International Journal of Computational and Experimental Science and ENgineering (IJCESEN)

Vol. 10-No.4 (2024) pp. 2971-2979
http://www.ijcesen.com

ISSN: 2149-9144

Research Article

Prevention of Patient Safety Incidents in Emergency Departments: A Review of Nursing, Emergency, and Healthcare Assistant Interventions

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Article Info:

DOI: 10.22399/ijcesen.4426
Received : 01 July 2024
Accepted : 30 July 2024

Keywords

Patient safety incidents,
emergency departments,
nursing interventions,
healthcare assistant interventions

Abstract:

Effective prevention of patient safety incidents in emergency departments (EDs) is crucial for maintaining high standards of care and minimizing risks. This review highlights the critical role of nursing, emergency, and healthcare assistant interventions in enhancing patient safety. Interventions such as continuous monitoring of patient vitals, effective communication among team members, and adherence to established protocols can significantly reduce the likelihood of errors. Furthermore, fostering a culture of safety within the ED through regular training and debriefing sessions equips healthcare staff with the tools and knowledge necessary to identify potential hazards and respond proactively. Collaborative efforts among nursing staff, physicians, and healthcare assistants create an environment where patient safety is a shared responsibility. In addition to promoting teamwork and communication, the implementation of advanced technologies and systematic approaches can further mitigate patient safety incidents. The use of electronic health records (EHRs) aids in the accurate documentation of patient information, reducing the risk of miscommunication and duplicating efforts. Furthermore, checklists and standardized procedures can streamline workflow while enhancing attention to detail. Training programs focused on high-risk scenarios, simulation exercises, and incident reporting systems enable staff to better prepare for and address potential emergencies. Ultimately, this comprehensive review emphasizes that a multifaceted approach combining education, technology, and teamwork is essential for fostering a safer emergency department environment.

1. Introduction

The emergency department (ED) represents the crucible of modern healthcare, a clinical environment of unparalleled complexity, dynamism, and inherent risk. It functions as the critical nexus between community and hospital, tasked with providing immediate, life-saving interventions while simultaneously diagnosing undifferentiated illness 24 hours a day. This unique mandate is carried out under conditions that collectively challenge the very foundations of safe care: wildly unpredictable patient volumes, high acuity presentations, constant interruptions, severe time constraints, and profound information gaps [1]. It is this confluence of factors that renders the ED exceptionally prone to patient safety incidents, a term encompassing errors, near misses, and adverse events that may or may not result in harm. The consequences of these incidents are far-reaching, extending beyond the immediate patient to impact families, healthcare providers, and entire systems. Patients may experience significant physical and psychological harm, increased morbidity and mortality, and prolonged recovery periods, while healthcare systems bear the substantial financial burdens of extended hospital stays, litigation, and redundant treatments [2]. Consequently, the relentless pursuit of safety incident prevention is not merely an operational goal but a fundamental ethical imperative for ED clinicians, administrators, and policymakers globally.

Within this high-stakes arena, patient safety is defined as the freedom from accidental or preventable injury arising from the processes of medical care, rather than from the underlying disease process itself. The threats to this safety in the ED are multifaceted and pervasive. Diagnostic errors, including missed, delayed, or incorrect diagnoses, stand as a leading cause of patient harm, often fueled by cognitive bias and system pressures [3]. Medication safety is continually jeopardized by the high frequency of drug administration, verbal orders, and the use of high-alert medications in uncontrolled settings. Furthermore, patients are exposed to risks of healthcare-associated infections, falls resulting from unfamiliar environments and acute illness, and failures in communication during the myriad handoffs that define emergency care [4]. The ED's role as the healthcare system's "front door" amplifies these risks; staff must make rapid, consequential decisions for patients with whom they have no prior therapeutic relationship, often with incomplete histories and amidst competing demands. This creates a "perfect storm" where latent system weaknesses and active human errors can converge with devastating effect [5].

This review focuses explicitly on the human agents at the heart of this storm: the frontline clinicians whose judgments and actions constitute the final layer of defense against patient harm. Specifically, it examines the critical interventions and roles undertaken by three pivotal groups: registered nurses, emergency medicine practitioners (encompassing physicians and advanced practice providers), and healthcare assistants (also known as nursing assistants, aides, or support workers). While systemic solutions, technological aids, and architectural design are undeniably crucial, the human element remains the decisive factor. Nurses form the operational backbone of the ED, providing

continuous physiological surveillance, executing complex medication regimens, and delivering the bulk of direct patient assessment and care. Their perpetual presence positions them as essential sentinels for early signs of deterioration [6]. Emergency practitioners bear the ultimate responsibility for diagnostic reasoning, therapeutic decision-making, and disposition, operating under intense cognitive load. Healthcare assistants, though frequently underrepresented in formal safety frameworks, are indispensable to the ecosystem of safety. They maintain the operational flow, provide essential basic care, and conduct continuous environmental monitoring, thereby preventing incidents that arise from fundamental needs being overlooked [7].

2. The High-Risk Environment of the Emergency Department

Understanding the specific risk factors inherent to the ED is fundamental to developing effective preventive interventions. The environment operates under conditions that consistently challenge the reliability of healthcare delivery. First, there is the issue of high patient volume and overcrowding, which has been robustly linked to increased rates of adverse events, mortality, and delays in critical treatments [1]. When EDs operate beyond their designed capacity, hallway care becomes common, privacy is compromised, monitoring becomes difficult, and staff are stretched thin, directly increasing the risk of errors. Second, diagnostic uncertainty is a hallmark of emergency medicine. Patients often present with vague, evolving, or complex symptoms without the benefit of prior medical records, placing immense cognitive load on clinicians and increasing the likelihood of missed or delayed diagnoses, which are among the most common and severe ED errors [8].

Furthermore, the ED is a hub of constant interruptions and multitasking. A nurse preparing a high-risk medication may be interrupted multiple times for questions about other patients, leading to potential administration errors. Physicians are frequently tasked with managing multiple critically ill patients simultaneously, a situation that can fracture attention and decision-making. Time pressure is another relentless factor; the need for rapid assessment and intervention, while often lifesaving, can encourage cognitive shortcuts (heuristics) that may bypass more thorough, analytical reasoning [3]. Information flow is also frequently suboptimal. Incomplete handoffs from pre-hospital services, lack of access to primary care records, and fragmented communication within the ED team can lead to actions based on an incomplete or inaccurate clinical picture. Finally, the physical environment itself can pose hazards, with cluttered spaces, poorly designed workflow patterns, and inadequate equipment contributing to risks like patient falls or cross-contamination.

3. The Foundational Role of Triage and Initial Assessment

The initial point of contact in the ED, typically the triage process, sets the trajectory for patient safety. An accurate and timely triage assessment is the first critical filter to identify patients at immediate risk of deterioration and to prioritize resources effectively. Nursing-led triage, guided by standardized acuity scales like the Emergency Severity Index (ESI) or the Manchester Triage System, is a fundamental safety intervention. However, the safety role extends beyond assigning a level. Nurses must employ robust clinical judgment to "flag" patients who may not fit standard criteria but are at high risk, such as the elderly with atypical presentations of serious illness or patients with subtle signs of sepsis [4]. Safety interventions here include the use of early warning scores (EWS) or rapid response triggers integrated into the triage documentation to objectively identify physiological instability.

Moreover, the triage encounter is a pivotal moment for preventing incidents related to patient identification and history. A proactive intervention is the rigorous application of two-patient identifiers (e.g., name and date of birth) even in the chaotic triage area. Furthermore, skilled triage nurses conduct focused but crucial medication reconciliation, asking about allergies, current medications, and potential drug interactions at the first opportunity, which can prevent catastrophic medication errors later in the care pathway [9]. For vulnerable populations, such as older adults or those with cognitive impairments, triage nurses initiate critical safety protocols, including fall risk assessments and the mobilization of additional support from healthcare assistants for close observation. Thus, a meticulously executed triage process, viewed not as a bureaucratic hurdle but as a core safety strategy, can intercept numerous potential incidents before they unfold in the main department.

4. Nursing Interventions for Medication Safety

Medication errors are a persistent threat in the ED, involving prescribing, transcribing, dispensing, administering, and monitoring stages. Nurses are the final barrier preventing administration errors and are central to safe medication practices. A

primary intervention is the adherence to the "five rights" of medication administration (right patient, drug, dose, route, time), reinforced with independent double-checks for high-alert medications such as opioids, anticoagulants, insulin, and concentrated electrolytes like potassium chloride [6]. The practice of having a second nurse independently verify the patient, medication, and dosage before administration is a powerful, though resource-intensive, error-catching tool.

Given the verbal order culture sometimes necessitated by emergencies, nurses play a vital role in ensuring safety through the "read-back" or "repeat-back" protocol. When receiving a verbal or telephone order, the nurse writes it down, reads it back to the prescriber verbatim, and receives confirmation, drastically reducing miscommunication errors [7]. Furthermore, nursing vigilance in medication reconciliation—comparing the ED medication list with the patient's home medications and resolving discrepancies—is an ongoing safety activity that continues beyond triage. Nurses also intervene by monitoring for and recognizing adverse drug reactions and side effects promptly, especially when new medications are started in the ED. They are also advocates for system-level improvements, such as supporting the implementation of smart infusion pumps with dose-error reduction software and computerized physician order entry (CPOE) with clinical decision support, which can intercept errors at the prescribing stage before they reach the bedside.

5. Emergency Practitioner Interventions in Diagnostic Reasoning and Decision-Making

Diagnostic error is a significant contributor to patient harm in the ED. Emergency practitioners must navigate uncertainty under pressure, making their cognitive processes a key area for safety interventions. One critical strategy is the cultivation of metacognition—thinking about one's own thinking. This involves acknowledging cognitive biases that commonly lead to error, such as anchoring (locking onto an initial diagnosis despite contradictory evidence), availability bias (relying on recent or memorable cases), and confirmation bias (seeking information that supports a preferred diagnosis) [8]. Practitioners can employ cognitive forcing strategies, such as routinely asking themselves, "What is the worst possible thing this could be?" or "What else could explain this presentation?" to deliberately broaden their differential diagnosis.

Structured handoff tools like I-PASS (Illness severity, Patient summary, Action list, Situation awareness and contingency planning, Synthesis by receiver) are not just for transfers; they can be adapted for internal sign-outs, ensuring critical information and pending tasks are not lost during shift changes, a period of high vulnerability [9]. Another vital intervention is the practice of "diagnostic time-outs" or deliberate pauses in complex cases. This involves consulting with a colleague, reviewing the chart afresh, or revisiting key findings with a nurse to gain a new perspective. Furthermore, the appropriate and timely use of diagnostic resources, guided by validated clinical decision rules (e.g., Wells' Criteria for PE, Ottawa rules for ankle/ knee injuries), helps standardize care and reduce unnecessary variation and radiation exposure while ensuring serious conditions are not missed [10]. Finally, fostering a culture where junior staff or nurses feel comfortable voicing concerns about a diagnosis or plan is a non-technical intervention of profound importance, leveraging the collective wisdom of the team to safeguard the patient.

6. Healthcare Assistant Contributions to Environmental and Basic Care Safety

Healthcare assistants (HCAs) are indispensable members of the ED team whose work directly impacts fundamental aspects of patient safety. Their interventions are often centered on the prevention of incidents that arise from gaps in basic care and environmental hazards. A primary safety function is in the prevention of patient falls, which are common and injurious in the ED. HCAs are frequently tasked with continuous or frequent observation of high-risk patients identified by nursing assessment. They ensure call bells are within reach, assist with toileting, and maintain a clear, clutter-free path to the bathroom, directly mitigating fall risks [11]. Their constant presence allows for immediate intervention if a patient attempts to ambulate unsafely.

Infection prevention and control is another critical domain. HCAs are responsible for meticulous and frequent cleaning of high-touch surfaces in patient care areas—bedrails, stretcher surfaces, door handles, and equipment. This environmental hygiene is a first-line defense against healthcare-associated infections, including multidrug-resistant organisms. They also enforce and model proper use of personal protective equipment (PPE) for patients, families, and staff. In terms of basic care, HCAs monitor patients for issues like skin integrity, especially for immobilized patients, alerting nurses to early signs of pressure damage. They also assist with nutrition and hydration, ensuring patients who are allowed to eat and drink do so safely,

preventing aspiration risks. By performing these essential tasks reliably, HCAs free up nurses to focus on more complex clinical assessments and interventions, thereby enhancing overall team efficiency and reducing the likelihood of tasks being overlooked in a busy environment.

7. Communication and Handoff Strategies as Safety Critical Interventions

Communication failures are a root cause in a majority of serious patient safety incidents. The ED, with its multiple shift changes, transfers to other departments, and consultations, is a network of potential communication breakdowns. Structured communication tools are therefore not optional but essential safety interventions for all staff. The SBAR (Situation, Background, Assessment, Recommendation) technique provides a concise, predictable framework for communicating critical information, whether from a nurse to a physician about a deteriorating patient or from an ED physician to a consulting specialist [12]. Its use reduces ambiguity and ensures the receiver gets the information needed for decision-making promptly.

Handoffs, particularly at the end of a shift, are periods of extreme vulnerability. The implementation of standardized, structured handoff protocols is a powerful safety intervention. Tools like I-PASS have been shown in multiple settings to reduce medical errors and preventable adverse events [13]. These protocols mandate the verbal and written transfer of key information: patient identification, current condition, recent events, immediate tasks, and contingency plans. Importantly, they encourage interactive questioning and require the incoming provider to "repeat back" key actions. For inter-departmental transfers (e.g., to the ICU or a ward), a similar structured approach is needed, ideally involving both physicians and nurses in a coordinated "warm handoff" that includes a written summary and direct verbal communication. Closed-loop communication, where the sender confirms the message is understood, is a simple but vital habit for all team members, especially when executing time-sensitive orders.

8. Teamwork, Situational Awareness, and a Culture of Safety

Technical skills alone cannot guarantee safety in the ED; it requires highly functional teamwork and shared situational awareness. Interventions here focus on fostering a culture where safety is prioritized over hierarchy and where every team member feels empowered to speak up. The principles of Crew Resource Management (CRM), adapted from aviation, are central to this. Key interventions include the use of structured briefings at the start of a shift to establish roles, identify sick patients, and anticipate resource needs [14]. Similarly, debriefings after a stressful event or resuscitation allow the team to reflect on what went well and what could be improved, converting experience into learning.

A core CRM concept is the practice of assertive communication. Staff are trained to use clear, respectful "CUS" words: "I am Concerned," "I am Uncomfortable," "This is a Safety issue" [15]. This gives nurses, HCAs, or junior physicians a formula to voice concerns without appearing confrontational. For example, a nurse noticing a potential drug allergy can state, "I am concerned this patient has a documented penicillin allergy." Shared situational awareness means everyone on the team has a common understanding of the patient's status and the plan. This is achieved through transparent communication, centralized tracking boards (used judiciously to protect privacy), and leaders (often the charge nurse or senior physician) verbally "huddling" the team when the situation changes. Ultimately, leadership must cultivate a just culture—one that distinguishes between human error, at-risk behavior, and reckless conduct, focusing on system improvement rather than individual blame, which encourages reporting of near misses as learning opportunities [16].

9. Technological and Systemic Supports for Frontline Staff

While frontline interventions are crucial, they are most effective when supported by robust systems and technology designed with safety in mind. Electronic Health Records (EHRs) with integrated clinical decision support (CDS) are powerful tools. CDS can alert prescribers to drug-allergy conflicts, excessive doses, or dangerous interactions at the point of order entry, preventing errors before they reach the patient [17]. However, these systems must be carefully designed to avoid alert fatigue, which leads to important warnings being ignored. Barcoding medication administration systems, where nurses scan the patient's wristband and the medication barcode before administration, provide a near-fail-safe check for the "five rights" and have been shown to significantly reduce administration errors [18].

Other technological supports include patient tracking systems that provide real-time visibility of patient location, status, and test results, reducing the chance of a patient being "lost" in the system. Telemedicine links can provide immediate

specialist consultation (e.g., telestroke) for time-critical conditions, bringing expert decision-making to the bedside and reducing diagnostic delays [19]. At a systemic level, standardized protocols and order sets for common conditions (e.g., sepsis, chest pain, asthma) reduce unwarranted variation and ensure evidence-based care is delivered reliably. Adequate nurse-to-patient staffing ratios, mandated by evidence and not just budget, are a fundamental systemic prerequisite for safety, as overwhelming workloads directly correlate with increased error rates and patient mortality [20]. Finally, physical design elements—such as well-lit, uncluttered spaces, standardized medication storage (e.g., using tall man lettering to distinguish look-alike drugs), and dedicated resuscitation bays with all equipment consistently located—create an environment that supports, rather than hinders, safe practice.

10. Addressing Specific High-Risk Situations:

Certain patient presentations demand targeted, protocol-driven interventions to avert specific safety incidents. Sepsis recognition and management is a prime example. Delays in antibiotics for septic shock significantly increase mortality. Nursing interventions include the proactive initiation of sepsis screening protocols at triage for patients with suspicious vitals (e.g., qSOFA criteria) and the prompt completion of the "sepsis bundle" once alerted, including obtaining blood cultures, administering antibiotics, and starting fluid resuscitation as ordered [21]. Emergency practitioners must prioritize early diagnosis, avoid anchoring on a less serious source of infection, and adhere to time-targeted bundle completion.

In trauma, safety is underpinned by the structured Advanced Trauma Life Support (ATLS) approach, which emphasizes a systematic primary and secondary survey to avoid missing life-threatening but occult injuries. A key safety intervention is the role of the trauma team, with clearly defined roles (team leader, airway, circulation, etc.) to prevent task saturation and communication chaos [22]. The nurse or HCA often acts as the "recorder," documenting findings and timing, which is vital for later review and continuity. For patients with acute mental health or behavioral crises, the primary safety incidents are harm to self, harm to others, and the inappropriate use of restraint. De-escalation training for all staff—using calm communication, offering choices, and showing respect—is a primary preventive intervention [23]. Creating a safe, low-stimulation environment and having security personnel trained in therapeutic techniques are system supports. The use of physical or chemical restraint must be a last resort, governed by strict protocols to prevent positional asphyxia or medication errors, with continuous monitoring once applied.

11. The Human Factor: Staff Well-being and Error Prevention

The safety of patients is inextricably linked to the well-being of the staff caring for them. Fatigue, burnout, and stress impair cognitive function, diminish empathy, and increase the likelihood of error. Therefore, interventions to support staff resilience are, in fact, direct patient safety strategies. Organizations must address the systemic drivers of burnout, such as excessive workloads, lack of autonomy, and inefficient work processes [24]. Leadership can implement interventions such as mandatory breaks, access to healthy food and hydration during shifts, and creating quiet spaces for mental respite. Peer support programs and confidential access to mental health services are crucial for staff dealing with the trauma of critical incidents or patient deaths.

On an individual level, staff can be trained in mindfulness and stress-reduction techniques to maintain focus during chaotic shifts. Encouraging a culture where it is acceptable to acknowledge fatigue and request a moment to regroup can prevent errors. Furthermore, creating a learning environment where errors and near misses are discussed openly in a blameless manner (for unintentional errors) allows teams to learn and adapt without fear of reprisal. This psychological safety is the bedrock of a true safety culture, where the focus shifts from "who made the error?" to "why did the system allow it to happen?" and "how can we prevent it next time?" [25]. Investing in staff well-being is not merely an ethical imperative but a strategic one, as a supported, engaged workforce is the most reliable safeguard against patient harm.

12. Measuring Safety and the Role of Continuous Quality Improvement

Prevention requires measurement. A robust safety program in the ED must move beyond merely counting rare "never events" and proactively monitor a suite of safety indicators. This includes process measures (e.g., time to antibiotic for sepsis, compliance with double-checks for high-risk meds), outcome measures (e.g., fall rates, central line-associated bloodstream infections), and balancing measures (e.g., length of stay, staff satisfaction) [26]. Data collection can come from

incident reporting systems, direct observation, chart review, and patient feedback. However, underreporting is a major challenge, often due to fear, time constraints, or a perception that reporting leads to no change.

Therefore, a key intervention is to foster a non-punitive reporting culture and to make reporting systems easy and quick to use. The real power of measurement lies in driving continuous quality improvement (CQI). Frontline staff should be actively involved in CQI projects, using methodologies like Plan-Do-Study-Act (PDSA) cycles to test small changes [27]. For instance, a nursing-led PDSA cycle might test a new visual cue (a colored bracelet) for patients with specific allergies. Regular morbidity and mortality (M&M) conferences, redesigned to be system-focused and not individual-shaming, are powerful forums for collective learning from adverse outcomes [28]. Audits of common high-risk processes, like sedation for procedures or blood transfusion checks, provide data to identify and close gaps in protocols. This cycle of measure, analyze, improve, and re-measure embeds safety into the daily fabric of the ED's operations.

13. Patient and Family Engagement as a Safety Strategy

Patients and their families are an underutilized but invaluable resource in the prevention of safety incidents. They possess unique knowledge about the patient's baseline condition, medication history, and preferences. Engaging them as active partners in care is a potent intervention. This begins with clear, compassionate communication about the plan of care, expected next steps, and potential risks. Educating patients and families on what to expect (e.g., "You will have an IV placed for fluids and antibiotics") and what to report (e.g., "Please tell us immediately if you feel short of breath or have any itching after this medication") turns them into additional sensors for detecting problems [29].

For medication safety, encouraging patients to maintain an up-to-date medication list or to bring their medications to the ED is highly effective. Furthermore, implementing a "teach-back" method, where staff ask patients or families to explain in their own words what they have been told about their diagnosis or discharge instructions, ensures comprehension and identifies misunderstandings that could lead to post-discharge adverse events [30]. Involving family in bedside rounds, when appropriate, can improve the accuracy of history-taking and ensure care plans are realistic. For patients with communication barriers (language, deafness, cognitive impairment), the proactive use of professional interpreters (not family members) and communication aids is a non-negotiable safety intervention to prevent diagnostic and treatment errors arising from miscommunication [31]. Finally, actively soliciting patient feedback through surveys or advisory councils provides direct insight into safety concerns from the recipient's perspective.

14. Interprofessional Collaboration and Simulation Training

The complex challenges of the ED cannot be solved by professional groups working in silos. Safety is maximized through deliberate, practiced interprofessional collaboration. Simulation-based training has emerged as a premier intervention for fostering this. High-fidelity simulations of critical events (e.g., cardiac arrest, septic shock, pediatric trauma) allow nurses, physicians, and HCAs to practice their technical skills while simultaneously honing non-technical skills like communication, leadership, role clarity, and mutual support in a risk-free environment [32]. Debriefing after the simulation is where the deepest learning occurs, as the team reflects on their performance and identifies specific behaviors to improve.

Beyond simulation, daily operational practices must reinforce collaboration. Interprofessional huddles at shift change or to manage surges in patient volume help align team goals. Co-leadership models, where a senior nurse and physician jointly manage department flow, can improve decision-making. Shared documentation spaces in the EHR, where both nursing assessments and medical plans are visible, promote a shared mental model. Interprofessional education, where students from different disciplines train together, can break down stereotypes and build respect from the earliest stages of professional development [33]. When each profession understands the roles, constraints, and expertise of the others, communication becomes more effective, backup behavior is more likely, and the team functions as a unified safety net for the patient.

15. Conclusion

Preventing patient safety incidents in the emergency department is a multifaceted, continuous endeavor that demands vigilance, intelligence, and cooperation from every member of the healthcare team. This review has delineated the specific, evidence-based interventions that nurses, emergency practitioners, and healthcare assistants can employ across the spectrum of emergency care. From the critical first filter of nursing-led triage and

the cognitive vigilance of diagnostic reasoning to the environmental stewardship of healthcare assistants and the life-saving clarity of structured communication, each role contributes uniquely to a layered defense against harm.

The evidence consistently points to several overarching principles: standardization of high-risk processes reduces variability and error; technology must be designed to support, not burden, frontline cognition; and measurement tied to continuous improvement is essential for progress. However, the most critical element remains the human and cultural dimension. A culture of psychological safety, where speaking up is encouraged and staff well-being is prioritized, is the fertile ground in which technical interventions take root and flourish. Ultimately, sustainable safety is not achieved through isolated acts but through the daily, disciplined application of these collective strategies by an interprofessional team united by a common purpose: to provide care that is not only effective and efficient but, above all, safe for every patient who passes through the demanding portals of the emergency department. The journey towards zero harm is ongoing, but by leveraging the full potential of its frontline staff through the interventions described, the ED can continually move closer to this vital goal.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
- **Acknowledgement:** The authors declare that they have nobody or no-company to acknowledge.
- **Author contributions:** The authors declare that they have equal right on this paper.
- **Funding information:** The authors declare that there is no funding to be acknowledged.
- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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