

## Medical Error and Under-Reporting Causes from the Viewpoints of Nursing Managers: A Qualitative Study

### Abstract

**Background:** Patient safety as a goal can be achieved by reporting medical errors (ME); however, most errors are never reported. The aim of this study is to explore the causes of ME, and the obstacles in reporting them amongst nurses. **Methods:** We conducted semi-structural interviews, with 12 nursing managers in the biggest teaching hospital in southern Iran (2015-2016). The interview guide concentrated on the causes of ME and barriers in reporting them. All face-to-face interviews were recorded and transcribed verbatim and analysed using thematic analysis. **Results:** In this study 4 main themes were extracted for the causes of ME: personal/social characteristics, nonprofessional practice, hospital related factors/organization contextual factors, and poor management. Also, 5 main themes (such as; personal characteristics, fear from reporting, nonprofessional practices, cultural and social factors, and error surveillance system features) were obtained with regards to barriers in reporting. **Conclusions:** ME can be reduced by improving professional practice and better human resource management. Also, reporting errors can be increased by focusing on cultural and social factors.

**Keywords:** Health policy, medical error, patient safety.

### Introduction

Medical error (ME), a critical public health problem that places patient safety at risk, has become an important public health and hospital priority.<sup>[1]</sup> ME is defined as the act of elimination or utilization of a plan that could lead to unintended result.<sup>[2]</sup> ME is one of the most common causes of death in the US with an estimated 7,000 deaths annually.<sup>[3]</sup> ME can occur at any phase of patient care, even during prevention.<sup>[1]</sup>

It is estimated that preventing ME can save approximately \$17-29 billion dollars annually in the US.<sup>[4]</sup> About 70% of MEs are preventable, and one of the main steps in managing and preventing ME is to improve ME reporting.<sup>[1]</sup> ME reporting can prevent future errors since clinicians learn from their mistakes and may improve patient management, which may regain patients' trust in healthcare providers.<sup>[5]</sup>

In developing countries such as Iran accurate rates of ME are unobtainable because the published data are not reliable.<sup>[6]</sup> Past studies in Iran have reported low rates of ME<sup>[7-9]</sup> which might be due, in

part, to a low rate of reporting, especially amongst nurses.<sup>[10-12]</sup> While there have been studies on factors affecting ME occurrence and the barriers to reporting, these studies were related to specific contexts.<sup>[7,12-15]</sup>

In Iran, nurse managers are hospital middle managers who do not always provide direct patient care. Despite this, they have a critical role in managing the healthcare environment, and they play a key role in ensuring patient safety.<sup>[16]</sup> Our past research with paediatric nurses revealed that the factors affect ME and under-reporting are multidimensional and context-based,<sup>[17]</sup> and many aspects are not clear to us. We chose to develop our strategy for patient safety by exploring the ME and under-reporting causes from the viewpoints of nurse managers in southern Iran's largest teaching hospital, given the impact these nurses have as role models for other nurses.

### Materials and Methods

This qualitative study (2015-2016) was conducted at Namazi teaching hospital, the largest general hospital in Shiraz, southern Iran. The hospital had 1,100 beds in 29 wards with about 24,000 admissions annually.

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Data collection was done using individual, semi-structured interviews.<sup>[18]</sup> The study population was the hospital's nursing managers, especially head nurses. Nurse managers are the nurses such as; matron, nursing supervisors and head nurses (different levels of nursing managers), who are responsible for supervising nurses in a hospital. They pay attention to patient care, manage the decisions, determinant the nurses' schedules, and set work meetings. All nursing managers had been trained by the hospital error-and-risk committee on the definition of ME, types of errors, the prevention methods, and how they could report through the hospital's ME reporting system. Using purposive sampling, we selected and interviewed 12 nursing managers who had ample experience.

All participants provided written informed consent. All interviews were conducted in Farsi and recorded digitally. Demographic data collected from participants included: age, gender, education, and occupational history. Participants were interviewed in their workplace during their shift for 30-40 minutes using an interview guide [Table 1]. All interviews were conducted in a quiet room without any third-party involvement by one of the researchers [RSM], who had been trained in qualitative research methods. All participants were interviewed once, and the interviews were continued until data saturation, which means that no new theme cannot be extracted from participants' speech.<sup>[18]</sup>

The interviews were transcribed in Farsi verbatim by the interviewer. Open coding was performed on the transcripts by Farsi-speaking researchers [RSM, MM, MA]. The coding tree and exemplary quotes were translated into English, reviewed by BM and discussed by the research team until consensus was achieved. Codes were analysed thematically to identify subcategories, categories and themes.<sup>[18]</sup>

**Table 1: The Interview Guide**

**Open Ended Questions:**

Please describe what you consider to be ME.

What do you think about the incidence of ME in your hospital, i.e., how frequently do you see or hear of ME cases?

What kind of ME impacts have you seen on patients?

Have you ever seen or heard of ME that did not cause any injury on patients, i.e., near-misses?

We know that ME worldwide are known to have gone under-reported. What you think about ME reporting in your hospital?

What do you think to be the hindrances for reporting ME in your hospital?

What is your opinion on how hindrances/barriers could be reduced?

In cases where an ME was reported, what do you think about the response from management? Is the management's response was in line with what you expected? Would you like to suggest anything to improve how ME reports are being followed up?

As the final question, do you have any comments about ME in general, and/or about ME in your hospital?

The study was approved by the Shiraz University of Medical Sciences (Grant No. 13189); as well as local Ethics Committee (IR.sums.med.rec. 1395.s214).

## Results

After achieving data saturation, twelve female nurses were enrolled in this study between the age of 34-54 years with the overall professional experiences of 11-28 years [Table 2]. All participants had a bachelor's degree in nursing. The ME causes and barriers in reporting ME were categorised as shown in Tables 3 and 4. The causes of ME was classified into personal/social characteristics, nonprofessional practice, hospital related factors/organization contextual factors, and poor management. The barriers in ME reporting were classified to personal characteristics, fear from reporting, nonprofessional practices, cultural and social factors, and error surveillance system features.

Our participants mentioned personal and/or social characteristics as a cause of ME. They reported "*individual differences in ability and talent*", as well as "*physical and psychological status*" that could lead to ME. They stated that these factors, as well as "*poor precision and motivation*" leads to reduced reporting.

Also, they stated that both high and low *self-esteem* had influence on the cause of ME:

*"Most errors are related to expert and experienced staff, because they believe that they know everything, and their self-esteem is too high."* (N2)

*"There is pressure on us, and I transfer it to my staff, which reduces our self-esteem overtime."* (N11)

Moreover, they reported "*numerous family and social responsibilities*" (N11), which is linked to fatigue and long working hours, leading to ME.

Non-professional practices, was mentioned by almost all our participants, amongst staff and administrators' as one of the main factors which increased ME risk and decreased reporting. In staff level, inadequate knowledge regarding medication rules and patient safety, as well as low experience can lead to ME. They mentioned "*failure to consider the protocol e.g., not doing double checking, 3, 6 or 9 rights can lead to ME*" (N8), the same as "*making mistake in drug dose calculation, especially among new and inexperienced staff*" (N1,4,8). "*Ignoring the instructions and guidelines*" (N4) in dealing with patients, as well as "*using non-holistic approach*" (N3) were other identified important factors.

They stated that nurses do not know various types of errors and cannot identified them. Although, "*irresponsibility*" and "*lack of job ethics*" (N8) might prohibit them from reporting. Sometimes "*they do not pay attention to near miss error.*" But the main obstacle is "*lack of awareness about the importance and advantages of error*

**Table 2: Participants Demographic Characteristics**

ID	Gender	Age in years	Job Title	Education	Overall Professional Experience in Years
N1	Female	40	Matron	Bachelor of Nursing	17
N2	Female	42	Head nurse	Bachelor of Nursing	19
N3	Female	48	Nursing supervisor	Bachelor of Nursing	25
N4	Female	37	Head nurse	Bachelor of Nursing	15
N5	Female	40	Head nurse	Bachelor of Nursing	17
N6	Female	34	Head nurse	Bachelor of Nursing	11
N7	Female	38	Head nurse	Bachelor of Nursing	16
N8	Female	40	Head nurse	Bachelor of Nursing	17
N9	Female	54	Head nurse	Bachelor of Nursing	28
N10	Female	43	Head nurse	Bachelor of Nursing	19
N11	Female	47	Head nurse	Bachelor of Nursing	24
N12	Female	44	Head nurse	Bachelor of Nursing	18
Mean±SD	-	42.25±5.45	-	-	18.83±4.71

**Table 3: The Causes of ME Occurrence**

Category 3	Category 2	Category 1
Personal/social characteristics	Individual differences in ability and talent	
	Self- confidence	
	Physical and psychological status	
Nonprofessional practice	Numerous family and social responsibilities	
	Knowledge/ awareness deficit	Medication rules
	Irresponsibility	Patient safety
	Low experience	
	Non holistic approach	
Hospital related factors/ organization contextual factors	Ignoring the instructions and guidelines	
	Big hospital	
	Teaching hospital	
	Patients' status	
Poor management	Drug problems	Drug label similarities
		Drug shape similarities
	Weak human resource management	Heavy workload
		Staff shortage
		employing under qualified staff
		Unsuitable staff arrangement
	Inadequate training	Inadequate training to nurses
		Inadequate training in university
	Inadequate training of staff in hospital	
	Poor supervision	
	Poor root cause analysis	
	Poor coordination between the different parts	
	Hospital financial problems	
	Sub-optimal facilities and equipment	
	Inappropriate discharge process	

reporting” (N7). They suggested more effective training to begin from the early years of university education:

*“I think this (patient safety) should begin from the university and continue until we learn to become concern about reporting errors.”* (N7)

Apart from the above factors, the participants mentioned the role of poor management and administrators’

nonprofessional practice in ME, especially “*weak human resource management*”, which is due to “*staff shortage, employing under qualified staff*” and “*undesirable staff arrangement*”. All of these factors have a close relationship with “*heavy workload*”, which was mentioned by the participants. Long and hectic work shifts, with shortage of human resource leads to fatigue, and then, the risk of errors would increase. Also, heavy workload leads to fatigue and lack of time to report (N6).

Moreover, they stated that this problem is related to hospital financial issues:

*“If we want to prevent errors, we should have accurate equipment, and enough staff?”* (N11) *“We always have financial issues and we don’t have enough human resources.”* (N4)

Also, they talked about the necessity to supervise the staff. One participant talked about “*the possibility of manipulating notes and cover-up’s*” (N1), which can be reduce by more rigorous supervision. They suggested more rigorous supervision of the staff, especially nurses to reduce ME:

*“This is a teaching hospital, and there are a lot of medical and nursing students here. But, unfortunately, they are not supervised properly.”* (N12)

It is noticeable that “*inadequate training*” about medication rules and patient safety issue in university and in-service in the hospital leads to low nurses’ competence and their nonprofessional practices. One of them suggested that patient safety issue should be part of the curriculums (N1).

With regard to reporting errors, the role of training and evaluation is clear. Few and ineffective training programs, incomplete attendance, and substandard evaluation, as well as inefficient academic educational curricula about patient safety, were mentioned by the participants as reporting barriers. They suggested more continuous, effective workshops, by using technology and presenting attractive booklets as a solution, as well as more face-to-face friendly training programs (N12).

**Table 4: The Barriers in ME Reporting**

Category 3	Category 2	Category 1
Personal characteristics	Individual differences in ability and talent	
	Psychological issues	
	Poor motivation	
Fear from error reporting	Poor precision	
	Fear from educational problems	
	Fear from occupational problems	
Nonprofessional practices	Fear from official's reaction	
	Fear from legal consequences	
	Staff's nonprofessional practices	Inadequate knowledge and skill
	Administrators' nonprofessional practices	Unprofessional behaviour
		Irresponsibility
Cultural and social factors (work culture)		Heavy workload
		Weak human resources management/Ineffective human resources management
		Poor supervision
		Blaming culture
		Inadequate encouragement
Error surveillance system features		Enforcement policy/penalties
		Poor error reporting culture
		Poor peer support
		Patients' legal issues
		Error management problems
		Lack of policy and procedures for reporting errors (No transparency)
		Poor training and evaluation system
	Lack of information privacy	
	Poor root cause analysis	
	No feedback	

The supervisors mentioned Root Cause Analysis (RCA) as a necessary managerial duty for identifying the problems root in patient safety processes (N11). *“Poor coordination between different parts of hospital”* (N11), as well as *“sub-optimal facilities and equipment”* (N9, 11) are both linked to hospital poor management that can lead to ME. Another effective factor that can cause ME is *“inappropriate discharge process”* (N12)

Hospital related factors, such as *“being a central teaching hospital”* (N1, 3, 4, 8) with a high load of medical services, *“poor condition patients that most of them have end stages disease”* (N1, 3), high patient turns over (N5, 12), and *“drug similarities in label and shape”* (N4, 9) linked by all participants to ME.

Our participants stated that fear from error reporting, such as fear from educational and occupational problems, official's reaction and legal consequences limits error reporting.

*“Fear! Many nurses are afraid. They think if they report the errors, they'll be punished.”* (N2) *“I think that they are scared from its consequence.”* (N7)

Also, the nursing managers declared that cultural and social factors (work culture) can influence reporting errors,

which includes; blaming culture, enforcement policy/penalties, inadequate encouragement, poor error reporting culture, poor peer support, and patients' legal issues. They suffer from administrators' inappropriate reaction, e.g., stereotyping an error to the whole ward by ridiculing them. Also, nurses might lose their occupational position due to reporting errors.

*“They (administrators) magnify an error, till she (error reporter) says: yeah, I regret reporting the error.”* (N5)

It was stated that administrators should have appropriate reaction according to the type of errors (N 3, 11). They believed that administrators' approach toward error reporting influences their next reports. They suggested fewer penalties and more encouragement to make error reporting a culture. They should focus on financial or non-financial rewards to increase the willingness to report (N8). Moreover, the nurses were worried about inappropriate reaction from their colleagues as well as patients' legal issue, which prevented them from reporting.

Error surveillance system features was another theme that was revealed in this study. A problem, which was mentioned by the nurses is: error surveillance system is new in this hospital. One of them said: *“They (higher aged nurses) don't accept changes. This error reporting system is new to them.”* (N11) Also, they stated that this program was not a priority for the administrators (N4).

The nurses stated that the presence of Patient Safety Agent (PSA) should be done fulltime in all wards. PSA is a nurse who conducts ME surveillance system in the wards and is trained on patient safety and ME that has friendly relationship with nurses. They can make the error reporting easier. Also, they talked about the ways to report. They believed that having various methods is an important feature of the error surveillance system. This would allow them to choose a method according to their situations. But they said that this system is time-consuming, and should be more user friendly. Consequently, they choose written method more than online website (N9). Moreover, our participants said that ME reporting processes should be more transparent, as well as clarifying the reporting advantages, consequences, and feedbacks (N3). It means that lack of clarification in error reporting processes has negative impact on reporting errors. Also, they felt that names of the wrongdoer and error reporter is revealed.

## Discussion

This study revealed other complex aspects to ME and under-reporting causes, one of which involved the personal and social characteristics of nurses, which have a significant influence on patient safety.<sup>[19]</sup> Nurses are different regarding their capabilities and talent. Older, experienced nurses often possess outdated knowledge, and no longer have motivation to learn new materials. Also, despite being highly experienced, sometimes physical and psychological

problems,<sup>[20,21]</sup> such as vision problems, can result in a higher number of errors in this age-group. Furthermore, these individuals show more resistance to new programs, such as the medical error reporting system, and they have less capabilities to do multiple tasks. But it was suggested that older experienced nurses had higher fear for error consequences, hence, they paid more attention to patients' care, beside their work experiences which new nurses do not possess.<sup>[22]</sup>

In the present study, we found that both high and low self-confidence can be a cause of ME. Lack of self-confidence in newly employed staff would lead to ME, while an extremely high confidence in one's own knowledge and skills would lead the individual to believe him or herself immune to errors, and start ignoring the details, which is a sure-fire recipe for ME. In addition, having numerous family and social responsibilities, such as being female, married, having children, and emotional states, such as stress and anxiety can be distractive in the workplace, which was mentioned in other studies, too.<sup>[20]</sup> Conversely, female staff are more careful and have fewer errors.<sup>[6,23]</sup> Also, financial problems force people to work overtime and cover more shifts to compensate, which would lead to more ME due to heavy mental workload and fatigue, similar to previous studies.<sup>[15]</sup> Moreover, previous research places lack of motivation, negligence and lack of a sense of responsibility among characteristics that prevent error reporting, which is consistent with our results.<sup>[14,24]</sup>

Studies have shown that personal characteristics are more difficult to resolve than organizational ones: "We cannot change the human condition, but we can change the conditions under which humans work".<sup>[25]</sup> Note that employee's health is a significant factor in making improvement in any hospital, which is firmly addressed in the Health Promoting Hospitals (HPH) project.<sup>[26]</sup> Through monitoring and treatment of physical and psychological problems in employees, we can continue benefiting from the experiences and capabilities of the staff, especially older individuals. We must also pay more attention to the distribution and organization of human workforce; in other words, when assigning the nurses to each medical department, we must ensure their capabilities fit the requirements of that department.

On the other hand, by hiring young and motivated employees after proper assessments, our workforce would be more useful for the current system. We also need to retire inefficient nurses before term. However, financial problems in payment of employee salaries, shortage of human workforce and lack of consistency between the number of nurses and patients have limited the administrations in proper management of the workforce; thus, they are forced to employ young and inexperienced nurses to spend their internship period in the hospital.

Similar to previous literature, our study indicates that unprofessional behaviours of young and inexperienced

nurses would both lead to ME and negligence toward reporting it. These nurses have less knowledge regarding medications, their required doses and methods of drug preparation, administration, and double checking, and are less familiar with the matters of patient safety,<sup>[20]</sup> such as the definition of medical error, error types, methods of error prevention and correction, and benefits and methods of error reporting, all of which result in a lower rate of error reporting. In this relation, it is necessary to include the topics pertaining patient safety and error reporting in the nursing curricula,<sup>[7,14,23]</sup> so the nursing students would have a good understanding of them before entering the clinic.

Furthermore, to have the necessary qualifications, nurses need to receive proper training on the use of instructions and guidelines,<sup>[20]</sup> such as 3 and 6 control rules,<sup>[27]</sup> and WHO's nine patient safety solutions<sup>[28]</sup> (especially in use of similar drugs in terms of name, pronunciation, form and colour), adoption of a holistic approach in dealing with patients and the subjects relating to ME. This education can also be provided through in-service training programs. Although these courses were provided in our study setting, they seemed ineffective. The participants emphasized that training sessions need to be continuous, short and interesting, multi-professional using problem solving methods, and include the use of technology-based methods (e.g. educational video clips or mobile applications), so the nurses who are too busy can also benefit from the education. Standard supervision, monitoring and evaluation of nursing performances is another strategy to improve patient safety.

Another matter pointed out by our participants was the size of the hospital. This hospital, which is one the biggest central and referral specialized medical centres in southern Iran, often admits critically ill and poor-prognosis patients, who are in their final disease stages, requiring high amount of diagnostic and treatment measures. In line with previous studies, our results confirm that this would lead to heavy workload, exhaustion, lack of concentration and eventually, increased occurrence of ME; what's more, the shortage of staff would only add to the negative effects of this problem.<sup>[20,27]</sup> After working long shifts with a heavy workload and multiple task, under critical and stressful conditions, the nurses might become more forgetful toward error reporting or simply not have enough time to write the reports.<sup>[14,24,27]</sup> Through better management of the workforce, as mentioned earlier, and use of the RCA method, which is defined as a method of problem solving,<sup>[29]</sup> we can identify the sources of our existing problems and take the necessary measures to resolve them. We could prevent the majority of errors through coordination between different diagnostic and treatment departments, and strong collaboration of physicians and nurses.<sup>[30,31]</sup> In this regard, the significance of role models (e.g. medical and nursing professors) for teamwork and to improve coordination between staffs and

wards was mentioned by the participants. Moreover, ME can be reduced by provision of standard and sufficient equipment and facilities,<sup>[27,32]</sup> as well as improvement of the patient discharge process, which must involve appropriate instructions and future follow-ups.

During the past few years, an electronic web-based error surveillance system was launched in this hospital. Improving the error reporting system is one of the effective ways to improve the level of patient safety.<sup>[7,10,19]</sup> However, it is still necessary to place error reporting among the hospital priorities. Head nurses often don't have enough time to educate the nurses on the necessity of error reporting and its methods, or supervise their performances because they are heavily involved with other activities outside of their job description. Although, employment of patient safety agents has resolved this issue to some degree. It is somewhat difficult for older nurses to accept a new system, as they are less skilled in working with a website, which could be due to lack of information technology (IT) knowledge and skill,<sup>[15]</sup> and thus have problems with electronic reporting; these individuals always prefer to reports via written methods or telephone. Therefore, in addition to provision of training on IT knowledge in all employees, which leads to increased error reporting,<sup>[33]</sup> we need to provide alternative methods of error reporting for individuals to choose based on their situation. Also, this system needs to be made user-friendly, time-saving, have appropriate information security, possess the ability to perform RCA, and provide outputs. In this regard, all participants believed that providing feedback to error reports would encourage them to report more errors in future instances, in line with previous studies.<sup>[8,15,23]</sup>

Furthermore, we need to clarify the staff of all processes, benefits and consequences related to error reporting,<sup>[7,10,23]</sup> in order to diminish their fears of the reporting consequences, especially in regard to occupational,<sup>[6]</sup> educational and legal problems.<sup>[15,20]</sup> Nurses are often concerned about negative reactions from administrators,<sup>[6,8,20,24]</sup> and co-workers toward.<sup>[34]</sup> They feel the error surveillance would identify the reporter and the person responsible and they would have to face retribution, or that their co-workers will have a different and judgmental attitude toward them, since blame can lead to a sense of insecurity.<sup>[25]</sup>

Interestingly, the attitude of administrators toward error reporting is predictive of reporting rates in the future. Exaggeration of errors, punishment,<sup>[11,15]</sup> existence of a blame culture,<sup>[34]</sup> lack of support,<sup>[7,14,24]</sup> and attitudes disproportionate to the severity of errors,<sup>[8]</sup> were all named by our participants as barriers to error reporting, which is somewhat consistent with results from previous studies. However, since the hospital policy is to have a supportive attitude toward reported errors, no reprimand or punishment for error reporters or wrongdoers,<sup>[25]</sup> this negative vibe needs to change by ensuring the nurses that they support

them and provide their identities. Since, this negative atmosphere prevents the staff from reporting, and which is related to cultural and mental backgrounds. Although, they did mention the necessity of firm legal responses to sentinel events and life-threatening errors. In other words, punishment should fit the crime. Additionally, financial and non-financial encouragement,<sup>[14,25]</sup> such as books or letters of commendation, can also be a motivation for error reporting in nurses.

One of the measures taken in the hospital under study is assignment of patient safety agents, who are intermediaries between the errors-and-risk committee and various hospital sections. These agents are selected from departments' nurses and assigned the task to collaborate with the department head nurse and provide training, information and supervision in matters relating patient safety. With a friendly attitude, these agents familiarize the other nurses with the benefits of error reporting and encourage them to do so. We did not find any similar cases in previous literature; however, the similar role of Liaison Nurses in infection control has been widely discussed.<sup>[35]</sup> Considering the satisfaction of our participants with the effective presence of patient safety agents, we recommend that other medical centres as well employ such agents to establish the culture of error reporting and improve their patient safety levels.

Finally, in line with previous studies, there is the matter of patients taking legal action against responsible parties,<sup>[26]</sup> and lack of social support,<sup>[14]</sup> which were another important cause of under-reporting, and dependent on community conditions, past values and training. The negative atmosphere of the media and society against healthcare providers in Iran, cause fear and concern. But it should be considered that to err is human, and different organizations must adopt more supportive policies toward accidental errors, meanwhile protecting patient rights; liability insurance plans play a significant role in this regard.

We published the same study on the paediatric nurses,<sup>[17]</sup> but there are some differences between these two studies. For example, in the current study, self-esteem as well as physical and psychological status were identified as an effective factor on ME. Also, this study showed that drug problems such as similarities in shape and label can lead to ME. Unsuitable staff management, poor supervision and poor RCA, which were categorized as poor management may cause ME. About barriers in ME, some factors were found in this study, which were not abstained in the previous one, such as psychological issues, fear from reporting, poor error reporting culture, no feedback, as well as error management problems. These differences may be due to different in groups of study, and participants' job positions. Nurses are at the close contact with patients, and their positions are lower than nursing managers. So, they mentioned related factor in another aspect.

### Limitations and suggestions

The main limitation about this study was conducted only in one healthcare system, and the participants mentioned their perceived obstacles in reporting ME, but not the actual barriers. Also, we interviewed the key nurses, who volunteered. We suggest to use other ways for gathering information such as observation and reviewing documents for next studies. Also, it is suggested further studies, especially quantitative studies on other groups of hospital staff to reveal other hidden aspects of ME to design interventional programs for better patient safety.

### Conclusions

In this study, the main aspects for ME and barriers to report were revealed in this setting. We can reduce ME by improving professional practice and better human resource management such as using a holistic approach in dealing with patients, having more supervision and more effective training programs, plus employing more qualified personnel. Also, reporting errors can be increased by focusing on cultural and social factors, and error surveillance system features. It means that culture of reporting errors should be promote, blaming the staff should be reduced, and it is better that we encourage them. On the other hand, it is necessary to make surveillance system more users friendly.

### Declaration of Participants' consent

The authors certify that they have obtained appropriate written informed consent from all participants.

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### Conflicts of interest

There are no conflicts of interest.

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