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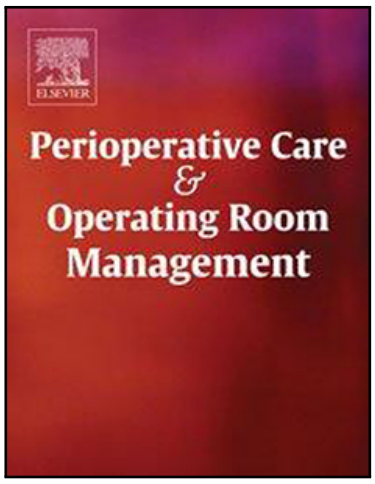

Risk-normalization in the perioperative environment: A concept analysis

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Collaborator statement

There are no formal collaborator groups or consortia associated with this study. Therefore, this section is not applicable.

Ethics approval

Ethical approval was obtained from the University of Pretoria Faculty of Health Science Research Ethics Committee (Ref: 845/2025)

Consent for publication

Not applicable. This study does not include any individual personal data in any form such as images, videos, or personal identifiers.

Use of AI-Assisted tools

The authors declare that no AI-assisted tools were used in preparation, writing, analysis, or revision of this manuscript.

Data availability

Not applicable.

Credit author contributions

Sophia M. Cilliers: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft. **Carin Maree:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Isabel Coetzee-Prinsloo:** Conceptualization, Methodology, Supervision, Writing – review & editing.

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Abstract

Introduction: Risk normalization refers to the psychological process by which repeated safe engagement in risky behaviors without negative consequences leads to habituation, reduced risk perception, and the acceptance of progressively higher levels of risk as normal. In the perioperative environment, this phenomenon contributes substantially to patient safety risks. Although the normalization of deviance has received attention in healthcare, risk normalization remains largely underexamined in perioperative nursing.

Aim: The aim of this concept analysis was to evaluate the existing literature and propose a conceptual definition of risk normalization in the perioperative environment.

Methods: A conceptual analysis was conducted using Walker and Avant's[46] framework to examine risk normalization in the perioperative environment. A comprehensive literature search was performed across peer-reviewed databases for English-language articles published between 2000 and 2026. Grey literature and selected theoretical sources were also consulted to support contextual understanding.

Results: The analysis identified the defining attributes of risk normalization in the perioperative environment, including habituation, risk perception, presumption of risk, desensitization to risk, and the absence of immediate negative consequences. The antecedents and consequences of risk normalization in the perioperative environment were also identified.

Conclusions: This concept analysis clarifies the defining attributes, antecedents, and consequences of risk normalization in the perioperative environment, providing a clearer understanding of the concept and its relevance to perioperative nursing practice.

Practical Applications: A clearer understanding of risk normalization may support the development of interventions that improve risk recognition and strengthen patient safety practices. Importantly, such interventions must also recognise the real operational trade-offs faced by perioperative leaders between additional safety measures and the need to provide timely access to surgical care.

Keywords: patient safety; normalization of deviance; perioperative nursing; operating room safety; healthcare safety culture

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1. Background

The perioperative environment is one of the most complex, high-stakes, and time-sensitive areas in healthcare. Perioperative nurses coordinate intricate procedures under intense production pressure, resource constraints, hierarchical team dynamics, and the constant awareness that even minor deviations from established safety protocols can result in serious patient harm.[35,54] Common deviations include incomplete surgical safety checklists, rushed instrument and swab counts, bypassing full sterile technique, or accepting incomplete handovers.[11] These seemingly small lapses can lead to wrong-site surgery, retained surgical items, surgical-site infections, positioning injuries, and anaesthetic complications.[8,49]

Despite rigorous safety protocols, repeated exposure to known risks such as inadequate staffing, equipment shortages, time pressure, and disruptive behaviours without immediate adverse outcomes often triggers a subtle psychological shift known as risk normalization. This gradual desensitization leads nurses and surgical teams to unconsciously accept higher levels of risk as the new normal.[41] What begins as a pragmatic adaptation to daily demands can progressively erode safety boundaries until deviations from protocol no longer appear unacceptable,[6] ultimately resulting in the normalization of deviance.

It is important to distinguish risk normalization from the legitimate, time-critical adaptations required during genuine perioperative emergencies, such as an emergency caesarean section or polytrauma. In these situations, temporary omission or abbreviation of certain safety steps may represent a conscious risk-benefit decision made to prioritise immediate life-saving intervention.[3] Risk normalization, by contrast, develops gradually under routine production pressure and without the acute clinical justification of an emergency; over time, elevated risk is accepted as the new normal even when circumstances do not demand it.

Although risk normalization is widely recognised as a critical precursor to normalization of deviance,[22,41] it has not been conceptualised as a standalone phenomenon in perioperative nursing literature. The term itself is rarely used in surgical contexts, yet the underlying psychological and behavioural processes (habituation, altered risk perception, and acceptance of shortcuts) are extensively documented under the more established construct of normalization of deviance.[31,47,53]

Early work by McNamara[31] warned that repeated deviations from safety standards, such as shortcuts in sterile technique or skipped instrument counts, gradually become accepted as

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normal practice in the operating room. Subsequent studies have reinforced this pattern, identifying productivity pressures, experience-related complacency, and social norms as key drivers.[11,54] A systematic review by Wilbanks and Gardenier[47] confirmed that normalization of deviance significantly contributes to medical errors and impaired patient safety in perioperative settings, explicitly identifying desensitization, production pressure, and the absence of negative consequences as major influencing factors.

Sedlar et al.[41] positioned risk normalization as a psychological precursor in high-risk industries, while Hester[22] highlighted its role in preventing accidents from being viewed as accidental. Collectively, these sources indicate that although direct references to risk normalization remain scarce in perioperative scholarship, the phenomenon of habituation-driven minimisation of risk perception is well integrated within the normalization of deviance framework.

Risk normalization is particularly concerning in surgery because even minor deviations can rapidly escalate into adverse events in this complex, high-risk environment.[35] Production pressure, hierarchical dynamics, and resource constraints make it easy for teams to rationalise shortcuts as necessary.[17] Once risk normalization becomes established, it provides the foundation for more entrenched deviant behaviours that are considerably more difficult to reverse.

Identifying and conceptualising risk normalization as a distinct phenomenon is therefore essential. It represents an earlier, potentially more reversible stage than normalization of deviance and shifts the focus from blaming individuals to understanding the systemic conditions that foster desensitization. This concept analysis aims to provide a clear theoretical foundation for recognising, measuring, and interrupting risk normalization before it progresses to entrenched normalization of deviance in the operating room.

2. Literature search

2.1 Methods

This concept analysis was guided by Walker and Avant's[46] eight-step method. The analysis focused on risk normalization in the perioperative environment to provide a clear conceptual understanding that can support early recognition and intervention before the process progresses to normalization of deviance.

2.2 Literature Search

A comprehensive literature search was conducted in collaboration with an academic information specialist. The search included full-text, peer-reviewed articles published in English between 2000 and 2026. Three major databases were searched: Scopus, Google Scholar, and EBSCOhost. Keywords included “risk normalization,” “perioperative environment,” “surgical safety,” “operating room risks,” “perioperative risk management,” “operating theatre,” and “surgical suite.” Boolean operators “AND” and “OR” were used to combine terms. Expanded search terms included “risk acceptance,” “risk tolerance,” “risk perception,” “risk adaptation,” and “risk management culture.” Reference lists of retrieved articles were hand-searched for additional relevant studies. Grey literature, including professional standards,[5,7] open educational resources,[16] and international infection control guidelines,[40] was also consulted to provide contextual understanding of standard perioperative safety protocols.

Studies published before 2000 and non-English publications were excluded. Selected theoretical sources, such as Ilynykh et al.[23] on normalization in social practices and Banja[6] on normalization of deviance in healthcare, were included to support broader conceptual understanding, although they were not specific to the perioperative setting.

Figure 1 presents the PRISMA 2020 flow diagram of the literature search and study selection process.

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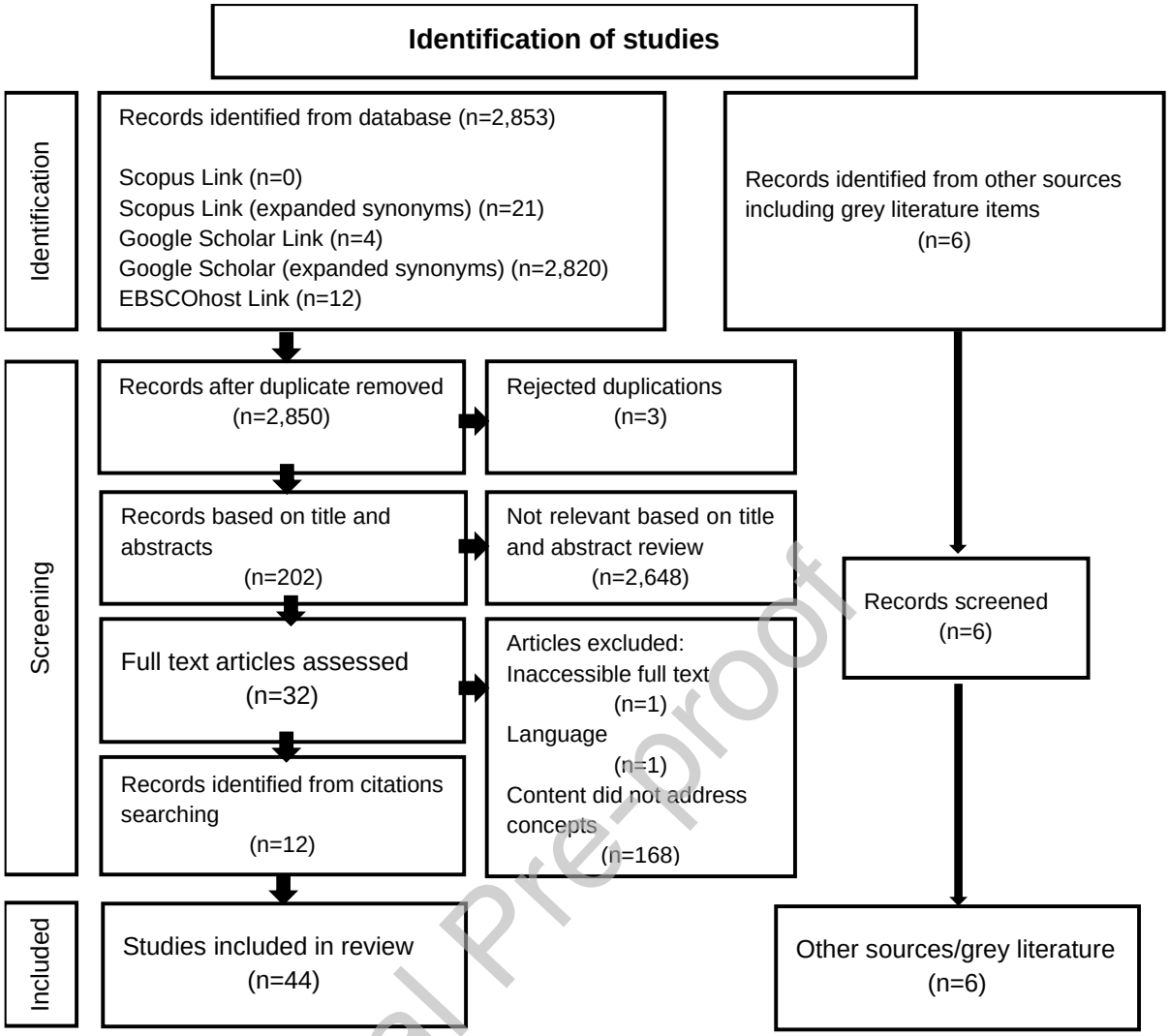

Fig. 1. PRISMA 2020 flow diagram

The database searches identified 2,853 potentially relevant records. After removal of 3 duplicates, 2,648 records were excluded following title and abstract screening. The remaining 202 records underwent full screening, resulting in 32 articles for full-text review. Citation searching identified an additional 12 relevant articles. Following full-text assessment and researcher consensus, 44 articles met the inclusion criteria. Six additional records were identified from grey literature sources.

2.3 Approach

Walker and Avant's[46] eight-step concept analysis method provided the methodological framework for this study. The steps included: (1) selecting the concept, (2) determining the aim of the analysis, (3) identifying uses of the concept, (4) determining the defining attributes, (5)

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identifying a model case, (6) identifying additional cases (borderline, related, and contrary), (7) identifying antecedents and consequences, and (8) identifying empirical referents.

2.3.1 Step 1: Selecting the concept

Risk normalization in the perioperative environment was selected because a clear conceptual understanding is needed to recognise the subtle transition from acceptable risk tolerance to desensitization and to enable timely intervention before it progresses to entrenched normalization of deviance.

2.3.2 Step 2: Determine the aim

The aim of this concept analysis was to evaluate the existing literature and propose a conceptual definition of risk normalization in the perioperative environment. By clarifying the concept, including its defining attributes, antecedents, and consequences, the analysis provides the theoretical foundation necessary for developing strategies to address factors contributing to normalization of deviance among perioperative nurses.

2.3.3 Step 3: Uses of the concept

- **Defining risk normalization**

Uses of the concept were identified through narrative synthesis of the literature. Concept analysis typically begins with dictionary definitions to establish the ordinary meaning of a concept. The Merriam–Webster Dictionary[32] defines normalization as "the process of making something conform to a standard, typical, or accepted norm." Risk is defined as "the possibility of loss, injury, or other adverse or unwelcome circumstance" or "the degree of probability of such an occurrence".[32] Although the compound term "risk normalization" does not yet appear in general dictionaries, it is used in specialized safety literature. The United States Federal Aviation Administration[18, p.A-10] describes risk normalization as "the gradual acceptance of dangerous or risky behaviours as normal over time." Normalization of deviance, by contrast, is more established and refers to the process whereby repeated deviations from established standards become accepted as the new norm in the absence of immediate negative consequences.[17,53]

- **Risk normalization in broader safety science and high-risk industries**

The concept of risk normalization originated in high-risk industries such as aviation,[37] nuclear power, oil and gas, and diving.[33,41] It has also been described as risk desensitization or

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as an early stage of the normalization of deviance, referring to how repeated deviations from safety standards alter individuals' perceptions of risk. This perspective includes Vaughan (1996) seminal work on the Challenger disaster, in which the progressive acceptance of risks associated with O-ring erosion became normalized.[22] More recent systematic reviews in high-risk industries have explicitly linked risk normalization to production pressure, organizational culture, and the absence of negative consequences.[36] Sedlar et al.[41] identified risk normalization as a core theme involving desensitization to hazards in high-risk work environments.

- **Risk normalization in healthcare and nursing literature**

In healthcare and nursing, risk normalization describes how clinicians become desensitized to potential harm, allowing unsafe practices to persist because of the absence of negative consequences.[38] It is positioned as a component or precursor to the normalization of deviance and helps explain the persistence of unsafe behaviors in complex, high-risk environments despite established safety protocols.[51]

- **Risk normalization in the perioperative environment context**

Risk normalization has not been explicitly described as a distinct concept in the perioperative literature. When discussed, it is typically presented as a subtheme or synonym within the broader concept of normalization of deviance in perioperative nursing and patient safety research, helping explain why safety lapses persist, rather than being recognized as an independent concept.

Studies have shown that organizational and managerial pressures related to productivity can drive the acceptance of elevated levels of risk.[17,36] Experienced staff and teams may become desensitized to risks after years of incident-free practice.[51] These complacency- and experience-related shifts may subsequently be adopted by new staff through negative acculturation processes.[50] Social and cultural pressures may further contribute to the acceptance of risky behaviors and have been associated with adverse events and poor patient outcomes.[54]

2.3.4 Step 4: Defining attributes

Defining attributes are the essential characteristics that must be present for an instance of a concept to be identified.[46] Through narrative synthesis and constant comparative analysis of the literature, five defining attributes of risk normalization in the perioperative environment were identified. These attributes consistently recur across high-risk industries and perioperative

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studies and collectively distinguish risk normalization from related concepts such as general complacency or isolated human error.

- **Habituation**

Habituation is a basic non-associative learning process in which repeated exposure to a stimulus without adverse outcomes leads to diminished emotional and physiological responses.[23,30] In the operating room, perioperative nurses may repeatedly omit full drying times for skin preparation, perform rushed instrument counts, or accept incomplete sterile field setups because these deviations have not previously resulted in harm. Over time, the psychological response to these risks diminishes, making the behaviour feel routine.[1,45]

- **Altered Perception of Risk**

The perception of risk refers to a personal and subjective interpretation of how likely, severe, or relevant risk experiences are at the moment.[9,19] Individuals' perception of risk is highly variable, human-centered, and are prioritized differently and inconsistently.[29] In the perioperative environment, nurses frequently prioritise urgent tasks over those perceived to have no immediate impact on patient outcomes.[20,21] This selective attention, combined with production pressure, leads to underestimation of risks such as incomplete counts or relaxed sterile technique.[41,42]

- **Presumption of Risk (Cognitive Assumption)**

Presumption of risk occurs when surgical teams assume that standard risks are inherently manageable based on protocols, experience, and the absence of prior adverse events.[28] In practice, this manifests as the belief that "we've done it this way many times without incident," leading teams to accept shortcuts as reasonable adaptations rather than deviations.[17,54] Consequently, violations of protocols or guidelines are often rooted in an underestimation or misjudgment of these presumed risks.[13]

- **Desensitization to Risk**

Desensitization involves the progressive acceptance of known risks as normal and manageable.[10] Once a risk is regarded as inherent to the surgical environment, the threshold for acceptable risk gradually increases. Small deviations from protocols become tolerated, and a new, higher level of risk is perceived as the norm.[21,23] In the operating room, this is evident when teams routinely bypass full sterile technique checks or accept incomplete handovers without concern.

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- **Absence or Perceived Absence of Immediate Negative Consequences**

The absence of immediate negative consequences reinforces risky behaviour by removing corrective feedback.[3,27] When shortcuts such as rushed counts or abbreviated sterile procedures do not result in visible harm, they are positively reinforced and gradually become accepted practice.[22,50] This lack of visible consequences is particularly dangerous in the perioperative setting, where adverse events may be delayed or attributed to other causes.

These five attributes do not occur in isolation but interact dynamically. When all attributes are present, the full process of risk normalization emerges. The absence of any one attribute (e.g., immediate negative feedback following a deviation) may interrupt the cycle.

Figure 2 illustrates a typical risk normalization scenario in the operating room, where a surgical team repeatedly omits portions of the surgical safety checklist and bypasses key sterile technique procedures during routine cases. Over time, these deviations become accepted as the normal way of working despite violating established protocols.

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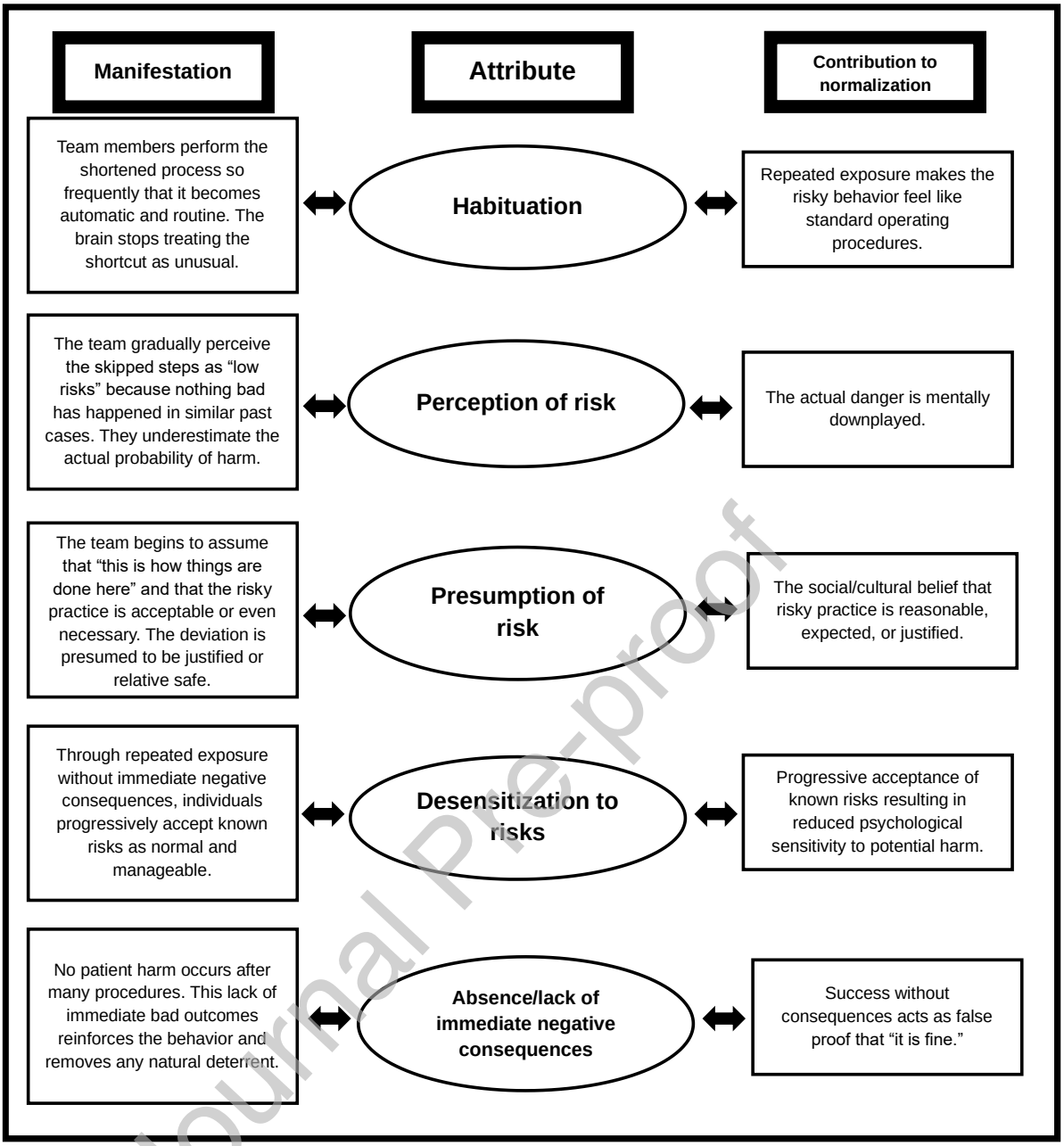

Fig. 2. Illustration of risk normalization in the perioperative environment

This cluster of defining attributes clearly distinguishes risk normalization from related but distinct concepts such as general complacency, fatigue, or isolated production pressure. In the perioperative environment, these attributes consistently appear together in the normalization of deviance literature: repeated exposure to risk without adverse outcomes results in emotional desensitization (habituation), diminished threat appraisal (altered risk perception), automatic assumptions of safety (presumption of risk), gradual acceptance of shortcuts as routine practice (desensitization to risk), and reinforcement through the absence of immediate harm.[31,41,47,53]

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2.3.5 Step 5: Case application

- **Model Case**

Walker and Avant[46] describe a model case as an example that demonstrates all the defining attributes of the concept under investigation. The following scenario illustrates how risk normalization may manifest in the perioperative environment.

Sarah, a circulating nurse with 12 years of experience in a busy trauma operating room, routinely omits the full 3-min drying time required for alcohol-based skin preparation because the surgeon is already gowned and waiting to begin the procedure [Habituation]. She justifies this practice by reasoning that the team has performed hundreds of similar procedures without a reported surgical-site infection [Perception of risk]. Over time, the scrub nurse and surgeon have come to expect this shortcut, and it is no longer questioned [Presumption of risk]. During the past 2 years, the entire team has stopped enforcing the recommended drying time during after-hours emergency procedures to save time. Similarly, swab and instrument counts are frequently performed visually rather than both verbally and visually because the team trusts one another and believes this approach saves 2–3 min between cases [Desensitization to risks]. Because no retained surgical items or surgical-site infections have been reported during the previous 18 months, these practices are now perceived as entirely normal and efficient [Absence or lack of immediate negative consequences]. Consequently, Sarah no longer experiences any internal conflict when deviating from established practice.

This case demonstrates all five defining attributes of risk normalization.

2.3.6 Step 6: Additional Cases

The identification of additional cases, including borderline, related, and contrary cases, constitutes the sixth step in Walker and Avant's[46] concept analysis method. During concept analysis, cases that closely resemble or clearly differ from the concept of interest are examined to further refine its defining attributes.

- **Borderline case**

Borderline cases exhibit most, but not all, of the defining attributes of a concept.[46] In these cases, the deviation has not yet become fully normalized. The cases presented below are derived from the collective professional experience of the authors.

Claire, a perioperative nurse with four years of experience, occasionally omits the final instrument count reconciliation when the surgeon insists on closing the incision quickly, particularly when the operating theatre schedule is behind and the patient is stable

[Habituation]. Although she feels uneasy, she mentally verifies the count and documents it as correct [Perception of risk]. The charge nurse has observed this practice but simply remarks that the team needs to prepare the operating room for the next patient [Presumption of risk]. During the previous month, two near-miss count discrepancies occurred; however, these incidents were attributed to an individual scrub nurse rather than to deficiencies in the process [Absence or lack of immediate negative consequences]. Claire continues to regard this behavior as a temporary workaround rather than standard practice and remains concerned about it after work. Although elements of desensitization are emerging, the behavior has not yet been fully accepted by the whole team [Desensitization to risks – only partial].

This case illustrates that several defining attributes are present and that the situation has the potential to progress to a full model case encompassing all attributes of risk normalization.

- **Related case**

Related cases share similarities with the concept of interest but do not exhibit all of its defining attributes.[46] The following example occurs in a comparable clinical context but does not result in risk normalization.

Mary works in a high-volume orthopaedic operating room where the team consistently runs 15–20 mins behind schedule because of understaffing. To compensate, team members routinely shorten their breaks and remain after scheduled hours, resulting in fatigue and occasional minor medication labelling errors. Nevertheless, every surgical safety checklist, instrument count, and sterile technique procedure is completed meticulously and documented because the unit manager conducts weekly audits and recognizes adherence to safety standards. Although fatigue-related errors are acknowledged as a concern and staffing requests have been submitted to address the problem, no one has accepted shortcuts as routine practice. Consequently, established safety standards remain intact and non-negotiable.

This case demonstrates the presence of production pressure without the gradual acceptance or normalization of risk. However, this does not imply that the situation is without safety concerns.

- **Contrary case**

A contrary case represents a situation in which the defining attributes of the concept are absent. According to Walker and Avant,[46] contrary cases help clarify the boundaries of the concept by illustrating what it is not.

Kelly, a relatively new but highly safety-conscious circulating nurse, consistently insists on completing a full verbal instrument and swab count, allowing the complete three-min drying time for skin preparation, and conducting a formal surgical time-out even when the operating

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list is running 90 mins behind schedule and the surgeon is visibly frustrated. She calmly explains that patient safety takes priority and documents any delays resulting from adherence to established protocols. When senior colleagues comment on the slower operating room turnover, Kelly responds that she would rather work safely than quickly. The surgical team recognizes that she does not compromise established safety practices, and over time her consistent behavior contributes to strengthening, rather than weakening, the unit's safety culture.

In this case, risk normalization does not occur because deviations from established practice are neither tolerated nor rationalized, despite the presence of production pressure.

2.3.7 Step 7: Antecedents and Consequences

Antecedents

Antecedents are events, conditions, or situations that precede and contribute to the development of a concept.[46] In the perioperative environment, several interrelated antecedents create fertile conditions for risk normalization.

- **Inherent Complexity of the Perioperative Environment**

The operating room is characterised by multidisciplinary teamwork, advanced technology, variable patient acuity, high cognitive workload, frequent interruptions, and time-sensitive decision-making.[28,54] These factors increase the potential for error and make strict adherence to safety protocols challenging.[26,35] In addition, the vulnerability of surgical patients further contributes to the risks associated with the perioperative environment.[43]

- **Organizational Production and Efficiency Pressures**

Production pressure, including demands for increased surgical throughput, reduced turnover times, and financial targets, is a dominant antecedent.[2,17] To meet these demands, perioperative nurses may prioritise speed over safety, leading to acceptance of shortcuts as necessary adaptations.[20,41]

- **Lack of Negative Consequences for Deviations**

When deviations from safety protocols occur without immediate adverse outcomes, the absence of corrective feedback reinforces the behaviour.[15,33] This lack of visible harm is particularly common in surgery, where complications may be delayed or attributed to other causes.[22,54]

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- **Organizational and Cultural Tolerance**

A weak safety climate, leadership acceptance of shortcuts, and negative acculturation of new staff contribute significantly.[6,22] When senior team members model or tolerate deviations, the behaviour spreads rapidly through the team.[54]

- **Experience-Related Complacency**

Longer clinical experience can foster overconfidence and reduced vigilance, with nurses believing "I've done it this way for years without incident".[34,50] Greater experience has been associated with higher levels of missed nursing care in perioperative settings.[44]

- **Social and Peer Pressure**

Subjective norms within the surgical team often encourage conformity to deviant practices while discouraging speaking up.[36,47] In the operating room this pressure commonly arises from hierarchical dynamics, particularly the influence of surgeons, and to a lesser extent senior nurses or anaesthetists. Junior or less experienced staff may feel reluctant to challenge shortcuts or unsafe practices for fear of retaliation, being labelled difficult, or disrupting team harmony. Over time, these interpersonal and hierarchical pressures reinforce the gradual acceptance of risk as normal.

Collectively, these antecedents create the conditions for the defining attributes of risk normalization to emerge and become entrenched.

Consequences

Consequences are the outcomes that follow the occurrence of a concept.[46] In the perioperative environment, risk normalization leads to several serious consequences.

- **Increased incidence of perioperative adverse events and patient harm**

Risk normalization may result in higher rates of preventable adverse events, including wrong-site surgery, retained surgical items, surgical-site infections, medication errors, and anesthesia-related complications.[17,50] These events may contribute to increased morbidity and mortality and adversely affect patients, families, healthcare institutions, and society through diminished quality of life, increased financial expenses, and a greater overall burden of disease.[6]

- **Short-term productivity gains**

Temporary improvements in surgical case volume, operating room turnover times, and overall efficiency may occur, masking the gradual accumulation of risk.[6] Staff may deviate from established safety standards in response to time pressure, convenience, or perceived gains in efficiency.[53]

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- **Erosion of safety culture and team vigilance**

Over time, members of the multidisciplinary surgical team may become less willing to raise safety concerns, less likely to challenge deviations from established practice, and less likely to demonstrate the high-reliability behaviors required for safe perioperative care.[3,17]

- **Normalization of deviance**

The progressive acceptance of increasingly frequent deviations from established safety protocols ultimately results in the normalization of deviance, whereby unsafe practices become accepted as the new standard of care.[11] Examples include omitted instrument counts, relaxed sterile technique, and bypassing the surgical time-out process.[50,54]

- **Underreporting of risks, near-misses, and adverse events**

Once risks become normalized, healthcare professionals may no longer perceive them as unusual or worthy of reporting.[20] Practices that were previously regarded as safety concerns gradually become accepted as routine practice. Consequently, hazards accumulate unnoticed, opportunities for organizational learning from incidents are reduced, and the cycle of risk normalization is further reinforced.[6,47,53]

- **Potential for major system failure**

When multiple normalized deviations occur simultaneously, particularly during periods of increased workload or procedural complexity, the consequences may include serious adverse events, patient harm, legal liability, organizational reputational damage, and loss of life.[36,41]

A particularly important characteristic of risk normalization in the perioperative environment is the feedback loop created between its antecedents and consequences. Once the defining attributes become established, the resulting consequences may reinforce the antecedents that initiated the process. For example, widespread underreporting removes the corrective feedback that might otherwise interrupt habituation, whereas diminished team vigilance and leadership tolerance of shortcuts strengthen organizational and cultural acceptance of deviations.

Consequently, each cycle of risk normalization further reinforces environmental complexity, production pressure, and social norms that discourage individuals from speaking up.[6,41,47,52] Breaking this self-perpetuating cycle therefore requires deliberate and targeted interventions that address both the antecedents and consequences of risk normalization.

2.3.8 Step 8: Empirical Referents

The eighth and final step in Walker and Avant's[46] concept analysis method is the identification of empirical referents, which are measurable that demonstrate the concept in

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practice and facilitate its assessment. Empirical referents for risk normalization in the perioperative environment can be informed by established measurement approaches developed in other high-risk domains.

Cristea and Gheorghiu[12] used scenario-based measures derived from the Theory of Planned Behavior to quantify cyclists' intentions to engage in risky behaviors. Their instrument assessed attitudes towards risk-taking (e.g., positive evaluations of running a red light despite known hazards), perceived behavioral control (e.g., "I can safely manage this situation"), and behavioral intention. These measures may be adapted for application in the perioperative environment. According to this framework, experienced individuals are more likely to engage in risky behaviors in tempting situations when they (1) perceive the risk as advantageous or acceptable (attitude) and (2) believe they can successfully manage the situation (high perceived behavioral control).

The perioperative environment presents numerous situations that may similarly encourage risk-taking behaviors. Examples include production pressure, surgeon expectations, staffing shortages, lengthy operating lists, and emergency procedures, and other time-sensitive clinical demands.

- **Attitude: Positive evaluation of the risky shortcut**

Similar to cyclists who develop favorable attitudes towards running a red light because it "saves time" and appears unlikely to result in harm, perioperative nurses may develop favorable attitudes towards safety shortcuts. One example is performing a rapid visual count instead of the recommended verbal and visual count to expedite the procedure. The perceived short-term benefits include improved efficiency, reduced fatigue, and team approval. Consequently, a more favorable attitude towards safety shortcuts has been associated with lower intentions to adhere to safe practices, consistent with the findings reported by Kim and Jeong.[26]

- **Perceived behavioral control: "I can handle this risk"**

Cristea and Gheorghiu[12] found that cyclists often believed they possessed sufficient skill, experience, and control to perform risky behaviors without adverse consequences. Similarly, perioperative nurses may rely on their clinical experience when deciding that shortcut practices, such as abbreviated instrument counts or omitted safety checks, can be performed safely. High perceived behavioral control may foster overconfidence, increasing the likelihood of engaging in risky behaviors.

- **Subjective norms: Social acceptance may increase risk**

When attitudes, subjective norms, and perceived behavioral control all favor risky behaviors, engagement in risk- taking under risk-conducive conditions becomes more likely,[12,25,26] thereby increasing the potential for patient harm.[39] In the cyclist study, subjective norms were a relatively weak predictor of risky behavior. In contrast, subjective norms in the perioperative environment may exert a considerably stronger influence through factors such as team expectations, production pressure, surgeon preferences, and the perception that "everyone does it."

Table 1 summarizes the literature included in the conceptual analysis of risk normalization in the perioperative environment.

Table 1. Summary of included sources for the concept analysis of risk normalization.

	Identification of source	Related antecedent	Related defining attribute	Related consequence	Explanation or rationale
1.	Ali et al. (2023)	Repeated exposure to risk	Habituation	Escalation of risk-taking	Habituation reduces sensitivity to risk
2.	Alqahtani et al. (2025)	Weak governance	Presumption of risk	Increased adverse events	Poor compliance structures lead to risk acceptance
3.	Amalberti & Vincent (2020)	Improvization under pressure	Absence of immediate negative consequences	Drift into failure	Risks tolerated when no harm occurs
4.	American Nurses Association (2025)	Professional ethical standards	Desensitization to risks	Erosion of safety culture	Deviation from code of ethics become normalized
5.	Banja (2010)	Production pressure	All five attributes	Unsafe practice becomes standard	Classic paper on normalization of deviance in healthcare
6.	Bingham et al. (2018)	Workload demands	Habituation Presumption of risk	Altered practice standards	Constructivist theory on reshaping practice
7.	Boyd & Jackson (2005)	High-risk patients who undergo surgery	Perception of risk	Clinical decisions variations	Defines risk in surgical contexts
8.	Carvalho et al. (2023)	Routine deviations in pediatrics	Desensitization to risks	Patient safety threats	Perception of health workers on normalization
9.	Cilliers et al. (2023)	Contextual factors in perioperative environment	All five attributes	Normalization among perioperative nurses	Qualitative study on contributing factors

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10.	Cristea & Gheorghiu (2016)	Risk attitudes	Perception of risk Presumption of risk	Intention to adopt risky *behaviors*	TPB applied to risky behavior
11.	Cutter & Jordan (2012)	Inter-professional differences	Desensitization to risks	Non-compliance with precautions	Mixed methods in perioperative environment
12.	Dekker & Pruchnicki (2013)	Gradual drift	Absence of immediate negative consequences	Disaster incubation	Dynamics of drifting into failure
13.	Dillon et al. (2013)	Near-miss events	Habituation	Failure to learn from events	Under recognition of risks
14.	Everson et al. (2020)	Production pressure	Presumption of risk Absence of consequences	Poor patient outcomes	Link between pressure and normalization of deviance
15.	Federal Aviation Administration (2025)	Operational pressure	Habituation	Increased safety incidents	Defintion of normalization of deviance Aviation resource guide on interference and risk
16.	Fooken & Schaffner (2016)	Decision-making under risk	Perception of risk	Risky choices	Psychological factors in risk decisions
17.	Gillespie et al. (2025)	Time pressure, workload	Desensitization to risks	Missed nursing care	Australian perioperative survey
18.	Göras et al. (2020)	Complexty in perioperative environment	Presumption of risk	Safety compromises	Managing complexity leads to adaptions
19.	Hester (2023)	Cultural acceptance	All five attributes	Accidents not seen as accidental	Normalization in high-risk industries
20.	Ilynykh et al. (2020)	Social practice	Habituation	Risk normalization	Normalization and habitualization
21.	International Council of Nurses (2021)	Ethical codes	Desensitization to risks	Ethical drift	Etical codes violations over time
22.	Javadi et al. (2013)	Individual beliefs	Perception of risk	Patient safety behaviors	TPB in nursing safety
23.	Kim & Jeong (2021)	Perioperative factors	Perception of risk	Safety management activities	Modified TPB model
24.	Leveson et al. (2016)	Sytem complexity	Absence of immediate negative consequences	Adverse events	System approach to hospital safety

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25.	Liao & Lou (2024)	Safety defense mechanisms	Presumption of risk	Quality and risk incidents	Perioperative nursing risk management

	Identification of source	Related antecedent	Related defining attribute	Related consequence	Explanation or rationale
26.	Li et al. (2024)	Work experience Environment	Perception of risk	Adverse event reporting	Nurses' risk perception factors
27.	Lindwall & von Post (2008)	Perioperative culture	Habituation	Cultural habits	Habits in nursing culture
28.	McNamara (2011)	Perioperative pressures	Desensitization to risks	Increased risks	Perioperative normalization of deviance
29.	Merriam-Webster (2005)	N/A	N/A	N/A	Definition of risk, normalization, and deviance
30.	Morrison & Wears (2022)	Dynamic pressures	Absence of immediate negative consequences	Drift to boundary of safety	Rasmussen's model
31.	Nyberg et al. (2024)	Experience and age	Perception of risk	Safety attitudes	Perioperative nurses
32.	Peñataro-Pintado et al. (2021)	Daily perioperative experiences	Desensitization to risks	Compromised patient safety	Qualitative experiences
33.	Price & Williams (2018)	Cognitive dissonance	Desensitization to risks	Persistent deviance	When wrong feels right
34.	Prielipp et al. (2010)	Routine acceptance	All five attributes	Doing the wrong thing unknowingly	Anesthesia context
35.	Quintard et al. (2016)	Risk acceptability	Perception of risk Presumption of risk	Risk tolerance	Healthcare-related risks review
36.	Rollon (2020)	Perioperative practice	Perception of risk	Improved safety	TPB to enhance practice
37.	Sedlar et al. (2023)	High-risk industries	All five attributes	Unsafe norms	Systematic review of normalization of deviance
38.	Shubayr (2024)	Radiation exposure	Perception of risk	Compliance variations	Perioperative radiation safety
39.	Singh & Arulappan (2023)	Role understanding	Presumption of risk	Safety measure adherence	Perioperative nurses roles

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40.	Tsegaye et al. (2024)	Workload, staffing	Absence of immediate negative consequences	Missed care	Maternity wards
41.	Van Harten et al. (2025)	Time pressure	Habituation Presumption of risk	Patient safety impact	Surgical teams
42.	Wilbanks & Gardenier (2025)	Perioperative setting	All five attributes	Poor outcomes	Systematic review
43.	World Health Organization (2009)	Surgical safety protocols	Perception of risk	Reduced adverse events	Safe surgery guidelines
44.	World Health Organization (2012)	Clinical procedures	Presumption of risk	Protocol deviations	Safety protocols
45-50.	Wright et al. (various 2019–2024) Include **six** articles	Safety culture factors	All five attributes	Eroded high reliability	Multiple studies on normalization of deviance in the perioperative environment

TBP; Theory of Planned Behavior

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	Identification of Source	Related Antecedent	Related Defining Attribute	Related Consequence	Explanation or Rationale
1.	Ali et al. (2023)	Repeated exposure to risk	Habituation	Escalation of risk-taking	Habituation reduces sensitivity to risk
2.	Alqahtani et al. (2025)	Weak governance	Presumption of risk	Increased adverse events	Poor compliance structures lead to risk acceptance
3.	Amalberti & Vincent (2020)	Improvisation under pressure	Absence of immediate negative consequences	Drift into failure	Risks tolerated when no harm occurs
4.	American Nurses Association (2025)	Professional ethical standards	Desensitisation to risks	Erosion of safety culture	Deviation from code of ethics become normalized
5.	Banja (2010)	Production pressure	All five attributes	Unsafe practice becomes standard	Classic paper on normalization of deviance in healthcare
6.	Bingham et al. (2018)	Workload demands	Habituation Presumption of risk	Altered practice standards	Constructivist theory on reshaping practice
7.	Boyd & Jackson (2005)	High-risk surgical patients	Perception of risk	Clinical decisions variations	Defines risk in surgical contexts
8.	Carvalho et al. (2023)	Routine deviations in pediatrics	Desensitisation to risks	Patient safety threats	Perception of health workers on normalization
9.	Cilliers et al. (2023)	Contextual factors in perioperative environment	All five attributes	Normalization among perioperative nurses	Qualitative study on contributing factors
10.	Cristea & Gheorghiu (2016)	Risk attitudes	Perception of risk Presumption of risk	Intention to adopt risky behaviours	TPB applied to risky behaviour
11.	Cutter & Jordan (2012)	Inter-professional differences	Desensitisation to risks	Non-compliance with precautions	Mixed methods in perioperative environment
12.	Dekker & Pruchnicki (2013)	Gradual drift	Absence of immediate negative consequences	Disaster incubation	Dynamics of drifting into failure
13.	Dillon et al. (2013)	Near-miss events	Habituation	Failure to learn from events	Under recognition of risks
14.	Everson et al. (2020)	Production pressure	Presumption of risk Absence of consequences	Poor patient outcomes	Link between pressure and normalization of deviance
15.	Federal Aviation Administration (2025)	Operational pressure	Habituation	Increased safety incidents	Defintion of normalization of deviance Aviation resource guide on interference and risk
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17.	Gillespie et al. (2025)	Time pressure, workload	Desensitisation to risks	Missed nursing care	Australian perioperative survey
18.	Göras et al. (2020)	Complexty in perioperative environment	Presumption of risk	Safety compromises	Managing complexity leads to adaptions
19.	Hester (2023)	Cultural acceptance	All five attributes	Accidents not seen as accidental	Normalization in high-risk industries
20.	Ilynykh et al. (2020)	Social practice	Habituation	Risk normalization	Normalization and habitualization
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22.	Javadi et al. (2013)	Individual beliefs	Perception of risk	Patient safety behaviours	TPB in nursing safety
23.	Kim & Jeong (2021)	Perioperative factors	Perception of risk	Safety management activities	Modified TPB model
24.	Leveson et al. (2016)	Sytem complexity	Absence of immediate negative consequences	Adverse events	System approach to hospital safety
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26.	Li et al. (2024)	Work experience Environment	Perception of risk	Adverse event reporting	Nurses' risk perception factors
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32.	Peñataro-Pintado et al. (2021)	Daily perioperative experiences	Desensitisation to risks	Compromised patient safety	Qualitative experiences
33.	Price & Williams (2018)	Cognitive dissonance	Desensitisation to risks	Persistent deviance	When wrong feels right
34.	Prielipp et al. (2010)	Routine acceptance	All five attributes	Doing the wrong thing unknowingly	Anesthesia context
35.	Quintard et al. (2016)	Risk acceptability	Perception of risk Presumption of risk	Risk tolerance	Healthcare-related risks review
36.	Rollon (2020)	Perioperative practice	Perception of risk	Improved safety	TPB to enhance practice
37.	Sedlar et al. (2023)	High-risk industries	All five attributes	Unsafe norms	Systematic review of normalization of deviance
38.	Shubayr (2024)	Radiation exposure	Perception of risk	Compliance variations	Perioperative radiation safety
39.	Singh & Arulappan (2023)	Role understanding	Presumption of risk	Safety measure adherence	Perioperative nurses roles
40.	Tsegaye et al. (2024)	Workload, staffing	Absence of immediate negative consequences	Missed care	Maternity wards
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42.	Wilbanks & Gardenier (2025)	Perioperative setting	All five attributes	Poor outcomes	Systematic review
43.	World Health Organization (2009)	Surgical safety protocols	Perception of risk	Reduced adverse events	Safe surgery guidelines
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3. DISCUSSION

This study aimed to conduct a concept analysis of risk normalization in the perioperative environment by examining its defining attributes, antecedents, and consequences. The primary objective was to formulate a conceptual definition that is relevant and meaningful across the diverse contexts in which it may be applied. The analysis highlighted the multifaceted nature of risk normalization in the perioperative environment and its implications for patient safety.

Based on the literature synthesis, the following conceptual definition of risk normalization in the perioperative environment was derived:

Risk normalization in the perioperative environment is a psychological process that arises when repeated engagement in risky or deviant behaviors, in the absence of immediate negative consequences, produces habituation and a progressive decline in

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emotional and physiological responsiveness to potential hazards. This habituation diminishes risk perception and creates a presumption of safety, allowing progressively riskier practices to be perceived and accepted as normal and routine within the perioperative environment.

The extracted data revealed consistent patterns. The five defining attributes of risk normalization (habituation, perception of risk, presumption of risk, desensitization to risk, and absence or lack of immediate negative consequences) interact dynamically to erode safety culture. Habituation occurs when repeated exposure to shortcuts (e.g., shortened skin prep drying times or rushed instrument counts) makes deviant practices feel routine.[1,23]

Over time, practitioners' perception of risk diminishes as they underestimate the probability of harm,[12,29,42] while presumption of risk leads teams to accept these deviations as necessary or standard under production pressure.[17,45] Desensitization to risk further entrenches the problem, as what once caused moral or professional discomfort no longer elicits concern.[6,36,37,54] This is strongly reinforced by the absence of immediate negative consequences.

When no surgical-site infections, retained items, or adverse events follow repeated deviations, the unsafe behavior is positively reinforced and becomes culturally accepted.[14,22,33,47] Several perioperative studies have illustrated this progression, showing how time pressure, understaffing, and production demands act as key antecedents.[11,20,31,53]

The consequences of risk normalization are profound and well documented as increased potential for patient harm, eroded safety culture, weakened high-reliability practices, and compromised professional accountability.[3,41,50,54] In perioperative settings, this manifests as missed nursing care, non-compliance with safety checklists, radiation safety breaches, and acceptance of fatigue-related errors.[35,43,44]

A subset of studies frames these behaviors through the Theory of Planned Behavior (TPB). Constructs, such as attitude toward the behavior, subjective norms, and perceived behavioral control significantly predict nurses' intentions to engage in (or deviate from) safety protocols.[12,25,26,39] When subjective norms shift toward acceptance of shortcuts and perceived behavioral control is reduced by time pressure, the intention to follow best practices weakens, accelerating normalization.

Importantly, not all high-pressure environments inevitably lead to full normalization. Strong leadership, regular audits, visible managerial commitment to zero deviations, and proactive speaking-up cultures can interrupt the cycle.[34,52,55] Ethical codes from the American

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Nurses Association[4] and the International Council of Nurses,[24] alongside the World Health Organization (WHO) surgical safety guidelines,[48,49] provide normative anchors that can counteract drift when actively upheld.

A further consideration is the operational trade-off that exists in many perioperative settings. Temporary gains in surgical volume, shorter turnover times, and improved efficiency can mask the gradual accumulation of risk. Staff and managers may deviate from established safety standards in response to time pressure or the perceived need to maximise access to care. Importantly, these decisions are seldom driven by an intentional desire to lower standards; rather, they reflect the ongoing tension between comprehensive safety practices and the organizational imperative to provide timely surgical care to as many patients as possible.

In conclusion, risk normalization in the perioperative environment is an insidious, multi-factorial process driven by the interplay of its five defining attributes. It begins subtly through habituation and altered risk perception and becomes entrenched when immediate negative consequences are absent. Addressing this phenomenon requires sustained attention to antecedents (especially production pressure), deliberate reinforcement of safety standards, and interventions grounded in behavioral theories such as TPB.

Practical Implications

The findings of this concept analysis offer clear, actionable guidance for perioperative nurses, nurse leaders, and healthcare organizations seeking to interrupt risk normalization and reduce the progression to normalization of deviance.

For frontline perioperative nurses, awareness of the five defining attributes provides a practical framework for self-monitoring and peer support. Nurses can recognise early warning signs such as habitual shortcutting of safety steps (e.g., abbreviated instrument counts or rushed sterile field setup), diminished concern about known risks, or the normalization of "we're running late" justifications. Speaking up can help interrupt the cycle at the individual level.

For nurse leaders and managers, the antecedents identified highlight the need for structural safeguards. These include protected time for critical safety protocols, regular audits of key safety processes (e.g., counts, time-out, and sterile technique), and visible leadership commitment to addressing recurring problems such as equipment shortages or staffing deficiencies. Managers should also foster psychological safety so that concerns about deviations are welcomed rather than dismissed.

For healthcare organizations, strengthening the five dimensions of the perioperative nurse work environment[55] offers an effective approach. Particular attention should be given to

staffing and resource adequacy, collegial nurse-physician relations, nurse manager leadership, and foundations for quality of care. Organizations can further support safe practice through regular multidisciplinary debriefings, simulation-based training focused on speaking up, and monitoring of leading safety indicators rather than relying solely on outcome measures. By making safe practice the easiest and most supported option, organizations can reduce the conditions that foster complacency and risk normalization.

Future research should evaluate the effectiveness of individual and organizational strategies aimed at addressing the contributing factors to risk normalization, thereby interrupting its development in the operating room. Recognizing the systemic pressures and operational trade-offs that exist in perioperative settings will be essential if such interventions are to be realistic and sustainable.

Limitations

Several limitations should be acknowledged. First, although the psychological processes are well documented, the specific term "risk normalization" is rarely used as a standalone concept in perioperative literature. The analysis therefore relied heavily on related studies of normalization of deviance. Second, as a concept analysis, no primary empirical data were collected from perioperative teams. The findings are therefore theoretical and require validation through observational and intervention studies. Finally, most included sources originated from high-resource settings, which may limit transferability to resource-constrained environments.

4. CONCLUSION

Efficient and safe patient care requires continuous awareness and management of the dynamic interrelationships among surgical team members, patients, tasks, equipment, and the perioperative environment. While patient safety has historically been viewed as the absence of harm, it is now understood as an active organizational capability rooted in system resilience and human performance.

Risk normalization is a dynamic and insidious process driven by five interconnected attributes: habituation, altered perception of risk, presumption of risk, desensitization to risk, and the absence or lack of immediate negative consequences. Habituation is a basic learning process that occurs when repeated exposure to a stimulus without adverse outcomes leads to diminished emotional and physiological responses. Over time, this reduces the perceived urgency and severity of risk, although the objective probability and potential consequences

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remain unchanged. What was once viewed as deviant behavior gradually becomes familiar, routine, and acceptable.

This habituated state distorts risk perception and fosters the presumption that risk is low, controlled, or justified, particularly under production pressure and time constraints. The resulting desensitization, reinforced by the consistent absence of immediate negative consequences, allows deviant practices to become embedded in team norms and routines. Consequently, unsafe behaviors are no longer perceived as risky, thereby increasing vulnerability to patient harm.

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Declaration of interest

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