Moher, D., Page, M. J., Koffel, J., Blunt, H. B., Brigham, T., Chang, S., Clark, J., Conway, A., Couban, R., Kock, S. D., Farrah, K., Fehrmann, P., Foster, M., Fowler, S. A., Glanville, J., Harris, E., Hoffecker, L., Isojärvi, J., Kaunelis, D., Ket, J. C. F., Levay, P., Lyon, J. A., McGowan, J., Murad, M., Nicholson, J., Pannabecker, V., Paynter, R., Pinotti, R., Ross-White, A., Sampson, M., Shields, T., Stevens, A., Sutton, A., Weinfurter, E., Wright, K., Young, S., & Young, S. (2021). PRISMA-S: an extension to the PRISMA statement for reporting literature searches in systematic reviews. Systematic Reviews. https://doi.org/10.1186/s13643-020-01542-z

Salvagioni, D. A. J., Melanda, F. N., Mesas, A. E., González, A. D., Gabani, F. L., & Andrade, S. M. D. (2017). Physical, psychological and occupational consequences of job burnout: a systematic review of prospective studies. PLoS ONE. https://doi.org/10.1371/journal.pone.0185781

Sinclair, P. M., Kable, A., & Levett-Jones, T. (2015). The effectiveness of Internet-based e-learning on clinical behaviour and patient outcomes: a systematic review. JBI Database of Systematic Reviews. https://doi.org/10.11124/jbisrir-2015-1919

Swift, A., Banks, L., Baleswaran, A., Cooke, N., Little, C., McGrath, L., Meechan, R., Neve, A., Rees, H., Tomlinson, A., & Williams, G. (2020). COVID-19 and student nurses: a view from England. Journal of Clinical Nursing. https://doi.org/10.1111/jocn.15298

Thomas, M., & Bigatti, S. M. (2020). Perfectionism and impostor phenomenon, and mental health in medicine: a literature review. International Journal of Medical Education. https://doi.org/10.5116/ijme.5f54.c8f8

Timmins, F., & Vries, J. D. (2015). Follow the yellow brick road- the compassion deficit debate where to from here. Journal of Clinical Nursing. https://doi.org/10.1111/jocn.12917

Tuma, T. T., Adams, J., Hultquist, B. C., & Dolan, E. L. (2021). The dark side of development: a systems characterization of the negative mentoring experiences of doctoral students. CBE—Life Sciences Education. https://doi.org/10.1187/cbe.20-10-0231

Umpierrez, G. E., Hellman, R., Korytkowski, M. T., Kosiborod, M., Maynard, G. A., Montori, V. M., Seley, J. J., & Berghe, G. V. D. (2012). Management of hyperglycemia in hospitalized patients in non-critical care setting: an endocrine society clinical practice guidelines. Journal of Clinical Endocrinology & Metabolism. https://doi.org/10.1210/jc.2011-2098

Usher, K., Wynaden, D., Bhullar, N., Durkin, J., & Jackson, D. (2020). The mental health impact of COVID-19 on pre-registration nursing students in Australia. International Journal of Mental Health Nursing. https://doi.org/10.1111/inm.12791

Vallée, A., Blacher, J., Cariou, A., & Sorbets, E. (2019). Blended learning compared to traditional learning in medical education: systematic review and meta-analysis. Journal of Medical Internet Research. https://doi.org/10.2196/16504

Voorberg, W., Bekkers, V., & Tummers, L. (2014). A systematic review of co-creation and co-production: embarking on the social innovation journey. Public Management Review. https://doi.org/10.1080/14719037.2014.930505