

Exploring nursing students' patient safety learning experiences during clinical practice: A qualitative study utilizing the SLERT tool

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ABSTRACT

Background: Patient safety is a global concern. Practice-based nursing education is pivotal in fostering safety knowledge, skills, and practice. The 'SLIPPS' Learning Event Recording Tool (SLERT), available in multiple European languages, was developed to aid healthcare students document, reflect on, and learn from, real patient-safety events. It is important to explore SLERT translation and use in diverse cultural and healthcare contexts, and in widely spoken languages such as Persian.

Objectives: To translate the SLERT into Persian and investigate Iranian nursing students' use of the tool to reflect on patient safety related events experienced during clinical practice.

Design: SLERT adaption followed by a 2-stage qualitative descriptive study.

Settings: Ardabil in northwest Iran.

Participants: Nursing students (n = 63) recruited through purposeful sampling.

Methods: Data were collected through accompanied completion of an electronic or paper version of the SLERT. Participants were prompted to express thoughts and reflections aloud in a storytelling manner (stage 1). Qualitative content analysis was used, during which follow-up interviews helped clarify ambiguities (stage 2).

Results: Twenty-three electronic and 40 paper SLERT reports were completed. Students reported 8 near-misses, 7 hazards, 10 adverse-events, and 38 good-practice episodes. A core theme "Enhanced Learning from Events" was developed comprising four main-categories: Consideration of event classification (severity/topic), Recognition of event outcomes (negative event outcomes and positive learning); Identification of possible causes and solutions (individual/organizational factors); Identification of factors influencing learning (impact of environment, educator & educational approaches).

Conclusion: Participants in this study found the SLERT a useful tool in promoting and supporting reflection on real patient safety events. An original finding regards how SLERT use had the inadvertent benefit of promoting learning about event classification. Students went beyond reflecting solely on the antecedents and outcomes of the event, to consider how events are classified and to analyze their own learning experiences and outcomes.

1. Introduction

Patient safety is a critical component of healthcare that ensures the well-being of patients by minimizing risks and harm during care delivery (World Health Organization, 2021). Despite significant advancements in

safety practices over the decades, patient safety remains a complex issue, with ongoing challenges in ensuring safe care delivery (Pereira et al., 2023).

As the future of healthcare, nursing students play a pivotal role in patient safety. Clinical placements provide invaluable learning

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opportunities and insights into the challenges of delivering safe care (Morey et al., 2021). However, there is insufficient evidence regarding the most effective ways to optimize placement learning, despite these experiences being the opportunity for students to apply theoretical knowledge in real-world settings and learn from the realities of clinical practice (Arora et al., 2021).

Variability in the clinical experiences of nursing students can significantly influence their ability to learn how to manage patient safety effectively. Differences in placement environments, the quality of supervision, and exposure to safety incidents contribute to inconsistent learning outcomes. Addressing these disparities is essential to ensure that all nursing students acquire the competence and confidence needed to cultivate a safety culture within healthcare (Morey et al., 2021; Fisher and Kiernan, 2019; Cresswell et al., 2013). Nursing students often face demanding and stressful clinical environments, which may be heightened in developing countries. This makes the clinical setting intimidating as they develop the range of skills needed to become competent nurses (Eweida et al., 2020; Pedregosa et al., 2020). Although students learn about patient safety both directly and indirectly during clinical placements, gaps remain in our understanding of what, how, and from whom they learn (Lee et al., 2022a; Fisher and Kiernan, 2019; Steven et al., 2023, 2014). Moreover, identifying the most effective ways of educating pre-registration students about patient safety remains critical to preparing them for real-world clinical practice (Zhou et al., 2024; Lee et al., 2022a,b).

Students need to develop patient safety knowledge, skills, and behaviors in order to become safe and effective practitioners once registered (Lee et al., 2022b). However, a recent analysis of trends in patient safety education research, reported that students lack an understanding of different types of patient safety errors or incidents (Zhou et al., 2024), highlighting the need for further research. A study from Iran also emphasized the necessity for strategies to prevent medical errors during nursing clinical placements and internships (Heydarikhayat et al., 2024). These strategies include offering retraining for challenging areas, evaluating student performance, integrating students into healthcare teams, and fostering a supportive environment. Furthermore, the authors suggest that incorporating lessons from clinical errors or experiences into placement education through analysis and reflection is essential (Heydarikhayat et al., 2024; Steven et al., 2020; Timpani et al., 2022).

Advancements in patient safety education require a collective effort from all stakeholders, including faculty, clinical instructors, and front-line staff, to strengthen the safety culture in both educational and clinical settings. Interprofessional and interdisciplinary learning is also crucial, as it exposes students to diverse perspectives and enhances their ability to respond effectively to various clinical challenges (Turrentine et al., 2020). This collaboration not only fosters an optimal learning environment but also supports the emotional well-being of learners (Steven et al., 2014, 2023; Javornická et al., 2024). Tools that facilitate learning based on students' real-time experiences with patient safety events are also critical. These tools, which can be used close to the event happening, have been suggested as enhancing adaptive practice, forward-thinking, and prompting deeper learning (Anderson et al., 2021). Developed as part of a European Union co-funded study, 'Shared Learning from Practice for Patient Safety' (SLIPPS), the SLIPPS Learning Event Recording Tool (SLERT), offers such possibilities (Steven et al., 2022, 2023; Bagnasco et al., 2022).

The SLERT is a structured tool for documenting and reflecting on patient safety events encountered during clinical placements. By facilitating reflection, the tool can enhance students' understanding of patient safety issues, ultimately improving learning outcomes (Steven et al., 2022, 2023; Javornická et al., 2024; Pointer et al., 2024). The SLERT is highly flexible, functioning as a learning aid for individual students, tutors, or groups, and can also serve as a data collection method for research (Steven et al., 2022). The SLERT encourages students to document and reflect on incidents, prompting self-directed

debriefing, facilitating interpretation and learning from events, and encouraging the interrogation of relevant theories, protocols, and guidelines (Steven et al., 2022, 2023; Javornická et al., 2024; Pointer et al., 2024). Its use may deepen students' understanding of safety protocols and sharpen their clinical judgment. It also fosters open discussions with instructors during meetings, cultivating a culture of accountability and enhancing communication skills. The SLERT has been translated into multiple languages and used in seven countries, demonstrating its global relevance and adaptability (Steven et al., 2022, 2023; Javornická et al., 2024; Pointer et al., 2024). However, to date it has not been used in Asian countries.

This study addresses gaps in the current literature regarding nursing education and patient safety by exploring Iranian students' experiences of using the SLERT during their clinical practice. The SLERT was selected over alternative strategies, such as retraining, preparatory courses, or performance evaluations, due to its distinctive capacity to integrate experiential learning with reflective practice - vital for cultivating a profound and enduring understanding of patient safety. Unlike traditional methods that often emphasize theoretical knowledge or one-off assessments, the SLERT offers a hands-on approach that engages students with real-world patient safety events. This methodology may enhance critical thinking and clinical reasoning while fostering a proactive mindset for identifying and addressing potential risks in healthcare environments.

Accordingly, the study aimed to first translate the SLERT into Persian and then use it to (1) investigate students' clinical encounters with patient safety events, including their learning processes, and (2) assess their experiences of using the SLERT as a learning tool.

1.1. Context

Nursing education systems vary significantly across countries with Iran offering multiple pathways into nursing including, diploma programs, an Associate Degree in Nursing (ADN), and Bachelor of Science in Nursing (BSN). The four-year, 8-semester, BSN program is the primary pathway into a career in nursing. The BSN blends theoretical knowledge with practical training and features a combination of coursework and clinical placements across various specialties. The Ministry of Health and Medical Education (MOHME) oversees the curriculum, ensuring it covers essential subjects such as anatomy, physiology, pharmacology, and nursing care. Graduates must pass a national licensing exam to become registered nurses (RNs).

2. Methods

2.1. Design and theoretical underpinnings

The study was conducted in two phases: an initial preparatory phase involving SLERT translation and evaluation of usability and acceptability, and a subsequent main study (see Fig. 1).

The main study employed a 2-stage qualitative descriptive design (Doyle et al., 2020; Sandelowski, 2010), which aims to understand phenomenon from the perspectives of those experiencing them and is particularly suited to investigating student experiences (Herlihy, 2022; Embrey and Taggart, 2022; Lee et al., 2022a,b). While this design is primarily qualitative, basic descriptive statistics are employed to numerically summarize demographic and classification data obtained through the SLERT.

Stage 1 involved students completing the SLERT, which provided them with the opportunity to reflect on the patient safety event they chose to narrate and on their use of—and reactions to—the SLERT tool. Stage 2 consisted of follow-up interviews, which allowed for a deeper exploration of participants' experiences with patient safety and facilitated further reflection on the SLERT tool and its impact on learning. This two-stage approach was preferred over direct interviews alone because it allowed for a more comprehensive understanding of

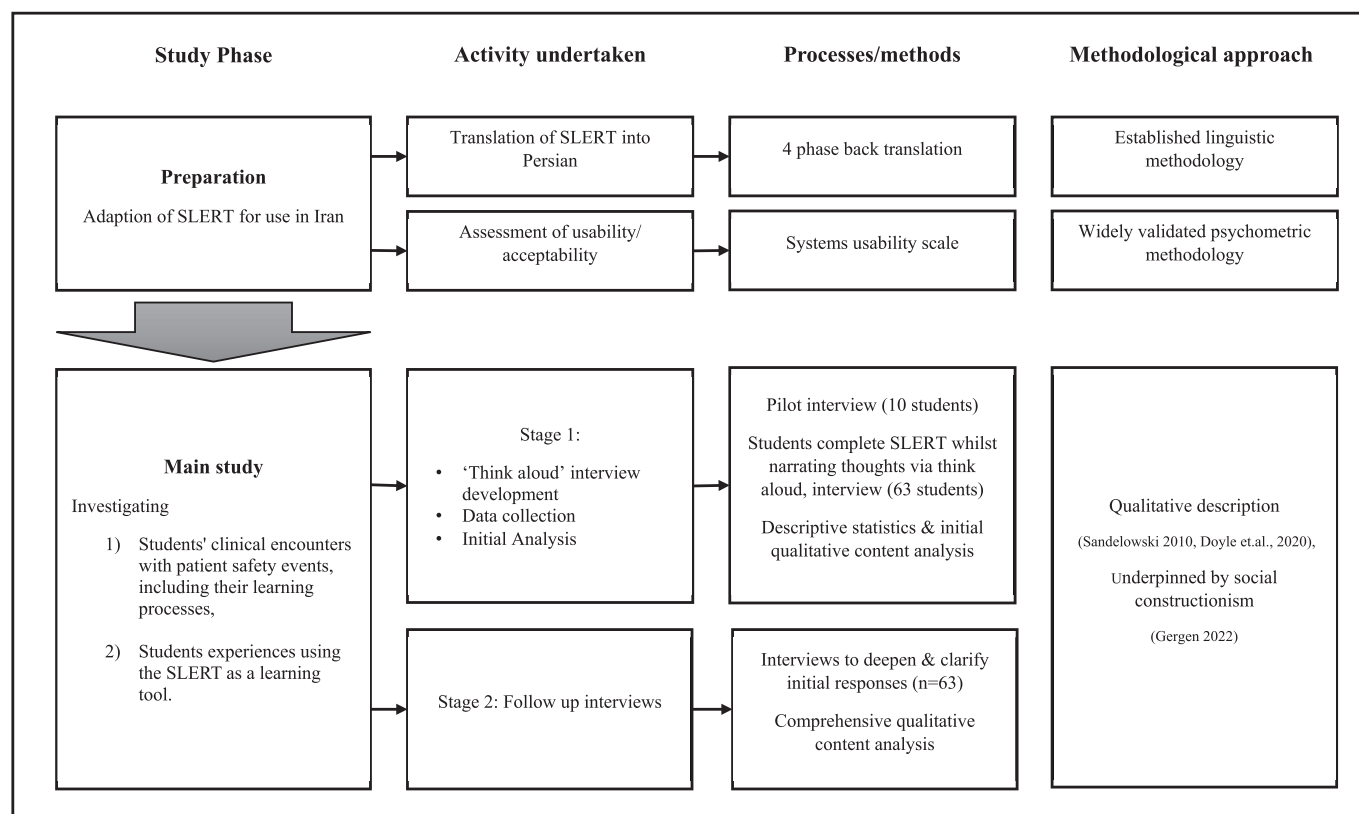


Fig. 1. Study design.

participants' experiences, providing both immediate reactions and reflections when completing the SLERT, as well as more considered reflections later during the interviews.

Although qualitative description is inherently interpretive, it strives to produce findings that remain 'data-near', avoiding overly high levels of theoretical complexity and abstraction (Sandelowski, 2010; Vaismoradi et al., 2013). In line with these underpinnings, we also drew on 'storytelling' (Timpani et al., 2022) to inform data collection. From a philosophical standpoint, this approach is grounded in a relativist ontology (reality is dynamic and context-dependent) and a constructionist epistemology (subjective realities are socially constructed) (Doyle et al., 2020). The study is therefore underpinned by social constructionism, which posits that knowledge and meaning are context-dependent, shaped by time, and constructed through social interactions (Gergen, 2022; Rees et al., 2020). This theoretical framework aligns with the study's objective of exploring nursing students' clinical experiences in the specific context of Iran.

2.2. The SLERT

The SLERT is a structured tool underpinned by established education theory (Steven et al., 2020) that enhances nursing and healthcare students' learning experiences by promoting critical analysis of negative or positive events of patient safety-related incidents experienced during clinical placement (Steven et al., 2022). As emphasized by Steven et al. (2022 page 2) 'The SLERT is primarily a tool for gathering student accounts and prompting reflections, not a questionnaire that measures or tests standardized constructs or psychometric properties.'

Part A of the tool requires students to describe the event, detailing the individuals involved, the circumstances, influencing factors, and outcomes. Part B encourages students to reflect on their feelings, what they have learned, and factors that may have contributed to the event. In part C, students provide demographic information (age, year of

education, and profession/nursing specialty), indicate the department/unit type, if they are aware of event reporting, and classify the events as near miss (an event that could have resulted in harm but did not, either by chance or timely intervention), hazard (a situation that poses a level of threat to life, health, property, or the environment), good practice (actions that contribute positively to patient safety and quality of care), or adverse events (an incident that results in unintended harm to a patient due to medical care) according to the World Health Organization (World Health Organization [WHO], 2023). Guided by these definitions and through reflecting on the circumstances and outcomes of the event students determine what they feel is the most appropriate classification.

2.3. Participants

The participants were nursing students, therefore before initiating the recruitment process, information regarding the SLERT tool was disseminated to relevant student groups to invite volunteers. Participants were selected through purposive sampling based on specific inclusion criteria: they must have completed at least three program semesters, be currently enrolled, and participate voluntarily. To gather diverse perspectives, we included participants from various personal (age, gender) and professional (academic year, clinical placement) backgrounds. Before data collection, we held face-to-face meetings, calls, or online consultations to clarify the study aims, stress identities would be confidential and quotes anonymized, address questions, and confirm understanding. Seventy participants were initially selected; however, seven withdrew, leaving a total sample of 63.

Importantly, we acknowledge that there may be a perceived hierarchical relationship due to the researchers' roles as educators or facilitators. However, no prior relationship existed between the interviewers and any of the participants, and we took deliberate steps to minimize this dynamic. We highlighted the voluntary nature of participation, to ensure that participants understood their involvement was optional.

This approach was aimed at creating an environment of openness, encouraging students to share their experiences without feelings of being singled out, or concern over potential repercussions or judgments from the researchers.

2.4. Preparation phase

2.4.1. Translation process

Translation of the SLERT into Persian for nursing students in Iran followed an established structured approach (Sousa and Rojjanasrirat, 2011). Initially, two native Persian translators, proficient in English, independently translated the SLERT from English to Persian. A language expert who had not seen the original English version then combined two Persian translations into 'Draft A.' Next, a third translator, unaware of the initial English text, back-translated 'Draft A' into English. Finally, the SLIPPs international core group compared the back-translated English version with the original SLERT and finalized the Persian version, SLERT-Per, ensuring its conceptual equivalence and cultural relevance for the Iranian nursing student population.

2.4.2. Assessing usability

The usability of the SLERT was assessed among 63 nursing students via the System Usability Scale (SUS) (Lewis, 2018). The SUS, administered on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree), included five positive (odd-numbered) and five negative (even-numbered) items (Mohammadzadeh et al., 2024; Rahmatizadeh et al., 2024). The total SUS score was calculated by adjusting the scores: subtracting one from all odd-numbered items and five from all even-numbered items, then multiplying the sum by 2.5 to yield a score between 0 (very poor usability) and 100 (excellent usability). The Persian SUS version was developed through forward translation by an ergonomics expert and a back-translation by two translators with experience in English-speaking countries (Dianat et al., 2014). The overall SUS score was 71.39, reflecting good to excellent acceptability and usability.

2.5. Main study phase

2.5.1. Data collection

Data collection took place between April and May 2024. In Stage 1, a pilot interview was conducted with 10 students not involved in the study. No suggestions were made to modify the interview questions, ensuring the acceptability and credibility of the interview questions. All participants (63) were then provided with paper and electronic versions of the SLERT, along with detailed instructions in Persian through the Porsline platform (<https://survey.porsline.ir/s/FOimvnpw>). Interview sessions were then arranged online or face-to-face, as preferred by participants. During the interview, the researcher (AM, MS) asked the participants to complete the SLERT and express their thoughts and reflections aloud in a narrative, storytelling manner while doing so. Participants were encouraged to seek clarification when required. This stage enabled rich data collection, capturing initial responses to the SLERT and more thoughtful, reflective accounts regarding the patient safety event. In the study context, it is essential to note that Iranian students complete 8 semesters of academic coursework, which may influence their experiences and reflections. After completing the SLERT tool in Persian, these were analyzed systematically, and the findings were subsequently translated into English for manuscript preparation.

Stage 2 involved conducting interviews to deepen and clarify initial responses. A total of 63 short, follow-up interviews were carried out (40 in person and 23 by telephone), depending on participants' preferences for SLERT completion. These interviews were audio-recorded, transcribed, and used to explore specific ambiguities or gather more detailed information. During these sessions, prompts such as "Can you provide an example?", "Could you elaborate on that?" and "Is there anything else you would like to add?" were employed to facilitate richer responses. All interviews were conducted in private, distraction-free environments to

ensure participants felt comfortable and could focus. The combination of participants' written SLERT responses and both interview transcripts created a comprehensive narrative for each participant.

2.5.2. Data analysis

Following data collection in stage 1, the demographic and classification elements of the completed SLERTs were analyzed using simple descriptive statistics. The resulting numerical representations are not grounded in positivist assumptions; rather, they serve as a complementary means of description (Gergen, 2022).

To facilitate an in-depth examination of students' narratives and perspectives (text from completed SLERTs and interview transcripts) a well-established qualitative content analysis approach was employed which supported systematic data coding and categorization (Lindgren et al., 2020; Vaismoradi et al., 2013; Graneheim and Lundman, 2004). An initial content analysis of the stage 1 interview transcripts was undertaken after stage 1, with a comprehensive analysis of all narrative data taking place after stage 2 data collection.

The analysis was structured in six steps:

1. Transcription: All interviews (up to 45 min in length) were meticulously listened to and transcribed to ensure accuracy.
2. Familiarization: The main researchers (XX. and XXX.) reviewed all transcripts multiple times to gain a comprehensive understanding of the content.
3. Coding: Semantic units were identified and coded. XXX generated initial codes from both explicit and implicit data, ensuring that the nuances of the participants' experiences were captured.
4. Discussion and Comparison: The researchers engaged in discussions to compare codes for differences and similarities, leading to the grouping of similar codes into subcategories.
5. Feedback: The wider research team provided feedback on the extracted codes, enhancing the consistency and reliability of the coding process.
6. Consolidation: Finally, subcategories were compared and consolidated to form main categories, with the overarching theme developed through consultation and discussion within the research team (see Table 2 and the Supplementary table).

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We recognize the importance of iterative analysis and an adequate sample (number and variation) for data saturation (Dyar, 2022; Polit and Beck, 2018; Graneheim and Lundman, 2004). The staged and iterative nature of the data collection and analysis processes confirmed that the sample was sufficient to achieve meaningful insights. Saturation was indicated by the absence of new codes and redundancy in categories (Dyar, 2022; Polit and Beck, 2018) ensuring a thorough understanding of participants' experiences. Analysis was conducted manually using Word and Excel software. An example illustrating the process of forming a main theme along with its corresponding categories is available in the Supplementary table.

2.6. Rigor and trustworthiness

Rigor and trustworthiness were addressed using established criteria (Dyar, 2022).

- (a) Credibility: The researcher engaged extensively with participants and the data to deepen understanding. Findings were shared with participants for validation and feedback, fostering a dialogue to clarify interpretations of their experiences. Participants were invited to review interview transcriptions as part of the member check process, ensuring accuracy and confirming that the

researchers' interpretations aligned with their perspectives. Feedback was incorporated into subsequent analysis stages to improve credibility.

- (b) **Dependability:** Adequate time was allocated for thorough data collection, maintaining continuous interaction with the data throughout the research process. The research team conducted rigorous reviews of all phases to ensure consistency.
- (c) **Confirmability:** Extracted codes were collaboratively reviewed by the team to enhance reliability. Any disagreements on themes were resolved through discussion to reach a consensus.
- (d) **Transferability:** Participants were selected for diversity to enhance the applicability of findings in similar communities. A detailed description of the research process, participant characteristics, and context is provided.
- (e) **Authenticity:** The research process and data management were audited by peers to enhance credibility. Comprehensive records of all study phases were maintained for transparency and authenticity in the research findings.

Additionally, as our study is grounded in constructionism, we incorporated reflexivity to critically reflect on how the researchers' backgrounds and perspectives influenced data collection, analysis, and interpretation.

Furthermore, our findings are presented in line with the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (Tong et al., 2007), to enhance the rigor and transparency of our study.

2.7. Reflexivity

Given our epistemological stance of constructionism, which acknowledges that knowledge is socially constructed and context-dependent, reflexivity was integral to our research process. The research team comprised both men and women. The two leading researchers (AM and MS) brought unique perspectives to this study. AM, with extensive experience in nursing education, provided insights into clinical challenges faced by students, while MS and AS, with expertise in qualitative methodologies, patient safety, and international research ensured a systematic approach to data collection and analysis.

Throughout the study, the two main researchers (AM and MS) kept reflexive journals to document their thoughts, decisions, and potential biases during data collection and analysis. This practice helped us remain mindful of how our positionality might influence interpretations. To ensure transparency all decisions made during data analysis were documented to create an audit trail. To minimize researcher influence during data collection, a participant-centered approach was employed, encouraging participants to share their experiences without interruption or leading questions. Four participants were engaged in member checking to validate our interpretations. During this process, we specifically inquired whether the participants identified any deviations or discrepancies regarding our findings. They shared varying perspectives on specific aspects of the data, underscoring the complexity of their experiences but did not highlight any omissions or discrepancies in our interpretations. Moreover, we facilitated collaborative analysis through regular discussions among AM, MS, and the broader research team (AS, RNV, MAK) to evaluate our coding decisions and interpretations critically. This collaborative approach minimized individual influences, incorporated diverse perspectives into the data analysis, and strengthened the credibility of our findings. By engaging in reflexivity throughout the research process, we aimed to ensure that our findings authentically represent participants' experiences while acknowledging our roles as co-constructors of knowledge.

2.8. Ethical considerations

This research was approved by the ethics committee of Ardabil University of Medical Sciences(ethics code IR.ARUMS.REC.1401.190).

All necessary permissions were obtained to access the research environment, introduce the study to potential participants, and explain its purpose. Participants were informed they could withdraw anytime without affecting their future employment or education. Informed written and oral consent was secured, and confidentiality was assured through data anonymization. Interviews were recorded with permission and scheduled according to participants' preferences. Audio files were transcribed verbatim and stored securely on a password-protected computer. All recordings were deleted after the research concluded, and participants were reassured.

3. Findings

3.1. Demographic characteristics

The sample consisted of 63 undergraduate nursing students, 23 males and 40 females. The majority of participants (79.4 %) were aged 21 to 25 years (Table 1). Participants reported various types of events, classified as follows: 8 near misses, 7 hazards, 38 instances of good practice, and 10 adverse events.

3.2. Main theme: enhanced learning from events

From the data analysis, a main overarching theme was developed: "Enhanced learning from events," consisting of four main categories: consideration of Event Classification, recognition of Event Outcomes, identification of Possible Causes and Solutions, and Teaching and learning approaches in clinical placement (see Table 2 and the Supplementary table).

3.2.1. Category: consideration of event classification

The SLERT was developed to help students describe and reflect on patient safety-related experiences. Although it was not explicitly designed to teach event categories, students in this study reported that using the tool prompted them to explore the nature of events more deeply and consider how to classify and categorize them effectively. Students generally categorized learning events into two main types: Severity of the Learning Event and Topic of the Learning Event.

Subcategory: Severity of learning event

The SLERT provides definitions for patient safety event classifications established by the World Health Organization (WHO), including

Table 1
Demographic characteristics of the participants (N = 63).

Variables	n	%
Age		
16–20	7	11.11
21–25	50	79.36
26–30	6	9.52
Gender		
Male	23	36.50
Female	40	63.50
Marital status		
Single	34	54.00
Married	29	46.00
Department of clinical placement		
Emergency	20	31.74
Surgery	25	39.68
Internal Units	9	14.28
Cardiac Units	4	6.34
Infection disease Units	5	7.93
Type of event		
Near miss	8	12.69
Hazard	7	11.11
Good practice	38	60.31
Adverse event	10	15.87

Table 2
The main theme, categories, and subcategories.

Main theme	Categories	Subcategories
Enhanced learning from events	Consideration of event classification Recognition of event outcomes Identification of possible causes & solutions Identification of factors influencing learning	<ul style="list-style-type: none">• Severity of learning event• The topic of the learning event• Negative event outcomes• Positive learning outcomes• Organizational factors• Individual factors• Solution suggestions• Impact of environment & educator• Teaching and learning approaches in clinical placement

categories like near miss, hazard, and adverse event. It also integrates the SLIPPs definition of ‘good practice’ (Steven et al., 2022). This tool prompts students to reflect on these classifications while analyzing their experiences, encouraging them to consider the nature of events more thoroughly and think critically about how to effectively categorize and classify them.

For example, one participant noted:

“During my clinical placement, I encountered a hazard that could have turned into an adverse event. Using the SLERT tool, I realized this was a hazard, not an adverse event.”

(P 23)

Another participant reflected on their understanding of error types:

“I remember they gave us a patient safety workshop, but at that time, I did not understand the difference between the types of errors. Now that I am reading this questionnaire (SLERT), I am thinking about it—I witnessed and even experienced all types of errors during my clinical placements”

(P12)

These reflections highlight how students began to recognize the breadth of errors and events they encountered in clinical settings.

Subcategory: Topic of the Learning Event

In addition to severity, students categorized incidents based on clinical topics such as medication errors, procedural errors, and equipment misuse. Notable incidents include medication errors, procedural mistakes, and failures in training and supervision. For instance, one student recounted,

“After reading this questionnaire (SLERT) and considering your questions, I recall witnessing a wrong prescription of a drug to a patient. I classify this event as a ‘medication error’

(P60)

Another highlighted the consequences of miscommunication, stating,

“A miscommunication between the nurse and physician led to a delay in treatment for a critical patient.”

(P10)

These reflections underscore the critical need for vigilance and adherence to protocols in clinical placement.

3.2.2. Category: recognition of event outcomes

The data revealed that students reflected significantly on the events they encountered, facilitated by the SLERT. This reflective process allowed them to identify various negative consequences associated with these events while simultaneously fostering valuable learning outcomes. Through this deliberation, students gained insights into the principles of patient safety, recognizing both the immediate negative impacts of

safety-threatening events and the positive learning opportunities that arose from these experiences.

Subcategory: Negative event outcomes

Students identified various negative outcomes from safety-threatening events, including immediate effects on patients, impacts on relationships, and broader consequences for caregivers and care provision. Immediate patient outcomes were often linked to the need for enhanced care, emphasizing timely responses to clinical situations and proper equipment checks:

“A delay in responding to a patient’s emergency led to increased anxiety and stress for both the patient and the staff. This experience emphasized the importance of timely and effective communication in emergencies, as it can significantly impact patient outcomes and staff confidence.”

(P30)

Participants also reflected on incidents involving medication errors and medical equipment issues:

“A nurse administered the wrong medicine to a patient. Fortunately, nothing serious happened... As a result of this incident, the patient ... requested that someone else take care of him, expressing a lack of trust in her.”

(P28)

“Equipment malfunction during a procedure caused unnecessary stress and discomfort for the patient. This incident underscored the importance of regularly checking and maintaining medical equipment to prevent such errors, which can erode patient trust and confidence.”

(P40)

These insights highlight the significant repercussions of safety-threatening events on patient trust and care dynamics, emphasizing the crucial role of effective communication and equipment management in fostering positive patient outcomes.

Subcategory: Positive learning outcomes

Completing the SLERT facilitated several positive learning outcomes for students, enhancing their understanding of medication principles and patient-centered care. Students reported a heightened appreciation for the importance of pharmacology, emphasizing that a solid foundation in this area is crucial for safe medication administration. They recognized the necessity of accurate drug calculations to prevent errors, with one student noting,

“Through the SLERT, I understood the significance of adhering to correct medication principles, such as accurate drug calculations. This knowledge has helped me to be more vigilant and precise in my practice.”

(P20).

Furthermore, students gained insights into the critical importance of adhering to aseptic techniques and medication administration protocols, which are essential for ensuring patient safety and preventing adverse events. Additionally, they understood that effective communication plays a vital role in patient-centered care, with one student stating,

“Effective communication is essential for patient-centered care” (P45). *This approach highlighted the significance of respecting patients’ rights and dignity, as another participant reflected, “Attending to patient rights and dignity is crucial. I realized that respecting patients’ autonomy and privacy can significantly impact their trust in healthcare providers.”*

(P 40)

Overall, these reflections demonstrate how students developed a strong sense of responsibility toward patients while fostering healthier relational dynamics between healthcare providers and patients.

3.2.3. Category: identification of possible causes and solutions

In reflecting on their experiences with event outcomes, students engaged in significant reflection facilitated by the SLERT. This process allowed them to identify several factors that influenced their sense of responsibility to patients, which can be categorized into Organizational Factors, Individual Factors, and Solution Suggestions.

Subcategory: Organizational factors

Students recognized various organizational issues contributing to safety events, such as understaffing and overcrowded wards. For instance, one student noted,

"I asked why he was doing such questionable work, and he said that the department is bustling; his shifts are tight, and he has to work with 15 patients. This is a significant problem that jeopardizes patient safety"
(P23)

Additionally, a lack of necessary equipment was highlighted as a factor that could heighten risks:

"Unfortunately, we lacked the necessary equipment for infection control. I believe this lack of preparation could increase risks and complications in the treatment process" (P2)

Subcategory: Individual factors

On an individual level, students identified behaviors that negatively impacted patient care, including unprofessional conduct and inadequate training. One student reflected,

"I witnessed unprofessional behavior from some treatment team members... I realized the need to pay more attention to professional ethics"
(P35)

They also noted failures in providing patient education and not reporting errors or near misses:

"I saw a nurse who failed to record an error, which could have led to its repetition. This experience taught me the importance of documenting errors to prevent their recurrence"
(P63)

Subcategory: Solution suggestions

In response to these challenges, students proposed several solutions to enhance patient safety. They emphasized the need for improved staffing levels, better training programs, and regular supervision. One student stated,

"I once saw a nurse commit a medical error due to inadequate practical training. This experience taught me the importance of both theoretical and practical education to prevent mistakes."
(P62)

Through this reflective process, students not only classified events but also contemplated potential organizational and individual factors influencing these events. Their insights underscored the importance of addressing systemic issues while fostering personal accountability to enhance overall patient safety.

3.2.4. Category: identification of factors influencing learning

In reflecting on their experiences with patient safety events, students identified several factors influencing their learning processes. These factors were categorized into two main subcategories: Impact of Environment & Educator and Learning Approaches and Techniques.

Subcategory: Impact of environment and educator

Emotional safety is crucial in the learning environment, significantly affecting students' ability to engage and learn. Students noted that their comfort in learning was influenced by the ward culture and the clinical educator's approach.

One student shared,

"My friend and I administered a patient with a higher insulin dose. We were afraid of the potential negative consequences, which led to us not reporting the event. I believe that this missed reporting opportunity hindered our learning experience."
(P31)

This quote highlights how fear of repercussions can prevent students from reporting mistakes, ultimately limiting their learning. Another student reflected on a similar experience:

"I once dressed a patient who had an appendectomy in a non-sterile way in the operating room. Unfortunately, I did not report this error because I thought the patient was not harmed. But now I see how important this issue is and that all errors should be reported to avoid them. Let's learn."
(P53)

This underscores the importance of fostering an environment where students feel safe to report errors. Conversely, positive educator behaviors can enhance learning:

"In my third-year clinical placement, the emergency coach calmly and patiently answered my questions, creating a safe and trusting environment that helped me solve problems and learn from the group's experiences."
(P14)

This illustrates how a supportive educator can facilitate a better learning experience. Emphasizing the value of a collaborative learning environment a student noted,

"The clinical instructor fostered an environment in small group discussions that encouraged us to think critically and learn from our experiences. This collaborative and facilitative approach significantly enhanced our learning."
(P43)

Subcategory: Teaching and learning approaches in Clinical placement

Students reported significant learning gains related to clinical placement and the educational benefits derived from engaging in diverse learning activities, particularly through patient safety-focused self-reflection prompted by the SLERT. A common theme emerged, highlighting the students' recognition of the necessity to enhance their communication skills with patients. As one student noted,

"Reflecting on these experiences, I realize the importance of improving my communication skills with patients and gaining their trust"
(P24)

Additionally, an emphasis on patient safety cultivated an awareness of risk identification and mitigation:

"Focusing on patient safety taught me to identify and mitigate risks"
(P31)

The application of theoretical knowledge in practical settings was also underscored. Students shared that,

"Applying theoretical knowledge in practice helped me bridge the gap between classroom learning and real-world experience. It made my learning more effective and engaging"
(P29)

This connection between theory and practice contributed to a more profound learning experience. Observing and learning from the mistakes of others played a crucial role in developing their understanding of consequences and crafting prevention strategies. One student remarked,

"I learned a lot from observing and discussing the mistakes of others. It helped me to understand the importance of critical thinking and problem-solving in clinical placement"

(P32)

Another emphasized the value of discussions about mistakes within their team,

"One of the coaches always had a habit of discussing with us when there was a mistake in the department. He emphasized improving the process and learning from the mistakes of others. He said that witnessing the mistakes of others is like history, which should be learned from... Now I feel that those sessions were very effective in my learning"

(P20)

This self-confidence demonstrated by students appears not only as an individual characteristic but also as a professional prerequisite that may impact the development and maintenance of trust within patient-professional relationships. The significance of patient trust emerged as a recurring theme throughout the students' reflections on their experiences.

4. Discussion

In this study, the 'SLERT' was made available to nursing students in Iran for the first time. Although the SLERT has been translated into several languages and used across various countries (Javornická et al., 2024; Steven et al., 2023), this is the first time it has been utilized in an Asian country. The Persian version of the SLERT shows good to excellent, acceptability and usability. Through the novel methodology employed, data collection went beyond simply gathering completed SLERT reports, enabling in-depth narratives to be compiled, offering valuable insights into student's experiences, emotions and reflections, facilitating a greater understanding of the reflective learning processes experienced. Using the SLERT to analyze and reflect on the events experienced, students identified core patient safety and patient care issues, considered solutions and additionally recognized key aspects related to their own learning.

An original finding regards how SLERT use had the inadvertent benefit of promoting learning about patient safety event classification. Although the SLERT was not designed to educate about event classification (Steven et al., 2022) it emerged as effective in motivating students to analyze and classify patient safety incidents based on clinical topics and severity levels. A recent small study by Gradisnik et al. (2024) which explored students (n = 15) handling of patient safety incidents during clinical placement also used guided self-reflection, but in the form of diaries. However, unlike the SLERT (Steven et al., 2022) it is unclear what evidence, or theoretical basis underpinned the diaries or if they underwent any pre-testing. Furthermore, no definitions of patient safety incidents were given to students, thus greatly reducing the students' opportunities to learn about classification. It is proposed that quality education and improved awareness of medical errors facilitates classification and reduction, improving safety (Rodziewicz et al., 2024; Sameera et al., 2021). Thus, tools such as the SLERT which prompt learning about event classification may have implications for future event reporting when students enter the nursing workforce (Halperin and Bronshtein, 2019).

Participants also observed that the SLERT enhanced their ability to document and analyze learning events, improving critical thinking and reflecting on positive and negative outcomes. This process heightened their recognition and awareness of ensuring accuracy in medication administration, correctly following procedures and protocols, and the

importance of respecting patients' dignity and rights. Moreover, they were inspired to aim to improve such patient safety related practices once qualified. Promoting patient rights and safety protocols fosters an ethical approach, while enhancing communication skills builds trust between patients and healthcare providers, ultimately improving patient outcomes (Kwame and Petrucka, 2021; Mistri et al., 2023). Throughout the data students emphasized the importance of developing and maintaining patient trust, illustrating a developing sensitivity toward the importance of relationships and patient-centered care, and an expanding conceptualization of patient safety encompassing physical and psychological elements.

It is also important that students recognize the complexity behind patient safety event manifestation and study participants identified both individual and organizational issues involved. Individual factors included unprofessional behaviors and attitudes, and failures to perform procedures correctly, provide patient education, or report errors. However, healthcare professionals and students may hesitate to speak up because of power differentials, fear of stigmatization or punishment (Martinez et al., 2017). Not reporting errors raises the risk of patient harm (Rodziewicz et al., 2024), and unprofessional behaviors impact of patient-professional relationships therefore it is essential to encourage reporting (Aljabari and Kadhim, 2021; Sameera et al., 2021).

Organizational issues, such as inadequate training, overcrowding, and lack of resources, were also identified by participants. These findings align with and expand findings from other studies (Gradisnik et al., 2024). Understanding individual and organizational deficiencies and risk factors helps identify learning that can feed forward to underpin continuous improvement (Hooker et al., 2019; Singh et al., 2024). Prioritizing quality enhancement and preventing recurrence of errors, can produce significant benefit for patients (Robertson and Long, 2018; Rodziewicz et al., 2024). However, utilizing event recording and analysis tools may not be sufficient and additional structural and cultural changes in educational and therapeutic settings may be necessary to achieve sustainable patient safety improvements (Bhati et al., 2023; Mistri et al., 2023).

Alongside reflections on patient care and care provision, students identified processes and situations of value in assisting their learning. In line with previous research, students in this study felt they could identify successful strategies, learn from mistakes and develop insight into their own strengths and weaknesses by reflecting on their experiences (Steven et al., 2023; Artioli et al., 2021; Levett-Jones et al., 2020). The SLERT requires students to write and narrate the story of their experience, and it is through this activity that they 'attain' a state of reflection, and 'unlock thoughts and knowledge otherwise inaccessible' (Charon and Hermann, 2012 p3). Indeed, such structured reflective practices have long been viewed as crucial for nurturing critical thinking skills and self-awareness (Jaastad et al., 2022; Steven et al., 2020).

The impact of the environment and educators on their learning was also significant, with students describing how a calm and encouraging educator, showing attention to students' needs, could create an emotionally safe learning environment. Such 'emotional safety for learning' (Steven et al., 2023, 2014), facilitated students' ability to learn through questioning and small group discussions, and enabled them to freely discuss issues and to learn from each other's experiences. By providing constructive feedback and creating space for exchange of experiences, instructors significantly contribute to student learning and development of professional competencies and values (Williams, 2024; Cawu and van Rooyen, 2022). Therefore, although a clinical environment may restrict potential experiences, the role of the educator (mentor or supervisor) is crucial in developing a student's emotional safety and in optimizing learning potential (Javornická et al., 2024; Morey et al., 2021). Although the SLERT has predominantly been used with individuals it could also inform group activity, encouraging students to share and discuss their clinical learning experiences. Such individual and group SLERT use may enhance practical application of learning and engender a greater sense of responsibility for patient safety (Stevanin

et al., 2018).

These findings align with prior research underscoring the importance of reflective tools in nursing education (Artioli et al., 2021; Jaastad et al., 2022; Steven et al., 2020) but also extend understanding by revealing how the SLERT uniquely cultivates students' incident classification skills—an outcome not extensively documented previously. Future research should explore how such tools influence long-term practices in patient safety reporting and healthcare culture, particularly within diverse international settings. The study's implications suggest that integrating SLERT into nursing curricula can promote collaborative learning environments and potentially enhance future incident reporting and patient safety outcomes.

4.1. Limitations

A limitation of this research is its cultural context, having been conducted in Iran. Although this may be seen as impacting transferability, it can be argued that the experiences and reflections described by the students have sufficient resonance with those reported in previous studies (Espin et al., 2019) to allow readers to see commonalities. Moreover, involvement in the wider research team of a member with international experience (AS) enabled diverse perspectives to be brought to bear on the data and analysis. The use of the SLERT tool is still relatively new, and its long-term effectiveness in shaping nursing students' patient safety learning experiences needs further investigation. However, the strength of this study lies in the in-depth exploration of nursing students' perspectives on patient safety learning using a novel storytelling qualitative approach. In addition, the accurate translation and validation process of the SLERT instrument ensured its cultural appropriateness for the Iranian nursing student population, adding to the rigor and quality of the study.

5. Conclusion

Findings from this study add to an emerging body of research (Steven et al., 2022, 2023; Javornická et al., 2024; Bagnasco et al., 2022) indicating that the SLIPPS Learning Event Recording Tool (SLERT) can act as a valuable adjunct to traditional methods of clinical education in diverse countries and settings.

By encouraging self-directed debriefing and reflection, the SLERT empowers students to take ownership of their learning, effectively bridging the gap between theory and practice. Moreover, its adaptability across various educational and cultural contexts, demonstrated by its translation and implementation in multiple countries, highlights its versatility and efficacy in diverse healthcare settings. This positions the SLERT as a comprehensive resource for cultivating patient safety competencies, enhancing clinical practices, and leading to better patient outcomes.

An original finding, which adds a new and unexpected insight, is that, in addition to promoting reflection on the outcomes of these incidents, the SLERT inadvertently deepens students' understanding of event classification. These findings indicate that SLERT not only meets immediate educational objectives but also has the potential to cultivate a broader safety culture through greater confidence in future reporting, increased transparency, and incident analysis.

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CRediT authorship contribution statement

Alireza Mirzaei: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Mehraban Shahmari:** Writing – review & editing, Methodology, Formal analysis, Data curation. **Reza Nemati-Vakilabad:** Writing – original draft, Data curation, Conceptualization. **Mehdi Ajri-Khameslou:** Writing – review & editing, Writing – original draft, Formal

analysis, Data curation. **Alison Steven:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used Grammarly in order to check English spelling, syntax and punctuation. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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