

Clinical risk management in hospital workforce: A systematic literature review

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Received: 04 February 2026; *Revised:* 04 April 2026; *Accepted:* 12 April 2026

 **Cite this** <https://doi.org/10.24036/jptk.v9i2.49423>

Abstract: Clinical risk management in hospitals is increasingly shaped by workforce conditions, as clinical risks emerge from everyday decisions, communication, workload, training, reporting behaviour, and organisational support. This systematic literature review synthesised evidence on workforce-related clinical risks, management strategies, and future research directions in hospital settings. Following PRISMA 2020, relevant English-language peer-reviewed journal articles published between 2021 and 2026 were identified through Scopus and screened using predefined eligibility criteria. Twenty-five studies were included and analysed using narrative thematic synthesis with MMAT-informed quality appraisal. The findings show that workforce-related clinical risks are mainly associated with weak reporting culture and psychological safety; communication and handover failures; workload and staffing pressure; fatigue; training and competency gaps; clinical process risks; teamwork problems; and limited leadership or organisational learning. The main strategies used to manage these risks include incident reporting and learning systems, non-punitive safety culture, workforce training, structured risk assessment, communication standardisation, leadership support, and feedback-based organisational learning. However, most evidence remains descriptive, cross-sectional, qualitative, retrospective, single-site, or quality-improvement focused, with limited measurement of direct patient safety outcomes. Clinical risk management should therefore be understood as a continuous workforce-dependent safety process that connects staff conditions, risk pathways, organisational strategies, and sustained patient and staff safety outcomes.

Keywords: clinical risk management; hospital workforce; incident reporting; organisational learning; patient safety; safety culture

1. Introduction

Clinical risk management has become a central concern in hospital governance because hospitals operate in complex, high-pressure environments where clinical decisions, interprofessional coordination, workload, technology use, and organisational culture directly affect patient safety (Huang et al., 2024; Syahrudin et al., 2026; Zamakhshari, 2025). Clinical risk management refers to systematic efforts to identify, assess, prevent, mitigate, monitor, and learn from risks that may cause harm to patients, healthcare workers, or the organisation (Edi Kurnawan et al., 2025; Longo et al., 2024). In hospital settings, these risks may arise from medication errors, diagnostic delays, communication failures, staffing shortages, workload pressure, inadequate supervision, infection risks, unsafe handovers, and poor reporting culture. The World Health Organization's Global Patient Safety Action Plan 2021–2030 emphasises that avoidable harm in healthcare remains a global priority and requires coordinated action across policy, organisational, clinical, and workforce levels (WHO, 2021). Therefore, clinical risk management should not be understood only as an administrative mechanism, but as a continuous safety process embedded in everyday hospital work.

The hospital workforce occupies a critical position in clinical risk management because doctors, nurses, pharmacists, allied health professionals, managers, and support staff are directly involved in detecting, reporting, preventing, and responding to clinical risks ([Alzamanan et al., 2024](#); [La Russa & Ferracuti, 2022](#)). However, the same workforce is also exposed to occupational, psychological, organisational, and clinical pressures that can increase safety risks. Evidence shows that healthcare worker burnout is associated with poorer patient safety, lower care quality, and reduced patient satisfaction ([Garcia et al., 2019](#); [He & Li, 2024](#)). Workload, fatigue, staffing instability, weak teamwork, punitive reporting systems, and ineffective communication can reduce vigilance and weaken staff's capacity to manage risk ([Anders, 2025](#); [Pickup et al., 2025](#); [Zabin et al., 2025](#)). The WHO Health Worker Safety Charter explicitly states that patient safety cannot be achieved unless health workers are protected, trained, respected, and supported ([WHO, 2020](#)). This indicates that clinical risk management must integrate both patient safety and workforce safety.

Previous studies have examined several related domains, including patient safety culture, clinical governance, healthcare risk management, burnout, incident reporting, and safety culture interventions ([Ariyani, 2025](#); [He & Li, 2024](#)). For example, safety culture research has shown that teamwork, leadership support, event reporting, non-punitive responses to error, and organisational learning are key elements of safer hospital care ([Azyabi et al., 2021](#); [Kumah, 2025](#)). Systematic reviews also suggest that safety culture interventions can improve hospital staff safety practices and organisational learning, although the design and implementation quality of these interventions vary across settings ([Garay et al., 2023](#)). In addition, studies on workplace safety culture show that patient safety and worker safety are strongly interconnected rather than separate organisational issues ([Hesgrove et al., 2024](#)). Despite this growing evidence, the literature remains fragmented because workforce-related risks are often studied separately from clinical risk management systems.

This fragmentation creates a clear research gap. Existing reviews tend to focus on patient safety culture, burnout, occupational safety, clinical governance, or specific risk domains, but fewer studies systematically synthesise how the hospital workforce is positioned within clinical risk management ([Chau, 2024](#); [Jendraatmaja et al., 2025](#); [Kiptulon et al., 2024](#); [Lu et al., 2022](#)). In particular, there is limited integrated evidence on how workforce factors such as staffing, workload, burnout, communication, training, leadership, reporting culture, psychological safety, and interprofessional collaboration shape clinical risk identification, mitigation, monitoring, and learning ([Mabona et al., 2022](#); [Ndlovu & Taderera, 2026](#); [Paul et al., 2025](#)). There is also insufficient synthesis on what risk management strategies are most commonly applied to support hospital staff in reducing clinical risks. As a result, the relationship between workforce conditions and clinical risk management remains conceptually important but empirically dispersed.

The novelty of this study lies in its workforce-centred approach to clinical risk management. Rather than reviewing clinical risk management only from a patient safety, governance, or technical risk-control perspective, this systematic literature review positions the hospital workforce as both a source of risk exposure and a key agent of risk prevention. This perspective is important because clinical risks are not managed only through policies, checklists, or reporting systems; they are managed through the daily judgment, communication, competence, coordination, and resilience of hospital staff. By integrating evidence across patient safety, workforce safety, clinical governance, safety culture, and organisational risk management, this review aims to provide a more comprehensive understanding of clinical risk management in hospital workforce contexts. The following research questions guide this study:

RQ1. What workforce-related clinical risks are most frequently identified in hospital settings?

- RQ2. What clinical risk management strategies, interventions, or organisational practices are used to prevent, reduce, or manage workforce-related clinical risks in hospitals?
- RQ3. What research gaps and future directions emerge from the literature on clinical risk management in the hospital workforce?

This study contributes to the literature in three ways. First, it provides a systematic synthesis of workforce-related clinical risks in hospital environments, including risks linked to workload, staffing, burnout, communication, teamwork, reporting culture, and organisational support. Second, it maps the clinical risk management strategies used to address these risks, including safety culture interventions, incident reporting systems, training, leadership support, risk assessment, staff engagement, and organisational learning. Third, it develops a research agenda for strengthening clinical risk management through workforce-centred safety governance. These contributions are relevant for hospital managers, patient safety officers, clinical governance teams, policymakers, and healthcare educators who aim to design safer, more resilient, and more accountable hospital systems.

2. Methods

2.1 Review design

This study employed a Systematic Literature Review (SLR) to synthesise evidence on workforce-centred clinical risk management in hospital settings. The review focused on how workforce-related factors, including staffing, workload, burnout, communication, teamwork, incident reporting, leadership, training, psychological safety, and organisational learning, influence the identification, prevention, mitigation, monitoring, and management of clinical risks. The SLR approach was appropriate because evidence on this topic is dispersed across patient safety, clinical governance, hospital management, occupational health, and organisational safety research. The PRISMA 2020 framework guided the review to ensure transparent reporting of the identification, screening, eligibility assessment, and inclusion process (Page et al., 2021). The synthesis was structured around three research questions: the main workforce-related clinical risks reported in hospitals; the strategies and organisational practices used to manage these risks; and the major research gaps and future directions in workforce-centred clinical risk management.

2.2 Data sources and search strategy

The literature search was conducted in Scopus because of its broad coverage of peer-reviewed research in health services, patient safety, clinical governance, hospital workforce management, and organisational safety. The search was performed in the title, abstract, and keyword fields using three concept blocks: clinical risk management, hospital workforce, and patient safety or clinical governance. The search was limited to English-language peer-reviewed journal articles published between 2021 and 2026. Full-text availability was assessed during the retrieval and eligibility stages, rather than applied as an initial database filter. The search and reporting process was aligned with PRISMA 2020 recommendations for transparent identification, selection, and reporting of studies (Page et al., 2021). The final Scopus search string was:

(TITLE-ABS-KEY (("clinical risk management" OR "healthcare risk management" OR "risk management" OR "risk mitigation")) AND TITLE-ABS-KEY (("hospital workforce" OR "healthcare workforce" OR "healthcare workers" OR "healthcare staff" OR nurses OR physicians OR doctors)) AND TITLE-ABS-KEY (("patient safety" OR "safety culture" OR "clinical governance" OR "incident reporting" OR "adverse events")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")) AND PUBYEAR > 2021 AND PUBYEAR < 2026.

The search string indicates that the database search was restricted to journal articles. Therefore, review articles were not treated as primary included studies in the final synthesis. All retrieved records were exported from Scopus for duplicate checking and screening. Reference list checking and selective forward citation tracking were also used as supplementary strategies to identify additional relevant studies that met the predefined eligibility criteria.

2.3 Inclusion and exclusion criteria

The inclusion and exclusion criteria were established before screening to maintain alignment between the review objective and the final evidence base. Studies were included if they examined clinical risk management, patient safety, safety culture, incident reporting, clinical governance, or workforce-related risk factors in hospital or acute care settings. Eligible studies had to provide extractable findings on hospital workforce groups, including nurses, physicians, allied health professionals, managers, and support staff. Studies were excluded if they focused only on non-hospital settings, patient-only outcomes without workforce analysis, financial or legal risk without clinical relevance, review papers, or publications with insufficient methodological information. Table 1 presents the eligibility criteria used in this review.

Table 1. Inclusion and exclusion criteria

Criteria	Inclusion criteria	Exclusion criteria
Publication type	Peer-reviewed journal articles.	Reviews, editorials, letters, theses, reports, conference abstracts, and non-journal publications.
Language	English-language publications.	Non-English publications.
Time frame	Studies published between 2021 and 2026	Studies outside the selected period.
Setting	Hospital or acute care settings.	Non-hospital settings without hospital relevance.
Population	Hospital workforce, including nurses, physicians, allied health professionals, managers, and support staff.	Patients only or non-healthcare workers.
Topic focus	Clinical risk management, patient safety, safety culture, incident reporting, or clinical governance.	Financial, legal, or administrative risk without clinical relevance.
Workforce relevance	Studies linking clinical risk to workload, staffing, burnout, communication, teamwork, training, leadership, or reporting culture.	Studies without workforce-related analysis.
Study design	Quantitative, qualitative, mixed-methods, intervention, quality-improvement, retrospective, or conceptual-methodological studies with extractable findings.	Studies with unclear methods or no relevant findings.
Full-text access	Full text available.	Full text unavailable.

2.4 Study selection procedure

The study selection process followed the PRISMA 2020 stages of identification, screening, eligibility assessment, and inclusion (Page et al., 2021). The initial Scopus search identified 1,845

records. Before screening, 1,348 records were removed because they were duplicates, marked as ineligible by automation tools, or excluded for preliminary reasons, including non-journal publication type, non-English language, document type outside peer-reviewed journal articles, or publication year outside the 2021–2026 period. This left 497 records for title and abstract screening. At this stage, 145 records were excluded because they were not aligned with the topic focus or had no clear relevance to clinical risk and patient safety. A total of 352 reports were sought, of which 104 could not be retrieved because the full text was unavailable or inaccessible. The remaining 248 reports were assessed for eligibility.

After full-text assessment, 223 reports were excluded because they did not meet one or more eligibility criteria. The main reasons for exclusion were non-hospital setting, population not involving the healthcare workforce, lack of workforce-related analysis, absence of clinical risk or patient safety relevance, unclear study design or methods, review-paper format, or insufficient extractable findings. As a result, 25 studies met the inclusion criteria and were included in the final synthesis. Two reviewers independently screened titles, abstracts, and full texts against the predefined criteria. Disagreements were resolved through discussion, and a third reviewer was consulted when consensus could not be reached. Reasons for exclusion at the full-text stage were documented to maintain a transparent audit trail.

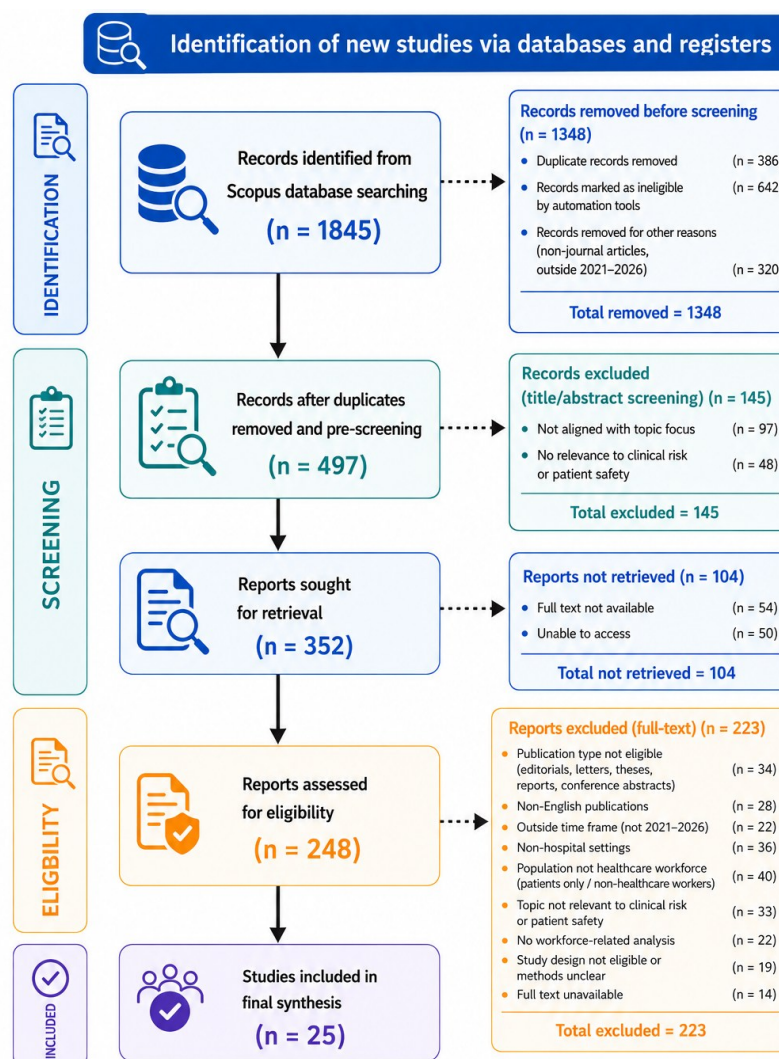


Figure 1. PRISMA 2020 flow diagram of the study selection process

Figure 1 illustrates the complete study selection process. The diagram shows how the initial pool of records was reduced through duplicate removal, preliminary eligibility checks, title and abstract screening, full-text retrieval, eligibility assessment, and final inclusion. The final review included 25 studies for qualitative synthesis.

2.5 Critical appraisal and quality assessment

Critical appraisal was conducted to assess the methodological quality, relevance, and trustworthiness of the included studies. Because the review included quantitative, qualitative, mixed-methods, and review-based evidence, the appraisal process was adapted to accommodate methodological diversity. The Mixed Methods Appraisal Tool (MMAT) was used as the main reference for appraising empirical studies across different designs, while relevant critical appraisal principles were applied to review-based evidence ([Tang et al., 2025](#)).

The appraisal considered the clarity of research aims, appropriateness of the study design, relevance to the hospital workforce and clinical risk management, transparency of data collection and analysis, credibility of the findings, reporting of limitations, and contribution to the review questions. Each study was classified as high, moderate, or low quality based on methodological transparency, relevance, and evidentiary contribution. Studies with stronger design quality and direct relevance to workforce-centred clinical risk management were given greater interpretive weight. Lower-quality studies were not automatically excluded when they provided useful contextual evidence, but their findings were interpreted cautiously.

2.6 Data extraction and synthesis

Data extraction was conducted using a standardised Microsoft Excel form. The extracted information included author, year, country, study design, hospital setting, professional group, workforce-related risk factor, clinical risk management strategy, reported outcomes, key findings, limitations, and implications for practice or future research. The extraction form was piloted on a small subset of studies and refined before full extraction to improve consistency.

The synthesis used a narrative thematic approach because the included studies were heterogeneous in design, population, setting, and outcome focus. Initial coding was guided by the review questions and focused on three areas: workforce-related clinical risks, risk management strategies, and evidence gaps. Codes were then grouped into broader analytical themes, including workforce pressure and clinical vulnerability; safety culture and reporting behaviour; leadership and governance; communication and teamwork; training and competency development; psychological safety; and organisational learning. Thematic analysis was used to identify recurring patterns across studies, while thematic synthesis supported the integration of evidence from different study designs and healthcare contexts ([Ahmed et al., 2025](#); [Zairul, 2025](#)). The final synthesis aimed to explain not only what workforce-related risks were reported, but also how hospital organisations manage those risks through workforce-centred clinical governance.

To support transparency and consistency in data management, three main tools were used during the review process. Microsoft Excel was used to organise the extraction matrix, manage study-level coding, classify workforce-related risk factors, and summarise the characteristics of included studies ([Aranguri et al., 2025](#)). Python was used to support descriptive aggregation and generate visual summaries, such as frequency distributions of study characteristics, workforce risk categories, and risk management strategies ([Lavanya et al., 2023](#); [Pereira et al., 2025](#)). PlantUML was used to prepare structured visual diagrams, including the PRISMA-style flow diagram and conceptual

representations of the synthesis framework ([Alterkawi & Dib, 2025](#)). These tools were used to support data organisation, transparency, and visual reporting; however, the interpretation of themes and synthesis of findings remained researcher-led and was guided by the review questions, eligibility criteria, quality appraisal, and thematic synthesis procedures.

3. Results and discussion

3.1 Study selection and characteristics of included studies

The final qualitative synthesis included 25 studies that met the eligibility criteria for workforce-centred clinical risk management in hospital or acute care settings. The included studies covered diverse healthcare contexts, including quaternary care hospitals, tertiary hospitals, emergency departments, intensive care units, operating rooms, oncology units, neonatal intensive care units, hospital laboratories, general surgery units, and wider hospital networks. Geographically, the evidence was drawn from Asia, Europe, North America, South America, Australia, and global health emergency contexts, indicating that workforce-related clinical risk management is not limited to a specific health system but represents a broad international patient safety concern.

As shown in Table 2, the included studies addressed a wide range of workforce-centred clinical risk issues. The most frequently identified areas were incident reporting, patient safety culture, medical error reporting, medication safety, communication failure, handoff risk, fall prevention, workload and fatigue, clinical risk management culture, leadership, and organisational learning. Several studies focused on how nurses, physicians, pharmacists, laboratory personnel, managers, and multidisciplinary teams identify, report, prevent, and respond to clinical risks in everyday hospital practice. This pattern confirms the central assumption of this review: clinical risk management is not only a technical or administrative process, but also a workforce-dependent safety function shaped by staff behaviour, competence, coordination, workload, communication, and organisational support.

Table 2. Summary of included studies and key findings

Study	Setting	Workforce-centred risk focus	Key synthesis finding
(Loganathan et al., 2026)	Quaternary care hospital, South India	Incident reporting	Incident reporting was limited by fear, individual barriers, and low openness despite the availability of a formal reporting system.
(Laus et al., 2026)	Onco-Haematological Department, Italy	Chemotherapy medication safety	Major risks were associated with sterile handling, dose accuracy, double-checking, and nursing adherence during antineoplastic drug preparation.
(Alsobou et al., 2025)	Government and private hospitals, Jordan	Safety culture and reporting	A stronger patient safety culture was associated with more positive nurses' attitudes toward incident reporting.
(Guo et al., 2025)	University Women's and Children's Hospital	Laboratory and diagnostic safety	Preanalytical errors often originated outside the laboratory and were linked to specimen handling, ordering, and communication processes.

Study	Setting	Workforce-centred risk focus	Key synthesis finding
(Jia et al., 2025)	Laboratory, China Tertiary hospital, Shanghai, China	Inpatient fall prevention	Fall prevention depended on dynamic reassessment, staffing, multidisciplinary collaboration, patient education, and nurse managerial responsibility.
(Jessup et al., 2025)	Metropolitan Hospital Network, Australia	Hospital-acquired complications	Structured risk assessment reduced falls and pressure injuries, but increased documentation burden and admission workload for staff.
(Arai et al., 2025)	National adverse event reporting system, Japan	Workload and fatigue	Doctors working ≥ 55 hours per week before an adverse event were more likely to be involved in serious adverse events.
(Martins et al., 2025)	Tertiary academic hospital, Brazil	OR-to-ICU handoff risk	Handoff risk was shaped by fragmented communication, workflow vulnerability, and coordination gaps across multidisciplinary teams.
(Tana et al., 2025)	Hospital departments, Italy	Fall prevention practice	Inconsistent training, underreporting, limited educational materials, and variable adherence to procedures weakened fall prevention.
(Lessios et al., 2024)	Large academic health system, United States	Incident reporting engagement	Organisational and technology-related barriers reduced physician engagement in safety and quality reporting systems.
(Dalky et al., 2024)	Public, private, and university-affiliated hospitals in Jordan	Nursing work environment and reporting	A supportive nursing work environment was strongly associated with better medical error reporting practices.
(Halinen et al., 2024)	Emergency department, teaching hospital, Finland	ED patient safety incidents	ED incidents were mainly linked to system-level workforce factors, including communication, competence, resources, and information transfer.
(Griffeth et al., 2023)	Nine ICUs, United States	ICU incident reporting	Underreporting reduced organisational awareness of risks and limited learning from near misses in ICU settings.
(Pramesona et al., 2023)	Public referral hospital, Indonesia	Reporting culture	Low incident reporting was driven by limited procedural knowledge, fear of blame, weak

Study	Setting	Workforce-centred risk focus	Key synthesis finding
(Salo et al., 2023)	Neonatal intensive care unit, Finland	Medication and fluid management	feedback, and insufficient management support. NICU safety risks were concentrated in medication, fluid management, blood products, and bedside administration processes.
(Jacobson et al., 2023)	Three cancer centres in the, United States	Oncology safety and communication	Oncology risks occurred across ordering, nursing, pharmacy, and communication domains, requiring coordinated multidisciplinary risk control.
(Pfeiffer et al., 2023)	Operating rooms, Swiss acute care hospitals	Safety climate and infection prevention	A higher safety climate tended to be associated with lower surgical site infection rates, especially in cleaner surgical procedures.
(Ferorelli et al., 2022)	General Surgery Unit, Italy	Surgical checklist adherence	Short risk management training improved the presence and completeness of the surgical checklist of surgical checklists among surgeons, nurses, anaesthetists, and scrub nurses.
(Napoli, 2022)	Surgery, internal medicine, and mental health departments, Italy	Incident reporting culture	Reporting improved when nurses perceived feedback, improvement actions, and support from managers or coordinators.
(Abu Alrub et al., 2022)	Tertiary teaching hospital, Saudi Arabia	Electronic incident reporting	Electronic reporting improved access, anonymity, confidentiality, and reporting volume, but punitive culture and feedback gaps persisted.
(Fusari et al., 2021)	Two public hospitals in Brazil	Nurse leadership in risk management	Nurse leadership supported risk management through team coordination, protocol use, notification, and participatory safety practices.
(Hung et al., 2021)	Global health emergency workforce	Emergency preparedness workforce risk	Emergency risk management depended on workforce competencies, training, motivation, retention, deployment, and coordination.
(Liu et al., 2021)	Inpatient wards, China	Inpatient fall management	Fall prevention required structured risk assessment, health education, supervision, patient participation, and targeted nursing countermeasures.

Study	Setting	Workforce-centred risk focus	Key synthesis finding
(Jäger et al., 2021)	Tertiary referral hospital, Switzerland	Critical incident reporting	CIRS data revealed risks related to medication, procedures, staff behaviour, training gaps, communication errors, and weak feedback loops.
(Farokhzadian et al., 2021)	Iran; three hospitals affiliated with Kerman University of Medical Sciences	Clinical risk management and patient safety	CRM integration strengthened patient safety, service quality, staff morale, and organisational awareness through better risk identification, reporting, learning, and prevention.

Table 2 indicates that the included studies can be grouped into three broad evidence clusters. The first cluster concerns incident reporting and organisational learning. Incident reporting systems are essential for identifying clinical risks, but their effectiveness depends heavily on psychological safety, staff engagement, timely feedback, management support, anonymity, and a non-punitive organisational culture ([Abu Alrub et al., 2022](#); [Griffeth et al., 2023](#); [Jäger et al., 2021](#); [Lessios et al., 2024](#); [Loganathan et al., 2026](#); [Napoli, 2022](#); [Pramesona et al., 2023](#)). These studies suggest that the presence of a formal reporting system alone is insufficient if healthcare workers fear blame, receive little feedback, or perceive reporting as burdensome.

The second cluster relates to clinical process risks in high-risk hospital settings. Studies on chemotherapy preparation, laboratory safety, OR-to-ICU handoff, NICU medication incidents, oncology safety, surgical checklist adherence, and inpatient falls show that workforce-related risks often emerge during complex clinical processes requiring coordination, accurate information transfer, procedural adherence, and timely decision-making ([Alsobou et al., 2025](#); [Jäger et al., 2021](#); [Martins et al., 2025](#)). These findings demonstrate that clinical risk is frequently produced at the intersection of professional roles, workflows, and organisational systems, rather than by isolated individual errors alone.

The third cluster focuses on workforce conditions, leadership, and safety culture. Workload, long working hours, the nursing work environment, leadership practices, workforce preparedness, and risk management culture have been identified as important factors influencing patient safety and organisational resilience ([Arai et al., 2025](#); [Dalky et al., 2024](#); [Farokhzadian et al., 2021](#); [Fusari et al., 2021](#); [Hung et al., 2021](#)). These findings support a workforce-centred understanding of clinical risk management, in which staff well-being, professional competence, leadership support, and team participation are integral components of hospital safety governance.

Figure 2 shows the distribution of included studies by publication year. The number of studies fluctuated across the review period: five in 2021, three in 2022, five in 2023, three in 2024, seven in 2025, and two in 2026. The highest number of included studies was observed in 2025, indicating increasing scholarly attention to workforce-centred clinical risk management, patient safety, incident reporting, and safety culture in hospital settings. Although the number of studies declined in 2026, this pattern may reflect the incomplete publication cycle for that year rather than a decline in research interest. Overall, the distribution suggests that workforce-centred clinical risk management remained a relevant and developing research area throughout the 2021–2026 period, with a stronger concentration of evidence emerging in recent years.

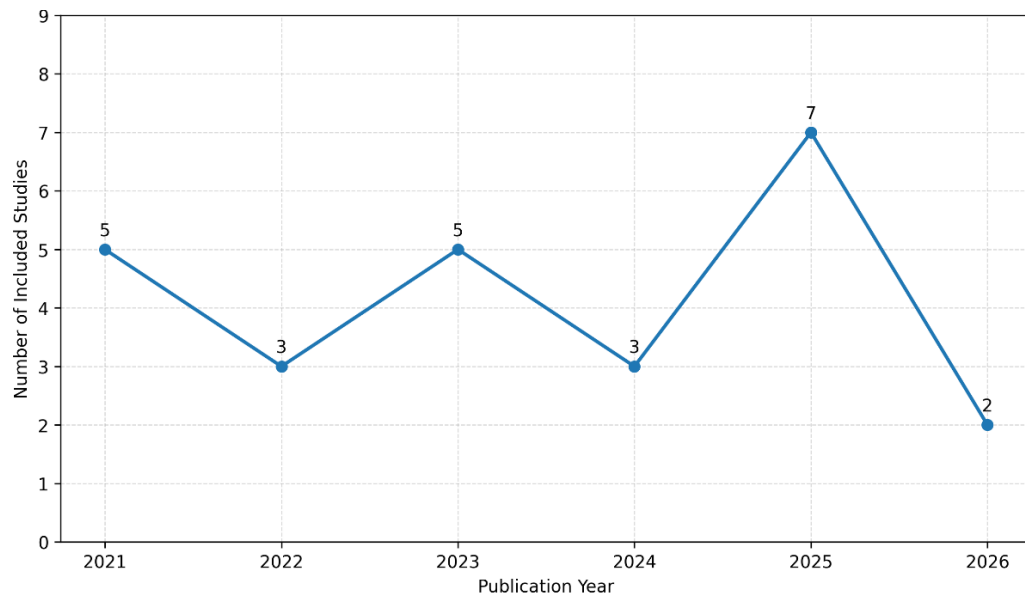


Figure 2. Distribution of included studies by year

Figure 3 presents the distribution of study designs across the included studies. Cross-sectional studies were the most common design, followed by intervention or quality improvement studies, qualitative studies, mixed-methods studies, retrospective studies, and one conceptual-methodological paper. This pattern indicates that the evidence base is methodologically diverse, but still largely dominated by descriptive and observational approaches. The presence of intervention and quality improvement studies suggests growing interest in testing practical strategies such as incident reporting systems, training, checklist adherence, fall prevention programmes, and risk mitigation initiatives. However, the limited number of longitudinal and robust intervention-based studies indicates that stronger evaluative research is still needed to determine how workforce-centred clinical risk management strategies influence patient safety outcomes over time.

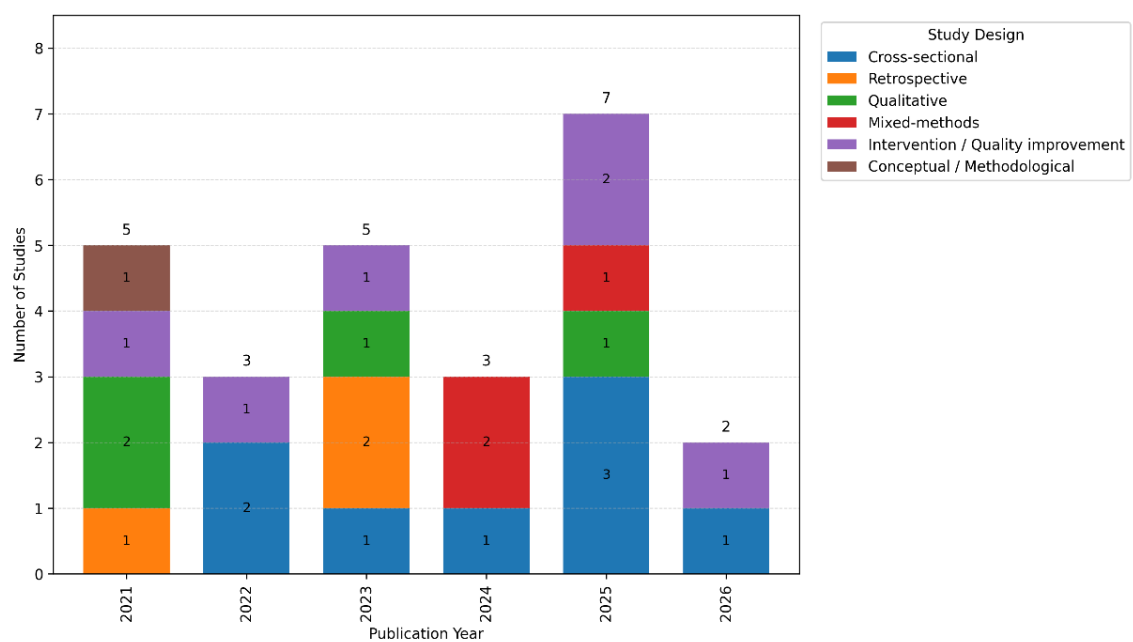


Figure 3. Distribution of study designs by year

Taken together, the characteristics of the included studies show that workforce-centred clinical risk management is a multidimensional field. The evidence does not point to a single dominant risk factor, but rather to interconnected risks involving staff workload, reporting culture, communication, competence, leadership, documentation, teamwork, and organisational learning. Therefore, the following synthesis is organised thematically to explain how these workforce-related factors shape clinical risk identification, prevention, mitigation, monitoring, and learning in hospital settings.

3.2 Methodological quality and evidentiary strength

The methodological quality of the 25 included studies was appraised using MMAT 2018 and relevant design-specific appraisal principles. Because the review included cross-sectional surveys, qualitative studies, mixed-methods studies, retrospective analyses, quality improvement studies, pre-post interventions, and one conceptual-methodological paper, the appraisal emphasised methodological appropriateness, transparency of data collection and analysis, relevance to the hospital workforce, relevance to clinical risk management, and credibility of findings for narrative thematic synthesis.

As shown in Table 3, the overall quality of the included evidence was acceptable for synthesis. Eleven studies were classified as moderate-to-high quality, while fourteen studies were classified as moderate quality. No study was judged as low quality. This suggests that the eligibility and appraisal process retained studies that were sufficiently methodologically clear and relevant to workforce-centred clinical risk management. However, the strength of evidence was not uniform. Moderate-to-high quality studies generally provided stronger interpretive value because they used mixed-methods designs, triangulated qualitative approaches, quality improvement methods, structured incident-report analyses, or risk-management frameworks such as FMECA, ISO 31000, DMAIC, root cause analysis, and incident-reporting taxonomy ([Halinen et al., 2024](#); [Jacobson et al., 2023](#); [Laus et al., 2026](#); [Martins et al., 2025](#)). In contrast, moderate-quality studies remained relevant for thematic synthesis. However, they were more often limited by cross-sectional design, self-reported data, single-site contexts, convenience sampling, voluntary reporting bias, short follow-up periods, or limited measurement of direct patient safety outcomes.

Table 3. Overall quality appraisal and evidentiary strength

Quality category	Number of studies	Main evidence characteristics	Main methodological concerns	Interpretive use
Moderate-to-high quality	11	Mostly mixed-methods, qualitative, quality improvement, intervention, and structured incident-report analyses with clear appraisal procedures and strong relevance to workforce-centred clinical risk management.	Some studies remained limited by single-site settings, short follow-up periods, the absence of control groups, or the lack of direct measurement of patient safety outcomes.	Given greater interpretive weight in explaining risk-management strategies, workforce mechanisms, and organisational learning.

Quality category	Number of studies	Main evidence characteristics	Main methodological concerns	Interpretive use
Moderate quality	14	Mostly cross-sectional, retrospective, descriptive, exploratory, or conceptual studies that provided relevant evidence on workforce risks, reporting culture, safety climate, workload, and clinical risk processes.	Common limitations included self-reported data, voluntary reporting bias, limited generalisability, cross-sectional design, and restricted causal inference.	Used to support thematic patterns, but interpreted cautiously, especially for causal or effectiveness claims.

Figure 4 illustrates how methodological quality varied across study designs. Cross-sectional studies formed the largest group, but most were classified as moderate quality because they relied on single-time measurement, self-reported responses, and limited causal inference. By contrast, qualitative studies, mixed-methods studies, retrospective incident-report analyses, and intervention or quality-improvement studies contributed a higher proportion of moderate-to-high-quality evidence. These designs were particularly useful because they provided richer explanations of workforce behaviour, organisational context, reporting practices, risk identification processes, and implementation mechanisms.

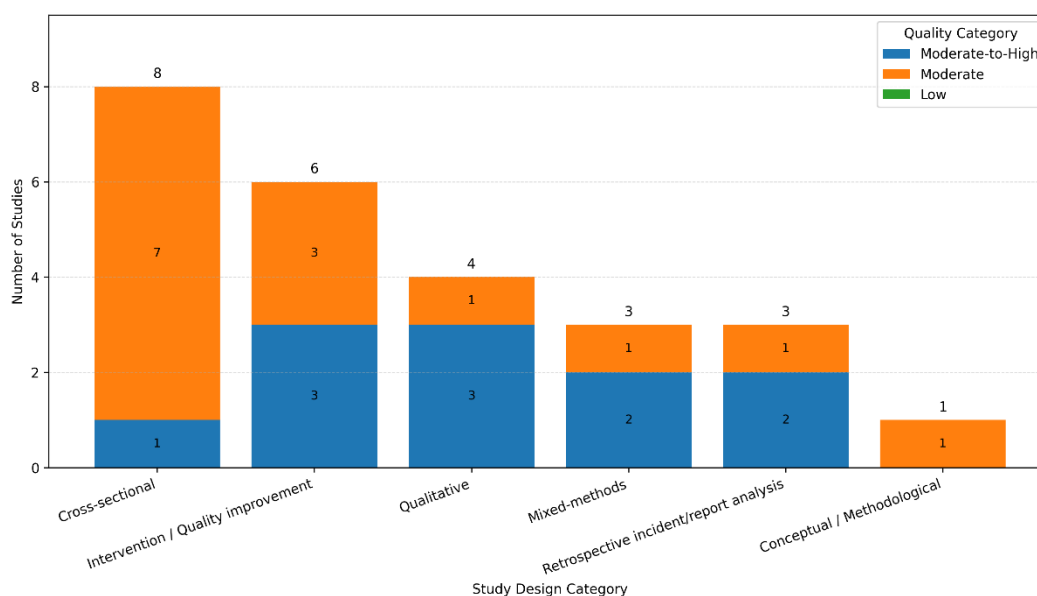


Figure 4. Methodological quality by study design

The appraisal also indicates that the evidence base was stronger for identifying workforce-related clinical risks and describing clinical risk management strategies than for proving the long-term effectiveness of those strategies. Many studies examined reporting rates, staff perceptions, checklist adherence, safety climate, incident reports, risk assessment processes, or organisational barriers. Fewer studies directly measured whether workforce-centred interventions reduced adverse events,

near misses, patient harm, or sustained organisational risk over time. Therefore, the findings of this review should be interpreted primarily as thematic and explanatory rather than causal. Greater interpretive weight was assigned to studies with stronger methodological transparency, direct relevance to hospital workforce and clinical risk management, structured risk assessment, triangulated qualitative evidence, mixed-methods designs, or large incident-report datasets.

3.3 Workforce-related clinical risks in hospital settings

To address RQ1, the synthesis examined workforce-related clinical risks identified across the 25 included studies. The findings indicate that clinical risks in hospitals are shaped not merely by technical errors or patient-level factors, but also by workforce conditions, reporting behaviour, communication quality, training, teamwork, leadership, and organisational learning. Seven main risk themes emerged from the included evidence: reporting culture and psychological safety; communication and handover failures; workload and staffing pressure; training and competency gaps; clinical processes and procedural risks; teamwork and interprofessional coordination problems; and leadership or organisational learning gaps. These themes show that workforce-related risks are interconnected and often develop through weaknesses in daily clinical practice, team coordination, safety culture, and organisational support.

Table 4. Key workforce-related clinical risks identified in hospital settings

Risk theme	Core workforce issue	Key clinical implication
Reporting culture and psychological safety	Fear of blame, punitive culture, lack of anonymity, unclear responsibility, limited feedback, and low staff engagement.	Underreporting of incidents and near misses may weaken organisational learning and allow repeated safety events (Abu Alrub et al., 2022 ; Griffeth et al., 2023 ; Jäger et al., 2021 ; Lessios et al., 2024 ; Loganathan et al., 2026 ; Napoli, 2022 ; Pramesona et al., 2023).
Communication and handover failures	Poor information transfer, incomplete documentation, weak escalation, and fragmented interprofessional communication.	Communication breakdowns may contribute to medication errors, diagnostic delays, unsafe transitions, and discontinuity of care (Guo et al., 2025 ; Halinen et al., 2024 ; Jacobson et al., 2023 ; Jäger et al., 2021 ; Martins et al., 2025 ; Salo et al., 2023).
Workload, staffing pressure, and fatigue	Long working hours, high patient load, documentation burden, staff shortage, and limited resources.	Reduced vigilance and delayed response may increase the risk of adverse events and missed preventive care (Abu Alrub et al., 2022 ; Arai et al., 2025 ; Dalky et al., 2024 ; Halinen et al., 2024 ; Jessup et al., 2025 ; Jia et al., 2025).
Training, competency, and supervision gaps	Limited training, insufficient onboarding, weak procedural knowledge, and inconsistent supervision.	Poor risk recognition and low adherence to safety procedures may affect fall prevention, checklist use, medication safety, and incident reporting (Halinen et al., 2024 ; Jäger et al., 2021 ; Laus et al., 2026 ; Liu et al., 2021 ; Pramesona et al., 2023).
Clinical process and procedural risks	Weak checking procedures, documentation gaps, unsafe routine workflows,	Risks may emerge in chemotherapy preparation, laboratory testing, falls, surgery, medication administration, and hospital-acquired complication prevention (Farokhzadian et al., 2021 ; Guo et al., 2025 ;

Risk theme	Core workforce issue	Key clinical implication
	and inconsistent protocol adherence.	Jacobson et al., 2023 ; Jessup et al., 2025 ; Laus et al., 2026 ; Salo et al., 2023).
Teamwork and interprofessional coordination problems	Fragmented professional roles, poor team awareness, and weak multidisciplinary coordination.	Weak coordination may increase risks during handoff, oncology care, fall prevention, surgical safety, and emergency preparedness (Fusari et al., 2021 ; Hung et al., 2021 ; Jacobson et al., 2023 ; Jia et al., 2025 ; Martins et al., 2025 ; Pfeiffer et al., 2023).
Leadership, governance, and organisational learning gaps	Weak leadership support, poor feedback loops, limited corrective action, and insufficient CRM culture.	Safety concerns may fail to become organisational learning, reducing motivation to report and preventing sustainable risk reduction (Farokhzadian et al., 2021 ; Fusari et al., 2021 ; Griffeth et al., 2023 ; Jäger et al., 2021 ; Lessios et al., 2024).

As shown in Table 4, reporting culture and psychological safety were among the most frequently identified workforce-related risks. Several studies found that healthcare workers were reluctant to report incidents because of fear of blame, punitive responses, limited anonymity, unclear reporting responsibility, lack of feedback, and weak managerial ([Abu Alrub et al., 2022](#); [Griffeth et al., 2023](#); [Jäger et al., 2021](#); [Lessios et al., 2024](#); [Loganathan et al., 2026](#); [Napoli, 2022](#); [Pramesona et al., 2023](#)). This indicates that incident reporting is not merely a technical function of hospital information systems, but also reflects psychological safety and organisational trust. When staff do not believe that reporting would lead to learning or improvement, near misses and adverse events may remain invisible to the organisation.

Communication and handover failures were another recurring risk theme. Evidence from emergency departments, operating rooms, laboratories, oncology settings, and neonatal intensive care units showed that incomplete information transfer, weak documentation, fragmented workflows, and poor interprofessional communication could contribute to medication errors, diagnostic or laboratory errors, unsafe transitions, and delayed care ([Guo et al., 2025](#); [Halinen et al., 2024](#); [Jacobson et al., 2023](#); [Jäger et al., 2021](#); [Martins et al., 2025](#); [Salo et al., 2023](#)). These findings suggest that communication should be treated as a core clinical risk-control mechanism, especially during patient transfer, specimen handling, prescribing, medication administration, and multidisciplinary care coordination.

The synthesis also shows that workload, staffing pressure, and fatigue directly affected hospital safety capacity. Long working hours among doctors were associated with serious adverse events, while nurses and other healthcare workers reported that high patient load, documentation burden, staff shortage, and limited resources reduced their ability to prevent, detect, and respond to clinical risks ([Abu Alrub et al., 2022](#); [Arai et al., 2025](#); [Dalky et al., 2024](#); [Halinen et al., 2024](#); [Jessup et al., 2025](#); [Jia et al., 2025](#)). These findings support the view that workforce capacity is closely connected to clinical safety capacity. In other words, clinical risk management cannot be separated from staffing, workload distribution, and staff well-being.

Training, competency, and supervision gaps were also central to workforce-related clinical risks. Several studies showed that limited training, insufficient onboarding, weak procedural knowledge, and inconsistent supervision were associated with poor checklist adherence, weak fall-prevention practice, unsafe medication processes, and low incident-reporting confidence ([Farokhzadian et al., 2021](#); [Guo et al., 2025](#); [Jacobson et al., 2023](#); [Jessup et al., 2025](#); [Laus et al., 2026](#); [Salo et al.,](#)

2023). This suggests that policies and protocols are insufficient unless staff are adequately trained, supervised, and supported to apply them consistently in daily clinical work.

Clinical processes and procedural risks were the broadest risk areas across the included studies. These risks appeared in chemotherapy preparation, laboratory testing, fall prevention, surgical checklist adherence, medication and fluid management, oncology care, and hospital-acquired complication prevention (Farokhzadian et al., 2021; Guo et al., 2025; Jacobson et al., 2023; Jessup et al., 2025; Laus et al., 2026; Salo et al., 2023). The evidence indicates that many clinical risks occur within routine workflows that require accurate assessment, repeated checking, documentation, communication, and team coordination. Therefore, clinical risk management should focus not only on individual error prevention but also on strengthening the systems and workflows in which healthcare workers operate.

Finally, teamwork, leadership, governance, and organisational learning were repeatedly identified as conditions that shape whether risks are prevented, reported, and corrected. Studies showed that weak multidisciplinary coordination could contribute to handoff failures, oncology process risks, fall-prevention gaps, and emergency preparedness weaknesses (Fusari et al., 2021; Hung et al., 2021; Jacobson et al., 2023; Jia et al., 2025; Martins et al., 2025; Pfeiffer et al., 2023). At the same time, leadership support, feedback, corrective action, and CRM culture influenced whether frontline safety concerns were converted into organisational learning (Farokhzadian et al., 2021; Fusari et al., 2021; Griffith et al., 2023; Jäger et al., 2021; Lessios et al., 2024). Taken together, these findings indicate that workforce-related clinical risks are multidimensional and interconnected, requiring integrated strategies that address staff capacity, communication, reporting culture, competence, teamwork, and leadership.

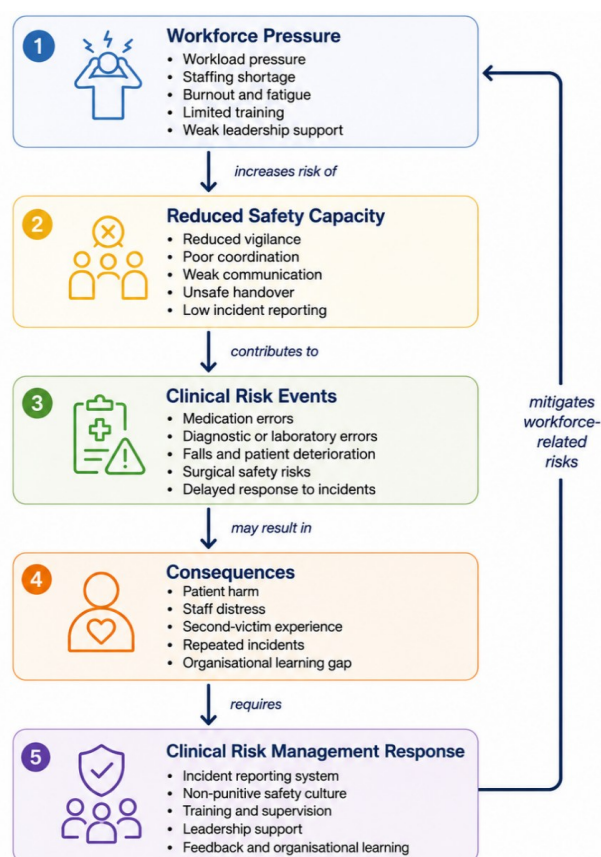


Figure 5. Thematic map of workforce-related clinical risks

Figure 5 illustrates the pathway through which workforce-related pressures may develop into clinical risks in hospital settings. Workload pressure, staffing shortages, burnout, limited training, and weak leadership support may reduce safety capacity by weakening vigilance, coordination, communication, handover quality, and incident reporting. This reduced safety capacity can contribute to clinical risks, including medication errors, diagnostic or laboratory errors, falls, surgical safety risks, and delayed responses to incidents. These events may then result in patient harm, staff distress, repeated incidents, and organisational learning gaps. The figure also shows that clinical risk management responses, including non-punitive reporting systems, training, supervision, leadership support, feedback, and organisational learning, can interrupt the risk pathway. Therefore, the thematic map reinforces the central finding of this review that clinical risk management is a workforce-dependent safety process embedded in everyday hospital practice.

3.4 Clinical risk management strategies used in hospital workforce contexts

To address RQ2, the synthesis examined the main clinical risk management strategies used to prevent, reduce, or manage workforce-related clinical risks in hospital settings. Across the 25 included studies, the strategies were grouped into six main areas: incident reporting and learning systems, non-punitive safety culture, workforce training, structured risk assessment, communication standardisation, and leadership or clinical governance support. These strategies indicate that clinical risk management depends not only on formal procedures, but also on staff engagement, organisational trust, communication, competence, and continuous learning.

Table 5. Key clinical risk management strategies for workforce-related risks

CRM strategy	Main purpose	Supporting studies
Incident reporting and learning systems	Improve risk identification, near-miss reporting, feedback, and organisational learning.	(Abu Alrub et al., 2022 ; Griffeth et al., 2023 ; Jäger et al., 2021 ; Lessios et al., 2024 ; Loganathan et al., 2026)
Non-punitive safety culture	Reduce fear of blame and strengthen psychological safety in reporting and risk communication.	(Abu Alrub et al., 2022 ; Alsobou et al., 2025 ; Fusari et al., 2021 ; Napoli, 2022 ; Pramesona et al., 2023)
Training and competency development	Improve staff preparedness, protocol adherence, checklist use, fall prevention, and risk awareness.	(Ferorelli et al., 2022 ; Griffeth et al., 2023 ; Jacobson et al., 2023 ; Jessup et al., 2025 ; Laus et al., 2026)
Risk assessment and quality improvement tools	Identify, prioritise, and control high-risk clinical processes using FMECA, RCA, ISO 31000, checklists, audits, and incident taxonomy	(Guo et al., 2025 ; Jacobson et al., 2023 ; Laus et al., 2026 ; Martins et al., 2025 ; Salo et al., 2023)
Communication and handoff standardisation	Reduce fragmented information transfer, unclear responsibility, and workflow discontinuity across teams.	(Guo et al., 2025 ; Halinen et al., 2024 ; Jacobson et al., 2023 ; Jäger et al., 2021 ; Martins et al., 2025)
Leadership and clinical governance support	Strengthen accountability, staff involvement, protocol use, supportive work environment, and organisational learning.	(Dalky et al., 2024 ; Farokhzadian et al., 2021 ; Fusari et al., 2021 ; Hung et al., 2021 ; Jia et al., 2025 ; Martins et al., 2025)

As shown in Table 5, incident reporting and learning systems were among the most frequently discussed strategies. These systems helped hospitals identify clinical risks, capture near misses, and monitor safety trends. However, their effectiveness depended on whether staff received feedback and felt safe to report without fear of blame. Therefore, several studies emphasised that reporting systems should be supported by confidentiality, managerial response, non-punitive culture, and visible improvement actions. Training and competency development also emerged as a practical strategy for reducing workforce-related risks. Studies on chemotherapy safety, fall prevention, surgical checklist adherence, emergency department safety, and inpatient safety showed that training improved staff awareness, procedural knowledge, and adherence to safety practices. This indicates that clinical risk management requires continuous staff development, not only the availability of protocols.

Risk assessment and quality improvement tools, including FMECA, RCA, ISO 31000, incident taxonomy, audits, and structured screening tools, were used to identify high-risk processes and guide corrective actions. These tools were particularly useful in chemotherapy preparation, laboratory safety, OR-to-ICU handoff, oncology care, NICU incidents, and hospital-wide incident reporting. Their value lies in helping hospitals move from reactive error response to proactive risk prevention. Communication standardisation and leadership support were also central to workforce-centred clinical risk management. Standardised handoffs, improved documentation, enhanced interdepartmental communication, and clearer workflows reduced risks during patient transfers and multidisciplinary care. At the organisational level, leadership, clinical governance, supportive work environments, and feedback mechanisms helped transform frontline risk signals into learning and practice improvement.

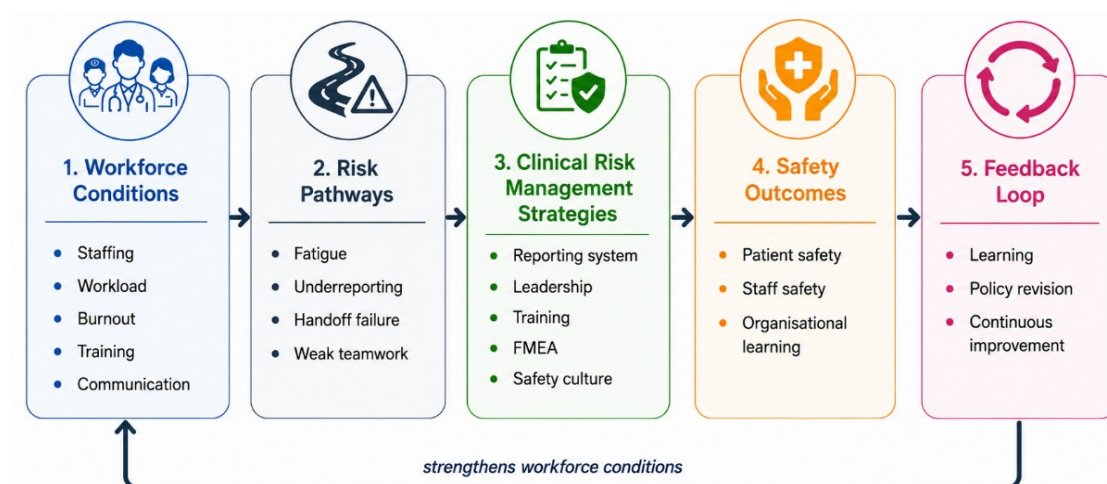


Figure 6. Workforce-centred clinical risk management framework

Figure 6 summarises how workforce conditions influence risk pathways and safety outcomes. Staffing, workload, burnout, training, and communication shape risks such as fatigue, underreporting, handoff failure, and weak teamwork. These risks require clinical risk management strategies, including reporting systems, leadership, training, FMEA, and strengthening safety culture. When supported by feedback, policy revision, and continuous improvement, these strategies can strengthen patient safety, staff safety, and organisational learning. Thus, clinical risk management should be understood as a continuous workforce-dependent safety cycle rather than a linear administrative process.

3.5 Research gaps and future directions

The main research gaps and future directions were identified by synthesising methodological limitations and recommendations across the included studies. The evidence base indicates that workforce-centred clinical risk management is increasingly recognised as an important component of hospital safety, yet the field remains methodologically and conceptually fragmented. Most studies were useful for identifying workforce-related risks, reporting barriers, safety culture issues, and clinical risk management practices. However, fewer studies directly tested whether workforce-centred interventions reduced adverse events, near misses, patient harm, staff distress, or long-term organisational risk.

Several important gaps emerged from the synthesis. Much of the existing evidence remains descriptive, cross-sectional, qualitative, retrospective, or based on single-site quality improvement studies. These designs are useful for explaining workforce-related risks and organisational barriers, but they provide limited causal evidence on whether specific workforce-centred strategies can reduce adverse events, near misses, or patient harm over time ([Arai et al., 2025](#); [Dalky et al., 2024](#); [Farokhzadian et al., 2021](#); [Loganathan et al., 2026](#)). Future studies should use longitudinal, controlled, multicentre, and mixed-methods designs to test the relationship between workforce conditions, clinical risk management strategies, and measurable safety outcomes.

Second, many studies evaluated intermediate indicators such as staff perceptions, reporting attitudes, checklist completion, incident reporting volume, safety climate, or documentation quality rather than direct patient safety outcomes. For example, studies on FMECA, comprehensive care documentation, ICU incident reporting, surgical checklist training, and CIRS analysis provided valuable evidence on risk identification and process improvement, but they were less able to prove sustained reductions in clinical harm ([Ferorelli et al., 2022](#); [Griffeth et al., 2023](#); [Jäger et al., 2021](#); [Jessup et al., 2025](#); [Laus et al., 2026](#)). Future research should link workforce-centred interventions with stronger outcome indicators, including adverse-event rates, incident severity, near-miss trends, patient complaints, staff well-being, patient satisfaction, and long-term organisational learning.

Third, the evidence remains uneven across workforce groups. Nurses were strongly represented in studies on incident reporting, fall prevention, leadership, and clinical risk management, while fewer studies examined physicians, pharmacists, allied health professionals, laboratory staff, support workers, managers, patients, and families as part of the risk-management process ([Fusari et al., 2021](#); [Jacobson et al., 2023](#); [Jia et al., 2025](#); [Salo et al., 2023](#)). This is a significant gap because hospital risks frequently arise across professional boundaries, especially during handoffs, medication management, laboratory workflows, oncology care, emergency care, and surgical practice. Future studies should adopt interprofessional designs to examine how different workforce groups jointly identify, communicate, report, and mitigate clinical risks.

Fourth, psychological safety, no-blame culture, feedback, and organisational trust were repeatedly identified as important conditions for incident reporting, but these factors were rarely tested through robust intervention studies. Several studies showed that fear of blame, lack of anonymity, weak feedback, and limited managerial support reduced staff willingness to report safety concerns ([Abu Alrub et al., 2022](#); [Lessios et al., 2024](#); [Napoli, 2022](#); [Pramesona et al., 2023](#)). Future research should evaluate whether structured feedback systems, non-punitive reporting policies, leadership interventions, and psychological safety programmes can improve reporting behaviour and reduce hidden clinical risks.

Finally, digital reporting systems and data-enabled surveillance require stronger evaluation. Electronic reporting systems, EHR-embedded tools, dashboards, laboratory information system upgrades, and speciality-specific taxonomies showed promise for improving access, classification, and visibility of safety risks, but most studies focused on usability, reporting volume, or feasibility rather than long-term clinical effectiveness ([Abu Alrub et al., 2022](#); [Griffeth et al., 2023](#); [Jacobson et al., 2023](#); [Lessios et al., 2024](#)). Future research should determine whether these technologies improve corrective action, organisational learning, workforce engagement, and measurable patient safety outcomes. Overall, future studies need to move beyond identifying workforce-related risks toward testing which clinical risk management strategies work, in which hospital contexts, for which professional groups, and with what sustained effects on patient safety, staff safety, and organisational resilience.

3.1 Limitations of the Review

This review has several limitations. The search was limited to Scopus, English-language peer-reviewed journal articles, and studies published between 2021 and 2026 with full text available for eligibility assessment and data extraction. Although this approach supported a focused and transparent review process, it may have excluded relevant evidence from other databases, non-English publications, review papers, grey literature, institutional reports, and local hospital safety documents. Therefore, the findings may not fully represent all clinical risk management practices across different healthcare systems, especially in settings where workforce-related safety evidence is not widely published in indexed journals.

The included studies were also methodologically diverse, dominated by cross-sectional, qualitative, retrospective, self-reported, single-site, or quality-improvement designs. This heterogeneity limited the possibility of meta-analysis and weakened causal interpretation. In addition, many studies measured intermediate indicators, such as staff perceptions, reporting attitudes, checklist adherence, safety culture, or incident reporting volume, rather than direct outcomes such as adverse-event reduction, patient harm, staff well-being, or long-term organisational improvement. As a result, the review is stronger at identifying workforce-related clinical risks and management strategies than at demonstrating the long-term effectiveness of specific interventions.

4. Conclusion

This systematic literature review demonstrates that clinical risk management in hospitals is closely connected to workforce conditions. Across the 25 included studies, the main workforce-related clinical risks were associated with reporting culture and psychological safety; communication and handover failures; workload and staffing pressure; fatigue; training and competency gaps; clinical process risks; teamwork problems; and weak leadership or organisational learning. These findings show that clinical risks are not only technical or individual problems, but also emerge from the organisational environment in which hospital staff work, communicate, report, learn, and make clinical decisions. The review also found that key strategies for managing workforce-related clinical risks include incident reporting and learning systems, non-punitive safety culture, workforce training, structured risk assessment, communication standardisation, leadership support, and feedback-based organisational learning. Overall, clinical risk management should be understood as a continuous workforce-dependent safety process that connects staff conditions, risk pathways, organisational strategies, and safety outcomes. Future research should use stronger longitudinal, multicentre, interprofessional, and intervention-based designs to evaluate whether workforce-centred strategies can produce sustained improvements in patient safety, staff safety, and organisational resilience.

Author's declaration

Author contribution

Nadhia Apriana: Conceptualization; Methodology; Data curation; Investigation; Formal analysis; Literature screening; Quality appraisal; Thematic synthesis; Writing original draft; Writing review & editing; Visualization; Project administration. **W. Victo Anggara Wisesa:** Conceptualization; Methodology; Supervision; Validation; Formal analysis; Writing review & editing; Project administration. **Detania Sukarja:** Conceptualization; Methodology; Supervision; Validation; Critical review; Writing review & editing; Final manuscript approval.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgements

The authors would like to acknowledge the School of Business and Management, Institut Teknologi Bandung, for its academic support during the preparation of this manuscript.

Conflict of interest

The author declares no competing interests.

Data availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethical clearance

Not applicable. This study is a systematic literature review based on previously published studies and did not involve direct data collection from human participants, animals, or identifiable personal information.

AI statement

The author used Grammarly to support language clarity and grammar checking. The tool was not used to generate scientific content. All arguments, analyses, tables, and interpretations were developed, reviewed, and verified manually by the author.

Publisher's and Journal's note

Universitas Negeri Padang as the publisher, and the Editor of Jurnal Pendidikan Teknologi Kejuruan state that there is no conflict of interest towards this article publication.

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