Review

Nurses' experiences in voluntary error reporting: An integrative literature review

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ABSTRACT

Objective: This integrative review aimed to examine and understand nurses' experiences of voluntary error reporting (VER) and elucidate factors underlying their decision to engage in VER.
Method: This is an integrative review based on Whittemore & Knafl five-stage framework. A systematic search guided by the PRISMA 2020 approach was performed on four electronic databases: CINAHL, Medline (PubMed), Scopus, and Embase. Peer-reviewed articles published in the English language from January 2010 to December 2020 were retrieved and screened for relevancy.
Results: Totally 31 papers were included in this review following the quality appraisal. A constant comparative approach was used to synthesize findings of eligible studies to report nurses' experiences of VER represented by three major themes: nurses' beliefs, behavior, and sentiments towards VER; nurses' perceived enabling factors of VER and nurses' perceived inhibiting factors of VER. Findings of this review revealed that nurses' experiences of VER were less than ideal. Firstly, these negative experiences were accounted for by the interplays of factors that influenced their attitudes, perceptions, emotions, and practices. Additionally, their negative experiences were underpinned by a spectrum of system, administrative and organizational factors that focuses on attributing the error to human failure characterized by an unsupportive, blaming, and punitive approach to error management.
Conclusion: Findings of this review add to the body of knowledge to inform on the areas of focus to guide nursing management perspectives to strengthen institutional efforts to improve nurses' recognition, reception, and contribution towards VER. It is recommended that nursing leaders prioritize and invest in strategies to enhance existing institutional error management approaches to establish a just and open patient safety culture that would promote positivity in nurses' overall experiences towards VER.

What is known?

- Error reporting facilitates analysis of factors responsible for the causation of nursing error and delineates one essential step to drive robust patient safety culture and improve nursing care quality.
- Despite a plethora of safety literature had emphasized the significance of error reporting, evidence had further suggested that nurses often underreport error.

What is new?

- This review provides insights on the spectrum and interplay of issues surrounding nurses' attitudes, perceptions, practices, and emotions and their perceived enabling and inhibiting factors of error reporting that would contribute to a holistic understanding of nurses' overall experiences towards voluntary error reporting (VER).
- The findings of this review delineate the need to drive organizational reforms to achieve a more optimized patient safety culture and better institutional error management outcomes. This calls for the collaborative efforts of nursing leaders at various levels to prioritize and invest in strategies to refine existing institutional policies, practices, processes, and communication approaches to boost nurses' commitment towards VER and improve the overall error reporting systems.

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1. Introduction

Medical errors denote a severe public health implication. The WHO defines a medical error as an event caused by deviations from the standard care that would result in a patient experiencing harm or risk of injury [1]. To set the context of this paper, the term 'medical error' from the nursing perspective comprises a broad spectrum of adverse clinical incidents associated with the delivery of care by nurses that fall below reasonable standards. They include but are not limited to the following: erroneous administration of medications, falls, and infections [2]. Medical errors can be harmful and may lead to profound health implications for patients, such as permanent incapacitation and death [3]. Such deleterious consequences may subject errant healthcare professionals to medico-legal disputes and litigation and their institutions to liabilities for compensations owing to medical negligence [4]. Costs incurred by medical errors contribute to a significant drain on healthcare resources and compound the financial burden on the affected healthcare institutions and governments. This is evident in the cost of up to GBP 2 billion incurred by the National Health Services in the United Kingdom in addressing such complications [5]. Likewise, the United States has also reported incurring an estimated US$ 50 billion to reduce the occurrence of medical errors [6,7]. Nonetheless, studies had shown that 48%—70% of errors could be averted [8,9], for which a feasible solution is a dynamic error reporting by health practitioners [10].

Error reporting is critical, given its central role in investigating and analyzing root causes of errors, the insights from which are envisioned to mitigate recurrences due to awareness and the resultant changes that took place [11]. From the organization's perspective, error reporting permits the diagnoses and identification of any underlying vulnerabilities embedded in the healthcare systems to systematically develop strategies to address any active and latent failures [12]. From the individual nurse's perspective, error reporting facilitates valuable learning through retrospective investigations and reflections from past mistakes to improve their prospective clinical practices [13]. Contemporary safety literature has copiously examined the aspect of preventable adverse medical incidents; given the resultant heightened awareness among healthcare professionals and patients, the need to improve the delivery of nursing care and patient safety is imperative. Establishing a robust error reporting system is fundamental to continuous quality improvement that supports a culture of safety in healthcare.

Nurses comprise the largest workforce in any healthcare organization. While highly involved in medical errors (due to actions of self or others), nurses are also pivotal to reporting and managing such errors as prominent stakeholders. Studies have argued that any practicing nurses, regardless of their level of knowledge and precision, are bound to have committed medical mistakes at one point or another in their nursing career [14,15]. Consistent voluntary error reporting (VER) by healthcare professionals is integral to a robust institutional error-management system [16]. Many studies have revealed that 50%—96% of medical errors were underreported by nurses [12,17,18]. Given the importance of error reporting to promote a robust culture of safety, the lack of commitment among nurses would result in their losses of valuable learning opportunities to improve their nursing care.

The term voluntary error reporting (VER) indicates an individual nurse's accordance, commitment, and intention to disclose and report a medical error openly [6]. Nurses' perceptions of error reporting have been shown to influence their behavior leading to actual translation to VER [19—21]. The recent literature review has focused on barriers of error reporting confronted by nurses [22—24]. Accordingly, this integrative review seeks to expand the scope of such existing investigation to gain a holistic understanding of nurses' experiences of VER from their perspectives with personal, professional, psychological, and organizational considerations. This review has adopted the conceptual model 'Conceptual Model for Disclosure of Medical Errors' by Fein et al. [25], whose definition of nurses' experiences in VER were underpinned by the interplay of factors concerning their attitudes, perceptions, feelings, and practice of error reporting, as well as various enabling and hindering factors in influencing their commitment in VER. Examining these areas makes up the totality of understanding of nurses' experiences of VER [25], and this will guide the approach of presentation of findings of this review. This integrative review aims to understand nurses' experiences in VER. Such insights would enhance professional nursing practices by informing strategies to foster a safety-centric culture and optimize error management.

2. Methods

This paper presents an integrative review that examines nurses' experiences in error reporting. The methodological approach by Whittemore and Knafl adopted in this review comprised five sequential stages: 1) problem identification, 2) systematic literature search, 3) data evaluation, 4) data analysis, and 5) presentation of findings [26]. The rationales underlying this choice were twofold. Firstly, the approach enabled the amalgamation of findings from studies of different research designs and methodologies to draw conclusions on established knowledge areas and identify any research gap of the given topic. Secondly, the systematic search, appraisal, and synthesis of the body of literature add rigor to the review [27].

2.1. Problem identification

The research question underpinning this integrative review would be: What are nurses' experiences towards VER?

2.2. Literature search

A systematic search was performed across four electronic databases: Cumulative Index to Nursing and Allied Health Literature (CINHAL) (Ebsco), Medline (PubMed), Scopus, and Embase to retrieve papers published between January 2010 to December 2020. Firstly, the rationales behind this timeline are due to a lack of studies focusing on electronic error reporting compared to paper reporting systems before 2010. Hence, this ensures the presentation of evidence that reflects contemporary practices of error reporting [28,29]. Secondly, the inclusion of papers towards 2020 served to provide the production of current evidence. The three key concepts underpinning the search strategy were error, reporting, and nurses. The final search date of the databases fell on 4th January 2021. The keywords utilized were a nurse, and the subject heading "error" and "reporting" were searched separately. Search interrogation techniques were deployed with simultaneous use of the Boolean operator (AND/OR) and truncation (wildcard) (*) to merge exploded terms to broaden the search to derive a more comprehensive result. The search utilized a combination of terms such as "nurs*" OR "nurse attitude" OR "nurse experience" AND "medication error*" OR "nursing error*" OR "medical error*" AND "voluntary report*" OR "incident report*" OR "report*" OR "disclose*."

Publications were included in this integrative review if they were peer-reviewed original research in English on nurses' perceptions, attitudes, and barriers in error reporting. Conversely, publications were excluded if the focus of error reporting was on allied healthcare professionals such as physicians, pharmacists, and

nursing students (for those investigating perceptions of both nurses and other professionals, they were excluded if they had not compartmentalized the findings for nurses). The exclusion was further applied to articles that reported on the causes and classification of medical errors, incident reporting of non-sentinel events, legal and ethical perspectives of medical errors, evaluation of error-reporting systems, and nurses' perceptions of cultural safety general rather than error reporting. Lastly, publications were also excluded if they were pilot studies, literature reviews, discussion papers, opinions, editorial papers, commentaries, conference reports, and grey literature (dissertation).

The total results of four database searches were 1,276 papers. Hand-search was performed on the reference lists of included articles to retrieve additional 17 papers for screening, considering the possibility of computerized databases is yielding 50% of eligible studies due to inconsistent search terminology [26]. With the support of Endnote (Clarivate Analytics) reference management software, screening of titles and abstracts of papers retrieved from database search were performed independently by both authors (MWJW and MJA), followed by assessing the full texts of each paper against the inclusion criteria. A systematic review process had resulted in the elimination of duplications and irrelevant papers against their titles and abstracts ($n = 1,138$), hence retaining 155 studies. The suitability and relevancy of these articles were then checked by full-text reading against both the inclusion and exclusion criteria leading to the elimination of 122 papers. The final stage sees all 33 papers undergoing thorough methodological appraisal. The PRISMA 2020 guidelines underpin the study selection process (Fig. 1) [30].

2.3. Data evaluation

To objectively rate the methodological quality of each paper, the Mixed Methods Appraisal Tool (MMAT) 2011 by Pluye et al. [31] was used, comprising five categories of scores: very low (0%), low (25%), moderate (50%), high (75%), and very high (100%). The MMAT 2011 facilitated the quality appraisal of each paper against its stipulated assessment criteria according to the study's methodological approach; this involved converting the outcome of the assessment into a total score to consider its eligibility for inclusion [31]. Calculation of the score for MMAT 2011 was based on the number of criteria met by an individual paper divided by the total number of the assessment criteria assigned for that paper's methodology [31]. Leblanc et al. had recommended excluding studies with low quality (below 25%) [32]. Both authors (MWJW and MJA) had independently appraised each paper to eliminate any potential biases. Any discrepancies to the assigned scores were discussed, and the consensus to the final score of each paper was reached between both authors, leading to the elimination of two papers.

2.4. Data analysis

Thematic analysis was chosen for an integrative review due to the heterogeneity of the included papers where meta-analysis would not be appropriate [26,27]. Data analysis consists of four stages: data reduction, data display, comparison, conclusion drawing, and verification [26,33]. Firstly, the data of each study were extracted and succinctly presented into a comprehensive review matrix (summary table of evidence) which consists of several
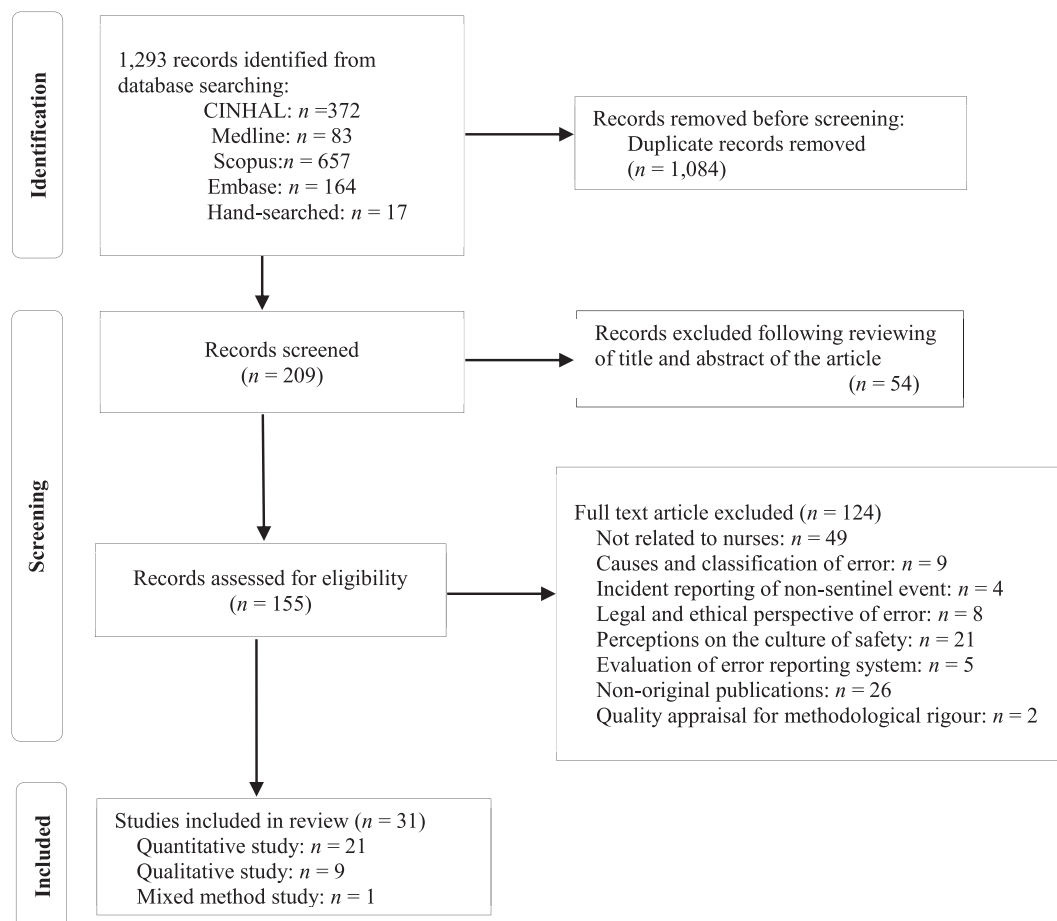

Fig. 1. PRISMA flow diagram for search strategy.

domains. The summary tables of evidence were classified according to research design, as shown in Table 1 (quantitative studies) and Table 2 (qualitative and mixed-method studies).

The constant comparative method was used to iteratively compare, classify and identify themes, patterns, and relationships across all included studies. This is followed by assigning labels (themes) to the collected data to attach meaning that closely reflected the collection of similar findings, a process known as coding. This is to inductively construct unifying themes in preparing for narrative integration of results to answer the research question of this review [33]. The first author (MWJW) performed the extraction, analysis, and coding of the data, while the second author (MJA) checked to verify its accuracy. Discussions between both authors (MWJW) and (MJA) were held to validate the conclusion by verifying from primary sources and clarifying any discrepancies to derive mutual consensus.

2.5. Presentation of findings

In the final stage of this review, findings are presented to address the research question underpinning this integrative review.

3. Results

There were 31 eligible studies included in this review. They consist of 21 quantitative studies, nine qualitative studies, and one mixed-methods study. Descriptive cross-sectional survey design underpins all quantitative papers ($n = 21$). The sample size ranged between 71 and 1,380 nurses, with all of them used questionnaire to collect their data. Of all qualitative papers, the majority were descriptive qualitative design ($n = 7$), while the remaining were grounded theory design ($n = 1$) and case study design ($n = 1$). The sample size ranged from 10 to 115 nurses in all qualitative studies. The majority ($n = 5$) used semi-structured interviews to collect their data. A detailed description of each study can be found in both Tables 1 and 2, respectively.

3.1. Identified themes

Thematic analysis of the findings of 31 papers contributes to the emergence of three major themes: 1) nurses' beliefs, behavior, and sentiments towards VER, 2) nurses' perceived enabling factors of VER, and 3) nurses' perceived inhibiting factors of VER. Except for theme 2, each theme would consist of various sub-themes (Table 3).

3.2. Nurses' beliefs, behavior, and sentiments towards VER

This first theme, "nurses' beliefs, behavior, and sentiments towards VER," investigates nurses' perspectives and their practice and feelings surrounding error reporting that underpinned their experiences towards VER. Three sub-themes represent this theme: reporting staff's attitudes and perceptions of VER, reporting staff's preferred reporting style, reporting staff's emotions.

3.2.1. Reporting staff's attitudes and perceptions of VER

A plethora of studies ($n = 12$) that examined nurses' attitudes towards VER had yielded mixed findings. Eight studies had revealed that nurses possess a positive attitude towards VER [34—39,53,54], while four studies had reported otherwise [40—42,55]. Consistent with this finding, of the four studies comparing nurses' frequency of error reporting to other healthcare professionals such as physicians, three studies revealed that nurses generally had a higher error reporting rate than the physicians [39,43,56]. In contrast, one has reported otherwise [42]. Despite this positive finding, approximately half of the quantitative studies ($n = 9$) found that more than 50% of nurses did not report errors [34,35,38,40—42,44—46,55]. This delineates the incongruity between nurses' attitude and their actual action of VER.

Five studies have examined how nurses' positive attitudes towards VER were centered around their commitment to professional accountabilities. A strong ethical obligation towards VER has been demonstrated by nurses, who considered error reporting part of their responsibility [42,54,56,57]. The underlying impetus has been reported to be their upholding of patient safety, accountability, and the provision of quality nursing care as part of their profession [42,57]. Nonetheless, such professional commitment could be a source of frustration to nurses. The interplay between nurses and other healthcare professionals could be frustrating when they identified that physicians might not hold themselves to similar standards in accountability for error reporting [42]. Conversely, studies ($n = 2$) revealed how nurses tended to display less favorable attitudes and were less inclined to report errors committed by other professionals, given that their accountability for their actions did not fall within the locus of nursing responsibilities [15,56].

Nurses' unfavorable attitude towards VER owing to their limitations was also observed. The need to shoulder substantial work commitments had led to nurses placing lesser emphasis on VER. This was demonstrated by nine studies that nurses were burdened by greater responsibilities such as not only high patient acuity and volume, but also administrative duties, with the expectation that they had to complete them within their working hours had led them to view VER as subservient to these competing tasks [20,28,39,43,45,47,48,53]. Given their competing nursing duties, three studies also revealed how this led to nurses perceiving the need for VER to be of lesser priority, resulting in them subsequently forgetting VER due to procrastination [43,49,55]. Concomitantly, the relationship between nurses' deficiency in knowledge and VER was also examined. Four studies have revealed how nurses' attitude concerning the unintentional omission of error reporting was due to their lack of knowledge to perceive and recognize events that constituted errors [44,46,49,55]. Likewise, it was reported that some nurses have not engaged in VER because of their perception of specific errors as trivialities [2,43,44] or because of their ignorance of the occurrence of the errors [2,46,55]. Lastly, nurses' less favorable attitude towards VER was also reported because of their perception of not wanting to be seen by their colleagues for being a troublemaker for causing the error and instigating error reporting [40].

Four other findings were noteworthy. Firstly, nurses' perception of error severity was noted to influence their attitude and actions towards VER, as identified across the studies ($n = 7$). They were likelier to report more severe errors inflicting more severe harm on their patients [34,37,39,44,46,50,57]. Nurses had reasoned that less severe errors needed no reporting, given their perceived relative innocuousness [2,11,36,46,55,57]. Secondly, errors were also noted to affect nurses' reporting attitude, as identified across the studies ($n = 6$). They were less likely to report near-miss events than actual errors, justifying this on the timely interception of the near-miss events and the absence of actual harm to patients [11,20,37,43,44,55]. Thirdly, nurses were also less likely to commit to reporting when the errors were known exclusively to themselves [36,50].

Additionally, negative perceptions among nurses leading to their inaction in VER were also reported by five studies. These perceptions were illustrated by their lack of realization of the significance of reporting. The resultant view that it would infringe upon the quality time for patient care also contributes to their negative attitude towards and hence their actual action of VER [11,17,20,40,55].

Table 1
Summary table of evidence for quantitative studies ($n = 21$).

Study and location	Aim of study	Design, methods, and sample	Key findings	Quality score & limitation of study
You et al., 2015 [13] South Korea	To identify reasons for MAE and why they are unreported and estimate the percentage of MAEs actually reported among hospital nurses.	• Descriptive cross-sectional survey. • Questionnaire. • 312 nurses across three university hospitals.	• Barriers perceived by nurses towards error reporting: 1) fear of blame associated with adverse health implications to patients; 2) an increased emphasis placed on MAE as benchmark to determine quality of delivered nursing care; 3) fear of adverse consequences associated with that error; 4) not wanting nursing administrators to hold them as solely responsible for the error instead of evaluating the medication system.	• MMAT score: 100% • The use of convenience sampling might contribute to sample bias. The use of self-reporting methods might contribute to concerns of social desirability.
Chiang et al., 2010 [17] China	To examine the factors that influence the failure to report medication adverse events by nurses.	• Cross-sectional survey. • Questionnaire. • 872 nurses across five tertiary hospitals.	• 337 (47%) participating nurses had failed to report self- or coworker-MAEs and 376 nurses (52.4%) had not failed to report. • Fear, perception of nursing quality, and nursing professional development were identified as barriers that contributed to failure to report by nurses. • Administration and reporting process were not identified as barriers of error reporting.	• MMAT score: 100% • Potential social desirability effect in self-reported questionnaire. Convenience sample limits generalizability.
Qin et al., 2015 [34] China	To analyze the behaviors of nurses toward reporting safety events, the barriers to reporting, and the correlations of these aspects with hospital safety culture.	• Descriptive cross-sectional survey. • Questionnaire. • 1,125 nurses across eight hospitals.	• Nurses' preferred reporting styles were as followed, informing leader" (63.0%−76.4%), informing doctor (41.8%−81.8%), "documentation" (49.1%−54.1%). • Managerial and collegial perception, and reporting procedures played as key barriers to error reporting. • Reasons for not reporting error as identified by nurses: 1) fear of receiving patients' complaint; 2) fear of being reprimanded; 3) fear of implication to future employment; 4) wanting to protect their colleagues; 5) fear that news will spread, and the press will write about it; 6) not wanting to be an incompetent nurse.	• MMAT score: 75% • Use of convenience sampling limits generalizability. The use of self-reported questionnaire may contribute to potential response bias.
Hung et al., 2015 [35] China	To explore the effects of nurses' attitudes and intentions regarding medication administration error reporting on actual reporting behaviour.	• Descriptive cross-sectional survey. • Questionnaire. • 596 nurses who worked in general wards and intensive care units in a hospital.	• The findings indicated that nurses' attitudes and intentions towards MAE reporting are positive, but the actual reporting rates are low. • Nurse managers' and co-workers' attitudes are major factors contributing nurses' attitudes towards medication administration error reporting. • Nurses' attitudes also influenced their intention to report medication administration errors; however, no connection was found between intention and actual reporting behaviour.	• MMAT score: 100% • Convenience sampling and data obtained from one hospital may not be representative. The need for participants to recall experiences for past three months may contribute to recall bias.
Yung et al., 2016 [36] China	To explore the attitudes and perceived barriers to reporting medication administration errors and to understand the characteristics of − and nurses' feelings − about error reports.	• Descriptive cross-sectional survey. • Questionnaire. • 306 nurses working in one large teaching hospital.	• Nurses' possessed positive attitudes in error reporting. 88.9% prefer to engage in verbal reporting with head nurse (67.6%), colleagues (55.6%). • 83.0% of nurses experience self-recrimination after reporting, 63.4% experienced uneasiness if they choose not to report. • Barriers towards engaging in error reporting were: 1) fear of being distrusted by a patient and their family; 2) fear of administrators taking the error report as evidence to justify issuing a negative evaluation of the culpable staff; 3) fear of in patient−nurse disputes. • Reasons for not reporting error were: 1) patients were not harmed (83.3%); 2) the error was not known to anyone except the involving personnel (45.1%).	• MMAT score: 100% • Limit generalizability of findings due to study conducted in one hospital. Response bias owing to self-reporting.

Table 1 (*continued*)

Study and location	Aim of study	Design, methods, and sample	Key findings	Quality score & limitation of study
Farag et al., 2017 [37] United States	To examine the relationship among work environment, social capital and nurses' willingness to report medication errors.	• Descriptive cross-sectional survey. • Questionnaire. • 71 nurses working in Emergency Department across five hospitals.	• Most nurses (71.8%) were very likely to report errors with high potential for patient harm. • 54.9% of them were very likely to report errors that reached the patients but had no potential harm, and only 25.4% of nurses were very likely to report errors that were near missed. • Willingness of Emergency Department nurses to engage in reporting increases when feedback pertaining to the error committed was received, and when the manager adopted appropriate leadership style.	• MMAT score: 50% • Findings is specific to one hospital and cannot be generalized. Potential social desirability effect in self-reported questionnaire
Mjadu & Jarvis 2018 [38] South Africa	To describe the perceptions of registered nurses towards critical incident reporting in adult ICUs in three tertiary level provincial hospitals.	• Non-experimental descriptive survey. • Questionnaire. • 127 nurses consist of ICU specialist and non-specialist of three hospitals.	• While 50.5% had an effective attitude towards incident reporting, 63.4% of nurses had not reported any error for the past 12 months. • Despite nurses knew about the reporting system, major barriers towards error reporting as identified by nurses were: 1) collegial atmosphere of unpleasantness characterized by blame and punishment; 2)lack of confidentiality.	• MMAT score: 75% • The nature of purposive sampling restricted to collection of data from one province may not be representative.
Afolalu et al., 2020 [39] Nigeria	To compare doctors' and nurses' perceptions of factors influencing medical error reporting.	• Descriptive cross-sectional survey. • Questionnaire. • 140 nurses and 90 physicians from one tertiary hospital.	• The proportion of doctors (53.3%) not reporting error is higher as compared to nurses (39.3%). • Barriers of error reporting identified by nurses: 1) the emphasis of individual blame (79.6%); 2)lack of confidentiality (60.8%); 2)supervisor's inappropriate responses (58.7%); 4) patient's loss of trust (56.1%); 5) no point reporting that does not cause harm (53.7%). • Facilitators of error reporting identified by nurses: 1) clear guidelines about reporting of error (84.9%); 2) having role model who encourage reporting (81.1%); 3) getting feedback (70.5%).	• MMAT score: 50% • Study was conducted on single site; hence findings might challenge generalizability.
Kim et al., 2011 [40] South Korea	To identify the types of medication errors that occur in nursing practice and the nurses' perceptions of medication errors and reporting	• Descriptive cross-sectional survey. • Questionnaire. • 220 nurses across seven hospitals.	• Low reporting rate with only 28.3% of participants submit an incident report, despite 63.6% of participants had been involved in medication errors once or more in the past month. • Reasons for nurses not reporting errors were: 1) afraid of being a troublemaker (46.7%); 2)not aware of the importance of reporting, even in minor errors (25.0%); 3) wanting to cover up for the co-workers involved (10.9%).	• MMAT score: 50% • Convenience sampling, low response rate and response bias may not be representative.
Chiang et al., 2019 [41] China	To test the hypothesized model for hospital nurses' voluntariness of incident reporting and determine the extent which reporting culture factors, nursing safety practices, and work perceptions predict VIR.	• Descriptive cross-sectional survey. • Questionnaire. • 1,380 nurses across six teaching hospitals.	• More than half of nurses (nearly 60%) did not display voluntary attitude towards reporting of errors and near misses. • Nurses' voluntary incident reporting was influenced by reporting culture (collegial atmosphere of punishment, confidentiality, provision of feedback and learning from error), nursing safety practice, and perception of work (workload and job satisfaction).	• MMAT score: 100% • The generalizability of findings may be limited due to data collected from the study population of six hospitals and self-reported data.
Rashed & Hamdan 2019 [42] Palestine	To assess the attitudes of physicians and nurses toward incident reporting in Palestinian hospitals.	• Descriptive cross-sectional survey. • Questionnaire. • 152 physicians and 323 nurses across 11 hospitals.	• Physicians were 2.1 time more likely to report incidents than nurses. • Top three perceived barriers of incident reporting identified by nurses: 1)lack of feedback about reported medical errors (70.7%); 2)reporting is a method through which to pinpoint blame (67.2%); 3) lack of supervisor support to those who report error (50.5%.). • Top three fear of reporting consequences identified by nurses were: 1)fear of administrative sanctioning (77.7%); fear of malpractice litigation (72.4%); 3) fear that their own competence may be questioned (71%).	• MMAT score: 75% • Self-reported survey findings may contribute to social desirability response bias, leading to overestimation of positive attitudes.

Table 1 (*continued*)

Study and location	Aim of study	Design, methods, and sample	Key findings	Quality score & limitation of study
AbuAlRub et al., 2015 [43] Jordan	To explore the awareness of the IR system, IR practices and barriers to IR among Jordanian staff nurses and physicians.	• Descriptive exploratory survey. • Questionnaire. • 307 nurses and 144 physicians across seven hospitals.	• Physicians were less likely to report any incident on 50% or more of occasions as compared to nurses. • Major barriers towards error reporting by nurses were: 1) felt pointless to report on near misses (69.0%); 2) not receiving any feedback (64.5%); 3) fear of receiving disciplinary actions (68.9%); 4) felt that reporting is unlikely to lead to system change (66.1%); 5) forgetting to report due to being busy (63.2%).	• MMAT score: 50% • Convenience sampling and data obtained from seven hospital may not be representative.
Mansouri et al., 2019) [44] Iran	To assess nurses' views about major barriers to reporting errors and adverse events in intensive care units.	• Descriptive cross-sectional survey. • Questionnaire. • 251 nurses across seven hospitals	• Majority of nurses (70.9%) failed to report errors despite having to commit them. • Three main areas that prevented nurses from reporting error were: 1)fear of consequences after reporting − fear of collegial blame, fear of reputation loss, and fear of being labelled as incompetent; 2) procedural barriers - lack of knowledge about the procedure, certain error considered as trivial, hence not reporting; 3) management barriers − blame culture, lack of feedback, facing of inappropriate reaction from manager.	• MMAT score: 75% • Despite data gathered from seven hospital, modest sample size might challenge generalizability.
Toruner & Uysal 2012 [45] Turkey	To determine the perspective of pediatric nurses regarding the causes, reporting, and prevention of medication errors.	• Descriptive cross-sectional survey. • Questionnaire. • 119 pediatric nurses across four hospitals.	• Despite majority of pediatric nurses (88%) made use of the error notification system, yet less than half (48%) of the errors were notified by nurses. • Top three barriers of error reporting for nurses were: 1) fear of potential blaming of nurses in case of adverse outcome for the patient (53%); 2)fear of losing credibility of the team (50%); 3) fear of disciplinary proceedings (42%).	• MMAT score: 25% • Small sample size limits generalizability of findings.
Dirik et al., 2018 [46] Turkey	To investigate hospital nurses' involvement in the identification and reporting of medication errors in Turkey.	• Descriptive cross-sectional survey. • Questionnaire. • 135 nurses from one university hospital.	• Nurses were reluctant to report error despite able to identify the errors. and when the error was reported, it is usually to physicians. • Common reasons why nurses not reporting error were: 1) afraid of being perceived as incompetent by their peers (71.9%); 2) fear of being punished by their managers (66.7%); 3) not aware of committing the error (66%); 4) patient was not harmed by the error (63.5%); 5) not wanting to facing negative reaction from patients & relatives (62.5%).	• MMAT score: 75% • Findings is specific to one hospital and cannot be generalized.
Hammoudi et al., 2018 [47] Saudi Arabia	To explore factors that influence the occurrence of MAEs and error reporting by nurses.	• Descriptive cross-sectional survey. • Questionnaire. • 367 nurses working in five public hospitals.	• Perceived barriers of error reporting by nurses were: 1) nurses felt reporting and contacting physicians were time consuming; 2) individuals blamed instead of the system by nursing administrator for its commission; 3) lack of positive feedback for correct medication administration; 5) focus predominantly placed on errors as determinant for quality of nursing care.	• MMAT score: 75% • The use of convenience sampling may introduce non-response bias.
Moumtzoglou 2010 [48] Greece	To explore the reasons why Greek nurses are reluctant to report adverse events.	• Exploratory study. • Questionnaire. • 214 nurses across 14 hospitals.	• Nurses' impeding factors for reporting of adverse events concerns with cultural aspect such as professional, national and organizational cultures, as well as structural issues of healthcare practices such as safety system, rules, and procedures. • The reasons cited by more than 50% of nurses for not reporting adverse events were:1)fear of the press; 2) fear that the error will be reported to nursing licensing board; 3)cumbersome of handling adverse event; 4)not confidence in bringing up the event; 5) fear of facing complaints by patients.	• MMAT score: 100% • Moderate response rate (61%) might conceal sample bias due to the possibility of those who responded are individuals with certain interests in issues under study.

Table 1 (*continued*)

Study and location	Aim of study	Design, methods, and sample	Key findings	Quality score & limitation of study
Nasiri et al., 2020 [49] Iran	To determine factors affecting the failure to report medical errors in teaching hospitals affiliated to Iran.	• Cross sectional descriptive analytical survey. • Questionnaire. • 131 nurses across two teaching hospitals.	Most important factors leading to failure to report medical errors as identified by nurses were:1) management related factor — lack of organizational support, failure to receive positive feedback, focusing on the person committing the error, inappropriate response of authorities relating to error severity; 2) nurse related factor — fear of legal issue, fear of being blamed by nursing authorities and physician, fear of incompetence stigma, fear of negative effects of error concerning economic losses; 3) factors related to reporting process — forgetting to report error, neglecting to report error, unclear definition of error.	• MMAT score: 100% • The use of the classical numbers for scoring and prioritization.
Rutledge et al., 2018 [50] United States	To report MER barriers among hospital nurses.	• Descriptive cross-sectional survey. • Questionnaire. • 359 registered nurses of one community hospital.	Top four barriers of error reporting were:1) extra time involved in documenting a medication error (48.2%); 2) system for forms used to report medication errors are long and time-consuming (35.9%); 3) Fear of liability or lawsuits (34.3%); 4) Fear of being blamed (32.8%).	• MMAT score: 50% • Findings based on one hospital could affect generalizability. Survey omits one item that examine managerial support.
Yang et al., 2020 [51] China	To identify nurses' perceptions of patient safety emphasis, face-saving, power distance, and fear of medication error reporting and to explore face-saving and power distance as the underlying mechanisms for cultural factors in the relationship between nurses' perceptions of safety emphasis and fear of MER.	• Cross-sectional descriptive and correlation. • Questionnaire. • 569 registered nurses across three tertiary teaching hospitals.	• Nurses' fear of medication error reporting is strongly associated with their cultural background, especially face-saving (social esteem and social identity) and power distance (social hierarchy that defines disparity power between the sub-ordinates and their superior). • When comparing the specific mediators' indirect effects, face-saving was found to be more powerful mediator than power distance.	• MMAT score: 75% • Correlation data of this study impedes drawing of causality. Convenience sampling challenges generalizability of findings.
Lee et al., 2016 [52] China	To identify which factors affect the intentions of nursing staff to report incidents using theory of planned behavior, organizational behavior.	• Survey design. • Questionnaire. • 649 nurses across 40 large hospitals	Psychological safety, subjective norm and perceived behavioral control correlates with nurses' intention towards error reporting. 1) Psychosocial safety is characterized by just culture with no punishment when error was reported. 2) Perceived behavioral control characterized by nurses' possessing of sufficient knowledge, abilities, and resources. 3) Subjective norm was characterized by managerial and collegial response towards their reporting.	• MMAT score: 75% • Possibility of sampling bias due to less than 60% response rate of completed survey.

Note: MAE = medication administration error. MMAT = Mixed Methods Appraisal Tool. VIR = voluntariness of incident reporting. IR = incident reporting.MER = medication error reporting.

3.2.2. Reporting staff's preferred reporting style

Investigating nurses' preferred methods in error reporting in the studies ($n = 9$) has revealed the critical roles of the mode of reporting and hierarchy. On the reporting mode, nurses have expressed their tendency to engage in informal error reporting, i.e., orally reporting to their colleagues and immediate supervisors in preference to formal writing [2,28,36,45,46,53]. The reasons were twofold. Firstly, nurses wished to seek their colleagues' and supervisor's clarification on the definition of an error and their support to resolve it [2,53]. Secondly, they feared leaving any documentary evidence that would incriminate them to the errors [20,28,36].

Similarly, two studies from Asia disclosed how nurses were more inclined to verbally inform their management, such as shift leaders, nurse managers, or head nurses who would finalize whether formal reporting be required [34,36]. On hierarchy, two other studies have revealed how nurses were expected to seek the approval of their nursing leaders before decisions on reporting and consult them in vetting incident reports before final submission [20,51]. Underlying this observation were traditional Asiatic values inherent to the hierarchical chain of command, which had to be obeyed by junior nurses by abiding by their senior nurses' instructions and respecting their decision-making capacity [36,51]. Yang et al. coined the term 'power distance', implying the nurses' need to show respect to their higher authority in the hierarchical structure in nursing owing to the disparity of power [51]. These findings thus suggested that hierarchy could profoundly influence nurses' effort towards VER.

3.2.3. Reporting staff's emotions

Three studies have investigated nurses' experiences during and after error reporting. Yung et al. [36] revealed that, when deciding on the appropriateness of their error-reporting, nurses were confronted by negative emotions such as regret, fear, and restlessness: the majority expressed self-recrimination following their decision to do so, whereas others said anxiety following their decision of not to report. Lee et al. collaboratively reported how nurses would experience constant self-reproach and guilt following error reporting [20].

Table 2
Summary table of evidence for qualitative and mixed method studies ($n = 10$).

Study and location	Aim of study	Design, methods, and sample	Key findings	Quality score & limitation of study
Koehn et al., 2016 [2] United States	To explore licensed nurses' decision-making with regards to reporting medical errors.	• Grounded theory • One-to-one interview. • 30 nurses from eight ICUs.	The process of "learning lessons from the error" consist of five stages. 1) The first stage "being off killer" discuss on the antecedents responsible for causing the error. 2) The second stage "living the error" discussed on nurses' emotional stage having to undergo and reconcile with the error. 3) The third stage "reporting/telling about the error" concerns with various considerations that lead to nurses deciding on whether to report error. 4) The fourth stage "living the aftermath" discussed about how nurses were constantly plagued by memories following reporting. 5) The fifth stage "lurking in your mind" discussed on how nurses' were taunted and having to live memories of the error over time that would influence their practices.	• MMAT score: 75% • Findings were obtained from nurses with longer working experience and hence may not apply to nurses with lesser working experience.
Soydemir et al., 2017 [11] Turkey	To determine what barriers to error reporting exist for physicians and nurses.	• Descriptive qualitative. • Semi-structured interview. • 15 nurses and eight physicians working in a training and research hospital.	• Both nurses and physicians does not report medical error which they had experienced or witnessed. • Barriers towards error reporting by nurses were grouped into four themes: 1) fear — fear of being blamed, fear of sanctioning and losing their job; 2) attitude of administrations — negative and/or lack of feedback after reporting, management not keen to investigate the causes despite reporting, focusing on pinpointing blame; 3) barriers related to the system — complexity of the reporting system, lack of anonymity; 4) the employees' perception of the error — lack of awareness to mandatory reporting, perceived severity of error leading to selective reporting.	• MMAT score: 75% • Given the small sample size and study conducted in one hospital, findings of this study may not representative.
Peyrovi et al., 2016 [15] Iran	To explore the barriers to reporting nursing errors in intensive care units in Iranian hospitals.	• Descriptive qualitative • Semi-structured interview. • 16 nurses working in four ICUs.	Barriers perceived by nurses in error reporting: 1) wanting to preserved professional reputation and preventing stigma; 2) afraid of consequences — punishment, legal repercussion and the experience of organizational misconduct; 3) feelings of insecurity — pointing a finger at (experiencing presumed blame) nurses and lack of managerial support; 4) management not investigating error root causes, leading to lack of motivation of reporting.	• MMAT score: 75% • The context of nursing and hospitals participating in this study may differ from other countries, hence may yield different meaning of findings.
Lee et al., 2018 [20] South Korea	To clarify the barriers to reporting patient safety incidents among nurses and resident physicians working in hospitals with reporting systems.	• Generic qualitative. • Individual in-depth interview. • 10 nurses and six physicians across six tertiary hospitals.	• Four categories of the identified barriers to reporting were: 1) "incidents and reporters"; 2) "reporting procedures and systems"; 3) "feedbacks"; 4)"reporting culture". • Additional reasons identified by nurses for not reporting error were: 1) manifestation of feelings of pressure or guilt; 2) lack of feedback after reporting; 3) the perception of potential blame; 4) stigmatization resulting from reporting.	• MMAT score: 75% • Findings might not complete as the barriers of reporting from managerial perspectives of the two professions not examined.
Lederman et al., 2013 [28] Australia	To examine error reporting by nurses in hospitals using electronic media	• Mixed-methods case study and survey. • Questionnaire and interview. • 30 nurses completed the survey. 18 nurses participated in the interview.	• Top barriers to error reporting identified in the survey were, lack of training to the electronic reporting system (53%), busy with work (52%), lack of access to computer (45%), afraid of being tracked (40%), lack of feedback (36%), excessive detail required in filling the reporting form (32%). • Four categories of barriers to error reporting identified through interview were: 1) training and education (lack of training); 2) technology acceptance; 3) organization structure and culture (lack of time, individual blame and lack of feedback); 4) access (confidentiality and anonymous reporting).	• MMAT score: 75% • Small sample size for quantitative component of the study may affect generalizability.
Espin et al., 2010 [53] Canada	To explore the emergent factors influencing nurses' error reporting preferences, scenarios were developed to probe reporting situations in the intensive care unit.	• Descriptive qualitative • Semi-structured interview. • 37 nurses working in ICU from three hospitals.	• Most (81%) nurses reported that they will engage in error reporting based on the scenarios discussed. • Majority of nurses were more inclined towards informal reporting. • Reasons given by nurses for not reporting were: 1) error that does not results in patient's harm; 2) not consider the commission as an error; 3) not wanting to engage in whistleblowing of other people's error; 4) lack of time; 5) fear of reprisal; 6) lack of management response.	• MMAT score: 100% • Different error perception and its meaning of interpretation by participants owing to the choice of words, presentation of scenarios.

Table 2 (*continued*)

Study and location	Aim of study	Design, methods, and sample	Key findings	Quality score & limitation of study
Choi et al., 2019 [54] South Korea	To determine nurses' perceptions of the DPSI	• Generic qualitative. • Focus group discussion. • 20 nurses working in one hospital.	• Most participants felt that DPSI is necessary because of its effectiveness and their ethical obligation to do so. • Barriers towards DPSI as perceived by nurses were, a closed organizational culture (blame and negative management response), fear of deteriorating relationship with patients and seeing DPSI as additional work burden. • Provision of clear guidelines and improving hospital organization culture would drive DPSI.	• MMAT score: 75% • Possibility of social desirability bias from the participant responses.
Haw et al., 2014 [55] United Kingdom	To explore the reasons given by inpatient psychiatric nurses for not reporting a medication error made by a colleague and to determine the perceived barriers to near miss reporting.	• Generic qualitative using clinical vignette. • Semi-structured interview. • 50 nurses working in acute psychiatric setting.	• Less than half of participants would report an error made by a colleague (48%) or a near-miss involving themselves (40%). • Barriers to reporting of errors and near missed: 1) patients not harmed; 2)forgetting; 3)fear in loss of status; 4) fear of being stigmatize by colleagues/ loss of trust by colleagues; 5) disciplinary consequences. • Reasons not reporting error made by colleagues: 1) passing the buck; 2) being a one-off event and not occur again; 3) empathy; 4) not worth reporting; 5) empathy and wanting to support them and not wanting them to face punishment.	• MMAT score: 75% • The use of convenience sampling and modest sample size might affect generalizability.
Hewitt et al., 2017 [56] Canada	To investigate the frames that enable and inhibit self-reporting and peer reporting among physicians and nurses.	• Case study design • In-depth interview. • Seven physicians and 23 nurses in one hospital.	• Three inhibiting frames for self-reporting were fear of blame, incompetence, and career progression. For peer reporting, they were tattletale, locus of responsibility, and professional boundaries. • Three enabling frames for self-reporting were professional accountability, trust in the system, and learning from error. For peer reporting, they were, severity of incident or repeated errors by a health professional, learning from errors, and anonymity.	• MMAT score: 75% • Findings from one hospital would challenge representative.
Hashemi et al., 2012 [57] Iran	To explore the factors associated with reporting the nursing errors.	• Descriptive qualitative. • Semi-structured interview. • 115 nurses working in the hospitals and specialized clinics.	• Three approaches of error perception by nurses. 1) Persons: nurses to be responsible and punished for committing error in viewing error commission as unacceptable to profession (self-regulation). 2) System: view nurses as susceptible to error commission and see error commission as flaws in organization system. 3) Combination: view error commission as multi-factorial, and both nurses and organization are accountable for it. • Barriers of error reporting were: fear of legal repercussion, job threats, economic losses, fear of honor and dignity, weakness of knowledge and nursing skills in error management, past unpleasant encounter with organization, high workload.	• MMAT score: 100% • Method of sampling was not adequately accounted for by the study.

Note: DPSI = disclosure of patient safety incidents. MMAT = Mixed Methods Appraisal Tool.

Table 3
Emerging themes and sub-themes.

Themes	Sub-themes	Number of papers
Nurses' beliefs, behavior, and sentiments towards VER	Reporting staff's attitudes and perceptions of VER	29
	Reporting staff's preferred reporting style	9
	Reporting staff's emotions	3
Nurses' perceived enabling factors of VER	Not applicable	8
Nurses' perceived inhibiting factors of VER	Less favorable reporting systems and processes	12
	A less supportive management responses	21
	Fear of being blamed and shamed	25
	Fear of punitive repercussions	23

Note: VER = voluntary error reporting.

In their grounded theory study, Koehn et al. used themes to insightfully delineate the trajectory of feelings faced by nurses surrounding their decision to report their errors [2]. Under the theme of 'living the error,' nurses revealed their astonishment upon being informed that their actions had led to errors [2]. With their further clarification of the error causation, their initial fear and distress were soon followed by anger, self-blame, and self-degrading of their worth in their profession that could last for days [2]. This would be followed by the following theme, 'reporting or telling the error,' which implied that nurses would perform the

action of VER based on their chosen decisions, regardless of whether reporting was made, upon considering the benefits and repercussions of consequences of their activities of error reporting [2]. Under the next theme, 'living the aftermath,' nurses lamented being constantly tormented by the aftermath of the error reporting. Such ruminations served as a painful lesson to mitigate future recurrences [2]. Under the final theme of 'lurking in your mind,' nurses reported how negative memories of their lapses would linger throughout their nursing career and serve as an impetus to influence their practice [2].

3.3. Nurses' perceived enabling factors of VER

The second theme on "nurses' perceived enabling factors of VER" will examine various facilitating factors that would incentivize nurses to commit to VER. Eight studies have examined the factors that would motivate nurses to engage in VER. Lee et al. [52] have posited that nurses' positive attitude and their actual action of VER were governed by the multifactorial considerations underpinned by the theory of planned behavior (TPB). Under the first domain of 'perceived behavioral control' of the TPB, the authors delineated the need for nurses to possess adequate knowledge, abilities, and resources to drive their commitment to VER [52]. The second domain of 'subjective norms' revealed that nurses desired and valued receiving their supervisors' support and the opportunity to open discussion of errors [52]. The third domain of 'psychological safety' highlighted their need for their organizations to foster a safe working environment in tandem with a just and open culture, under which they could report errors without fears of repercussions [52]. This concurred with Choi et al. [54], who revealed how clear institutional guidelines and positive organizational culture facilitate VER by nurses.

Other factors have also been elucidated. Hewitt et al. have identified three factors that would enhance nurses' receptiveness to VER [56]. This receptiveness was centered upon three beliefs: firstly, one in need for professional accountability for their actions; secondly, trust in their organizations' commitment to a non-blaming policy and, thirdly, reporting would drive their constructive learning of the errors [56]. Hashemi et al. [57] have corroboratively expanded the list of motivators to include the call for a supportive work environment where physicians and authority would not evade their responsibility and thus leave nurses alone to deal with errors. Afolalu et al. [39] revealed positive organizational factors, such as clarity in defining errors, clear guidelines on reporting, and their leaders as role models that would incentivize nurses to commit to VER. Lastly, the provision of feedback [37,39,42] and supervisory support [38] in positively influencing nurses' commitment to VER have also been affirmed.

3.4. Nurses' perceived inhibiting factors of VER

This third theme, "nurses' perceived inhibiting factors in VER," will examine various hindering factors that would impede nurses' action in VER. This theme is represented by four sub-themes: less favorable reporting systems and processes; less supportive management responses; fear of being blamed and shamed; and fear of punitive repercussions.

3.4.1. Less favorable reporting systems and processes

Studies ($n = 10$) have revealed how nurses' attitude and commitment to VER could be dictated by processes and policies underpinning the organizational error-reporting system. Nurses perceived error reporting as time-consuming owing to the tedium of lodging incident reports that would add to their existing heavy workload [11,20,28,48,50,55,57]. Nurses perceived the error reporting process to be cumbersome, and this was hereby

explained in three instances. Firstly, nurses highlighted that significant efforts were warranted in the aftermath of error reporting: they would be overwhelmed by the need to coordinate with other healthcare professionals and manage the clinical sequelae arising from that error [2,47]. Secondly, they underlined the difficulty in locating hardcopy forms for incident reporting [28,55]. Thirdly, they emphasized the difficulty in navigating the complex platform [11,28,39]. Lederman et al. further revealed how nurses who had trouble coping with technology acceptance had attributed their heightened challenge to lack of support by their institution to organize relevant training initiatives to enhance their familiarity in electronic error reporting systems [28].

The lack of reassurance for reporting staff's anonymity has been found as a limitation of the institutional error-reporting system, as identified across five studies. Firstly, Lee et al. highlighted nurses' concern with identity exposure in error reporting, undermining their willingness to engage in VER in the future [20]. Echoing these, four other studies have further revealed how nurses would yearn for the opportunity to engage in anonymous reporting. This would lessen their burden of responsibility and drive their commitment to VER [28,38,56,57].

3.4.2. A less supportive management responses

Studies ($n = 21$) have examined the relationship between nurses' past experiences and the management's responses to their attitude of error reporting and their commitment to VER in the future. Such undesirable responses were characterized the lack of feedback by their nursing supervisors [2,11,20,28,42—44,46,48,50], or, if given, the mostly negative nature of such feedback [11,39,46,47,49]. The significance of feedback provision to nurses' intention in VER was further affirmed by Chiang et al. [41]. Nurses further asserted how they would value receiving constructive feedback on enhancing patient safety because this would enable them to learn from past mistakes to improve their future practices [38,42,56].

Conversely, nurses' commitment to VER in the future could be undermined by their organizations' nonchalance: the lack of commitment to investigating root causes of errors after error reporting [15,53], and the lack of action to address flaws in the existing system [15,43]. Additionally, an overemphasis on error occurrence as a critical quality indicator to appraise nurses' performance further demotivated them towards VER for fear of repercussions [11,13,17,47]. Five studies have also revealed how nurses faced immense negative responses from their nursing leaders that are incommensurate with the severity of their errors following their reporting. This had further discouraged them from engaging in future VER [39,44,49,54,57].

3.4.3. Fear of being blamed and shamed

The consensus was unanimous among studies ($n = 20$) that emphasizing individual blame for error causation would serve as a barrier to VER by nurses. Nurses highlighted fear of blame by their colleagues, and/or physicians for being responsible of causing the error following VER [2,11,13,15,20,28,36,38,39,42,44—47,57], and this would also negatively influence their attitude towards VER [35]. Nurses asserted that the disapproving outlook by the middle and senior management towards the occurrence of errors: such an outlook meant that the post-incident focus was on assigning blame and holding them entirely responsible, instead of acknowledging limitations and fallacies of existing work processes that might have caused the errors [2,11,13,39,46,47,49,56]. Additionally, the literature revealed how the intensity of blame would be heightened if any patients' mishaps resulted from the error [13,15,45,47]. Two implications have been reported to follow such a blaming culture. Firstly, Hashemi et al. cautioned how the fear of consequences

might lead to silence among nurses, encroaching on their honesty and responsibility in VER [57]. Secondly, this might drive nurses into feelings of worthlessness, guilt, and regret due to self-blaming, eroding their confidence and motivation to continue their chosen profession [2,20,36,38].

Studies ($n = 14$) have also affirmed how assigning and focusing on individual blame following error reporting could result in nurses experiencing shame. The shaming culture denoted an implicit endorsement of an administrative sanction on any implicated nurses, degrading their worth and pride following reporting. The nurses' concerns were manifold. Nine studies reported how nurses experienced fear of losing their professional credibility due to their colleagues and supervisors devaluing their competency and considering them as underperforming by associating their errors with poor quality of nursing care [15,17,36,42,44,45,49,55,57]. Additionally, nurses also felt distressed with the loss of honor and dignity should their mistakes were reported and exposed, to the extent of questioning their proficiencies in their chosen profession [2,15,20,42].

Furthermore, the fear of shame on error reporting was also documented in two studies from China. From the oriental perspective, nurses perceived the notion of VER as having to admitting their misdeeds which would lead to chastisement by co-workers and supervisors; hence, their disinclination towards VER to uphold social esteem and dignity [34,51]. Lastly, nurses also feared media publicity on their errors following reporting [34,36,42,48,49]. They were concerned that this would tarnish their reputation and bring their profession into disrepute due to their disinclination towards VER [15,44,51].

3.4.4. Fear of punitive repercussions

An organization condoning a punitive culture for reporting error make it less appealing for nurses to commit in VER [17,41]. An institutionalized punitive culture has been demonstrated across some studies ($n = 17$) to discourage nurses from reporting errors for fear of punishments for having committed them. In some instances, nursing leaders' disapproval was reflected in the various punitive sanctioning: poor ratings in performance appraisals, economic loss due to wage deduction and settlement of monetary fines, and termination of employment [2,11,15,20,36,38,41—44,49,55,57]. Thus, the perceived threat to their existing employment stability and future career prospects induced the nurses' inaction for VER [34,44,56]. It is noteworthy that the fear of disciplinary repercussions has led nurses to conceal their errors and others' [11,15,17,46,53]. Such unwillingness prevailed lest they be jointly implicated in their co-workers' errors that subject them to punishments due to collective team-based responsibility [15].

Additionally, the fear of professional liabilities has been demonstrated across some studies ($n = 7$), leading to nurses' reluctance to report errors. Nurses associated any errors with professional negligence, the reporting of which would subject them to consequences such as institutional disciplinary proceedings, suspension or revocation of nursing licenses by nursing regulatory boards, and litigation on the grounds of malpractice [11,15,36,42,45,48,50]. The reluctance among nurses towards VER for fear of nurse-patient disputes was further identified in 10 studies. The underlying reasons included the erosion of confidence of patients and family members in their profession, complaints, lawsuits, and even aggression [34,36,39,44—49,54]. Again, it is noteworthy in some studies ($n = 5$) that nurses would avoid reporting their co-workers' errors for two reasons: their unwillingness to subject their co-workers to disciplinary actions [17,34,40,55], and their preference to avoid compromising the social convention between them that could potentially jeopardize amicable collegial working relationship [56].

4. Discussion

Identifying and reporting errors are vital steps to foster a safe working environment in healthcare. While eradicating medical errors is impractical [58], strategies to manage and reduce them are instrumental, and VER delineates one crucial initiative to improve patient safety. As frontline healthcare providers involved in direct patient care, nurses should be committed to VER. The impacts of errors on patient safety can be accurately evaluated, and preventive actions can thus correspondingly be meted. Apart from being a professional calling, this has also been seen as a legal and ethical obligation underpinning responsible nursing care [48]. Quality assurance and patient safety in healthcare institutions can be affirmed when nursing leaders drive efforts and prioritize error reporting [59].

A review of the literature ($n = 31$) revealed that the findings were more inclined towards highlighting nurses' less favorable opinions of the factors influencing their attitude and commitment towards VER, signifying that their experiences of VER were less than ideal. It is plausible that such negative experiences could lead to a slippery slope of patient safety culture. This review examined and will discuss the complexity and interplays of the issues concerning the relationship between nurses' attitude, perception, emotion, and practice in error reporting and various underlying factors that would underpin their experiences towards VER. This would produce a synergistic effect that leads to a better understanding of nurses' overall experiences in VER.

4.1. Nurses' attitude, perception, emotion, and practice of VER

This review first reported the attitude of nurses in VER were more inclined towards positive as evidenced by the number of studies ($n = 8$) supporting this finding and as well as of those ($n = 3$) who revealed a higher rate of VER among them as compared to other health professionals. Inherent to the principle of sound risk management is the unmistakable ability to recognize and embrace error reporting. This commitment further reflects nurses as a disciplined workforce that displays integrity and dedication towards a culture of safety and quality. Nonetheless, studies ($n = 9$) included in this review had also revealed that nurses failed to report an error, and this further signifies a gap between their idealistic professional views and realistic practice of VER. Because of this, studies postulated that VER was a rational behavior in which nurses exercised their rational decision-making after considering the consequences to choose and plan their actions and then engage in that desired behavior [17,60]. Ajzen and Fishbein's [61] theory of planned behavior (TPB) has offered insights into this view by deducing that attitudes and perceptions of an individual (nurse) would form the primary determinant to influence their rational behavior, i.e., their commitment towards VER. According to the TPB, attitudinal beliefs (the first domain) posited how the behavior (VER) of an individual (nurse) and the intention to act on that behavior rested with their consideration; in other words, this would depend on whether the individual had a favorable or unfavorable evaluation of that behavior. This explanation echoed with the findings of this review, where nurses would consider various positive and negative consequences to underpin their attitude and their eventual decision to commit to VER. This would also influence their underlying feelings and emotional coping concerning that decision they had made.

Using the TPB as an approach [61], Redding et al. [62] further explained how two considerations would underpin attitudinal beliefs of nurses towards VER: firstly, their expectation of the outcome for engaging in that behavior and secondly, the extent to which they value the result [62]. As reported in this review, nurses'

practice of selective reporting and their perception of reporting as insignificant would reflect on a spectrum of their negative attitude towards VER; this would align with both considerations by Redding et al. [62]. Echoing this review, Chiang et al. [17] argued that, since most errors did not seriously harm patients, most nurses would consider them careless lapses and hence had perceived reporting as redundant. These identified issues would therefore signify their complacency and further undermined their professional credibility.

Additionally, this review also revealed nurses' disinclination in reporting their co-workers' errors. One plausible explanation was that nurses had perceived whistleblowing as an act of sabotage that breached professional etiquette. Given the insights from attitudinal beliefs of the TPB [61], nurses viewed that whistleblowing and the punitive follow-up actions on those implicated would jeopardize amiable collegial relationships and possibly even inter-professional collaboration, which explained their less favorable attitude and commitment in VER. This explanation was in line with Espin et al. [53] and Hewitt et al. [56], further supporting the two considerations of attitudinal beliefs as discussed earlier by Redding et al. [62]. Nonetheless, nurses must realize that they also owe a duty of care to their patients: the two principles of beneficence — 'doing good' and non-maleficence — 'above all, not harm' — implies that nurses are accountable for not only their actions but also others' that might endanger the patients' safety [63]. Commitment to the disclosure of errors of self and others would support this principle.

Ajzen and Fishbein [61] also postulated that in addition to their attitudinal belief, commitment to an intended behavior (VER) by an individual also rested with their perceived behavioral control. This was associated with control beliefs, the second domain of the TPB. In other words, Chang [64] contended that nurses' attitude and commitment in VER would also depend on their perceived capabilities and proficiencies to drive their intention. This concurred with this review where nurses attributed not committing to VER due to forgetfulness and knowledge deficits. These fallibilities further reflected the limitations of nurses' capabilities and challenged their ability to engage in VER. Such findings further resonated with Garrett & Reeves [65] and Brubacher et al. [66]. Addressing from the perspectives of attitudinal and control beliefs of the TPB, two important recommendations would arise from these findings of this review. Firstly, this calls for nursing leaders to drive professional education programs to inform and convince nurses on the importance of VER and their crucial role and responsibilities in contributing to patient safety culture. Secondly, it is also imperative for nursing leaders and the broader organization to advocate necessary support mechanisms to provide emotional comfort to nurses affected by their decision of VER. This will cultivate a positive mindset and enhance receptiveness among nurses to VER [57,67,68].

4.2. Nurses' perceived enabling and inhibiting factors of VER

A review of both facilitating and inhibiting factors had demonstrated that the efforts to drive nurses' commitment to VER stemming from various considerations of organizational supports needed improvement. Resonated with the view of Afolalu et al. [39], nurses in this review also posited that their attitude and commitment to VER would be strengthened by addressing various systemic, organizational, and administrative factors. While this review had shown that nurses would value multiple initiatives to drive their positive attitude and commitment to VER, by the same token, having to deprive them of these incentives would further discourage them from doing so. This further points to the limitation of the organization to advocate a just and open patient safety culture that is conducive to supporting VER.

Addressing the inadequacies of reporting systems exemplified

by their perceived complexity and redundancy of existing error-reporting systems in underlying nurses' unwillingness to report errors is one pressing concern. They also represented another situation of control belief, the second domain of Ajzen and Fishbein's TPB [61] as discussed earlier, where Chang [64] further asserted how their perceived lack of supportive resources and opportunities would also act as predictors to hinder their commitment to VER. Nursing leaders need to acknowledge such logistical barriers and strive to simplify and streamline them to encourage reporting. Resonating with the views of Chen et al. [10], this review has also found it critical for nursing leaders to obtain feedbacks from nurses as frontline users to review and improve the reporting process. Considering technological advancement, it is also imperative that the nursing leaders work with information technology designers to establish more user-friendly electronic error-reporting systems. Such supportive steps serve as initiatives that contribute as the enabling factors for VER, but actively involving nurses in the change process is envisioned to drive their positive experiences and dedication to VER.

Ajzen and Fishbein [61] further argued how nurses' attitude and commitment in VER could be shaped by their normative belief, the third domain of TPB. In this instance, Sheeran & Orbell [69] explained that the normative idea concerned the extent to which an individual (nurse) perceived and valued the opinions and attitudes of other people (subjective norm) to perform in that intended action. This review has further highlighted the significance of two aspects of normative beliefs: the nature of the reporting process and responses from nursing leaders following error reporting. Firstly, the bureaucratic and centralized nature of seeking a supervisor's endorsement before engaging in formal error reporting would encroach on nurses' autonomy to abide by their professional accountability to undertake mandatory reporting. Additionally, when nursing leaders practiced selective reporting, and their actions were incongruent with institutional guidelines of compulsory reporting, Lee et al. cautioned that this might cause nurses to experience dissonance and unknowingly endorse and imitate this flawed practice [20]. This would further undermine the organizational efforts to drive a safe and just culture. In this regard, Covell and Ritchie have asserted that individuals tended to follow 'the culture of the floor,' implying that the departmental culture would shape VER practices among nurses [70]. Thus, this reflected the need for nursing leaders to stay objective and exhibit exemplary behaviors of error reporting to drive this positive influence among nurses. Secondly, the issues concerning negative and absence of feedback aftermath VER could impede learning for nurses, who would have only an incomplete understanding of the incident and its factors. In this regard, Hoffmann and Rohe contended that, following error reporting, nursing leaders would have to openly convey the investigation outcomes alongside constructive feedback to the nurses involved to support their learning from mistakes [71]. Accordingly, Hillen et al. [72] and Wong, Cummings, and Ducharme [73] had recommended for nursing leaders to adopt the appropriate leadership style, such as transformational leadership, to model clinical governance stewardship to advocate a conducive working culture desirable for error reporting for nurses, further contributing as an enabling factor to drive their positive experiences in VER.

One recurring finding in this review is fear, identified by nurses as a predominant factor for their evasion from VER. Echoed with the view of Heard et al. [74], the notions of blame, shame, and punishment as highlighted by this review represented different facets of collegial, managerial, and organizational disapproval (normative beliefs) of nurses' erroneous actions and were responsible for their strong and negative evaluation towards VER. This review would discuss nurses' fear from two perspectives, 1) blame

at the management and collegial levels and 2) blame at the personal level and its related consequences.

At the management and collegial levels, nurses' fear of punitive actions and disapproval by their nursing leaders and colleagues has led to their unwillingness to report errors. Two implications could follow. Firstly, Kagan and Barnoy have found that this could lead to nurses deliberately concealing future errors to absolve them from accountability [59]. Secondly, Chen et al. have posited that fear would further demotivate nurses — the frontline users — to voice their insights into problems underlying errors [10]. While nurses are not to be absolved from professional accountability, nursing leaders should be mindful that honest errors are part of human fallibility. Therefore, the focus should be on instilling the belief that error reporting seeks to enhance nurses' learning and improve existing flaws of work processes: such a belief could improve their receptiveness to VER.

At the personal level, the fear of punishments following error reporting drove nurses to strive for perfection in their performance, potentially unknowingly subjecting them to undue pressure. When unmet, such unrealistic perfectionistic expectations might turn into self-blame [75,76]. Reproach by others, coupled with self-condemnation, could further result in more fear and ill feelings towards VER. Thus, the two perspectives have called for nursing leaders at all levels to work with other healthcare stakeholders to drive a non-destructive culture of reporting, serving as an incentive to promote nurses' positive experience toward VER.

4.3. Limitations and strengths

Some limitations are of note. Firstly, while the literature search has involved four databases, the use of more databases might have ensured a more comprehensive retrieval of papers because of the heterogeneous terminology about errors. Secondly, potential publication bias arose from the inclusion of solely peer-reviewed papers in English, as this step could have meant excluding relevant materials from other sources and in other languages. Nonetheless, one of the strengths of this review is that our findings are not confined to one cultural context, and this breadth provides comprehensive insights into nurses' error-reporting behaviors from a global perspective. Secondly, the methodological strength of this review was the adoption of integrative review methods that drives systematic and rigorous screening and reporting of evidence to attenuate potential bias and errors [26,27].

4.4. Implications for nursing management and recommendations

4.4.1. Strategies to enhance nurses' positive attitude, perception, and practice of VER

Following the discussion above on how various factors would profoundly influence VER by nurses, several recommendations are suggested. Firstly, the issues concerning nurses' negative attitude in VER underpinned by their cognitive fallibilities, their negative perceptions towards VER, and their preference towards oral reporting call for the necessity for further attention. Such human approaches to error management posit to attribute an adverse incident to human failures [39,57]. Human failures undermine an organization's effort and ability to build and sustain an effective error-management system. To promote a strong patient-safety culture, three areas of improvement involving continuous learning are warranted. Firstly, undergraduate curricula should instill among nursing students the significance and benefits of error reporting to equip them with sufficient knowledge and correct mindsets to prepare them for practice. Secondly, healthcare institutions should invest time and resources in reviewing and, if necessary, revising existing training initiatives to improve nurses'

proficiency in safety management. Internal workshops on patient safety, risk management, and incident reporting should be incorporated into new nurses' orientation programs to acquaint them with institutional error-management protocols and be organized periodically for existing staff to teach their correct beliefs and adherence to proper practices in VER. Thirdly, identifying the learning needs of nursing staff should also be prioritized to tailor appropriate 'refresher' training to drive their positive attitudes, perceptions, and professional accountability towards VER. Additionally, training opportunities for both senior and middle nurse leaders may be considered to improve their understanding of the significance of their roles through leading by example and role modeling by consistently adhering to institutional error-reporting guidelines. This was exemplified by discouraging the notion of oral reporting and encouraging and affirming their support for nurses' decision to lodge errors through formal incident report systems.

4.4.2. Strategies to support nurses' emotions and to promote their commitment to VER

Nonetheless, the literature on safety has contended that a given adverse incident usually does not originate from a single event caused by an individual (human failure) but rather from a series of events. This view reflects the complexity of the interplay between multiple factors [3,77,78]. Such a systematic approach to error management posits attributing an adverse incident to system failures [57,68,77,78]. Despite advocacy for deemphasizing individual blame by healthcare institutions to promote a supportive culture of reporting [2,56], this review has found that nurses' resistance towards VER was partly due to the entrenched organizational culture characterized by nursing leaders' disapproval of nurses' errors. As such, nurses would view VER as a mechanism that reflected their failures and subjected them to disciplinary actions, which might cause nurses to lose trust in the organization when they perceived a mismatch between idealistic and realistic practice. Consistent with the view of Smeulers et al. [79], this calls for nursing leaders to consider openly encouraging and rewarding nurses for their efforts in disclosing their errors and others, with a focus on root cause analysis and improving the system rather than blame. Additionally, to ease their perceived burden of reporting, nurse leaders could consider incentives, such as allocating protected time within nurses' working hours to meet their daily requirement of completing their necessary administrative duties, or where it is not feasible, to replace with overtime pay if error reporting take place outside work time. Undertaking this recommendation will affirm an organization's commitment to an open and just safety culture and cement nurses' trust in VER.

Lastly, this calls for collaborative efforts among nursing leaders to introduce organizational reforms to promote shared values on error reporting. Firstly, as change sponsors, nursing executives are instrumental in espousing this commitment and legitimizing change in a twofold manner: enacting and conforming to institutional policies that explicitly enforce zero-tolerance to non-reporting behaviors mandating feedback collective contextual learning in the aftermath of error reporting. Secondly, they should ensure supportive protocols and initiatives to manage the emotional needs of distressed nurses due to errors. Thirdly, they could consider organizing corporate team-building events such as staff retreats where frontline nurses are invited and empowered to voice their opinions and concerns. They should also work together with senior and middle nursing leaders to collectively formulate practical solutions to improve error-reporting initiatives. Alternatively, the anonymous employee-engagement survey may be deployed as a platform for nurses who wish to remain anonymous but are keen to share their concerns; this will provide insights into

their perspectives on VER barriers and develop strategies to address them. Nurse managers should critically drive departmental changes by disseminating institutional expectations and error reporting guidelines to all nursing staff to reinforce their adherence. Nurse managers are also instrumental in establishing a positive departmental culture that forms the norm for encouraging error reporting and dealing with errors. This can be done by managing nurses' expectations on error reporting through proper supervision, monitoring and regulating collegial attitudes, and acting as role models for acceptable behaviors by reacting to a mistake saying congruent with the system approach to error management. These initiatives entail an open and supportive risk management system.

5. Conclusions

To the best of our knowledge, this is the first integrative review to integrate findings that examine nurses' attitudes, practices, and emotions, and various enabling and inhibiting factors from gaining comprehensive insights into nurses' experiences in VER from a holistic approach. This review concludes that nurses' experiences in VER have been less than ideal, underlining a thorny problem that would deserve further attention. The connection between nurses' attitude and perception of VER and how various enabling and inhibiting factors perceived by them influence their commitment to VER is evident. This implies that existing organizational initiatives to establish an effective error management system needed improvement. This warrants more outstanding efforts by organizations to formulate and invest in strategies to manage various aspects of human failure and system failure to drive positivity of their overall experiences and devotion in VER. A strong corporate responsibility is needed to establish a safe and just working culture. To display the organization's commitment to driving this cultural shift, nursing leaders should prioritize mass communication of these strategies to raise nurses' awareness of its availability and understanding of their organization's intention to drive patient safety culture to ensure its practicability. Future research should investigate nurses' perspectives on these strategies initiated by their healthcare organizations to evaluate the effectiveness of supporting nurses' learning and emotional well-being after error reporting and promoting their commitment to VER.

Declaration of competing interest

The authors have declared no conflict of interest.

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Data availability statement

Authors declare the absence of shared data in the present study.

CRediT authorship contribution statement

Ming Wei Jeffrey Woo: Conceptualization, Methodology, Formal analysis, Writing — original draft. **Mark James Avery:** Supervision, Methodology, Formal analysis, Writing — review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2021.07.004.

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