

Medical Errors and Barriers to Reporting in Ten Hospitals in Southern Iran

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Abstract

Background: International research shows that medical errors (MEs) are a major threat to patient safety. The present study aimed to describe MEs and barriers to reporting them in Shiraz public hospitals, Iran.

Methods: A cross-sectional, retrospective study was conducted in 10 Shiraz public hospitals in the south of Iran, 2013. Using the standardised checklist of Shiraz University of Medical Sciences (referred to the Clinical Governance Department and recorded documentations) and Uribe questionnaire, we gathered the data in the hospitals.

Results: A total of 4379 MEs were recorded in 10 hospitals. The highest frequency (27.1%) was related to systematic errors. Besides, most of the errors had occurred in the largest hospital (54.9%), internal wards (36.3%), and morning shifts (55.0%). The results revealed a significant association between the MEs and wards and hospitals ($p < 0.001$). Moreover, individual and organisational factors were the barriers to reporting ME in the studied hospitals. Also, a significant correlation was observed between the ME reporting barriers and the participants' job experiences ($p < 0.001$).

Conclusion: The medical errors were highly frequent in the studied hospitals especially in the larger hospitals, morning shift and in the nursing practice. Moreover, individual and organisational factors were considered as the barriers to reporting MEs.

Keywords: medical errors, hospital incident reporting, refusal to participate, hospitals, Iran

Introduction

World Health Organization (WHO) has indicated patient safety as a priority in healthcare delivery system (1). Medical errors (ME) in delivery of healthcare are a major threat to patients' safety (2). Approximately, 10% of the patients admitted in hospitals in high-income countries suffered from MEs or medical adverse events. According to the published reports, ME is one of the main causes of increasing complaints in hospitals (3,4). Moreover, 4% of hospitalisations involved adverse events that prolonged the hospital stay. About 58% of these adverse events were judged to be preventable, and one in four was attributed to negligence (5). Additionally, Stratified indicated that 225,000 deaths per year

occurred from iatrogenic causes after deaths from heart diseases and cancers in the United Nations (6).

Studies have shown that the causes of MEs included lack of job training and experience, burnout, stress, heavy workload, and lack of communication among healthcare professionals, with medical knowledge deficiency being the most important one (7,8). Yet, one of the main factors in prevention of MEs and thus increasing patient safety is reporting of MEs and near miss (9). Reporting of errors is crucial to the process of error management. It is also recommended both as an ethical obligation and to comply with emerging accreditation standards (10,11). In

addition, attention should be paid to the hospital staff's viewpoint to improve MEs reporting and interventions should be designed to enhance their knowledge in this area (12).

Evidence has demonstrated underreporting as a significant problem, particularly in non-confidential reporting systems (10). Such reporting is discouraged because of a fear that they could reveal specific flaws in professional competence and individual ability and provide a basis for professional sanctions or punishment (13).

Reporting is fundamental to the broad goal of error reduction. However, barriers to reporting must be addressed before an incident reporting system can have a substantial impact on patient safety. Reporting will occur only if practitioners feel safe doing so and it becomes a culturally accepted activity within the healthcare community. Until healthcare embraces such a culture, practitioner reporting will continue to be an untapped resource (14).

There are, however, powerful disincentives to reporting. For instance, management attitudes and institutional climate can greatly influence the success or failure of reporting efforts (15).

Given the importance of MEs that could lead to high costs for patients and healthcare system, more researches are required to be conducted in this area, so that the number of MEs can be decreased.

The present study aimed to describe MEs and barriers to reporting in Shiraz public hospitals, Iran.

Methods

This cross-sectional study was conducted in Shiraz public hospitals in 2013. Shiraz is the sixth broadest city in Iran and has 19 public hospitals, 10 of which had ME documentations. The present study was performed in these 10 public hospitals (two general and eight specialised hospitals). Data were gathered for one year (March 2012 to March 2013). The data collection was done in two phases. In the first step, the MEs referred to the Clinical Governance Department and recorded documentations were considered. The MEs were measured using the standardised checklist of Shiraz University of Medical Sciences (including type of MEs, ward, the individual committing the error, and time of error occurrence). In the second step, the most relevant factors that influenced the reporting of MEs in the hospitals were identified using Uribe questionnaire (16). This questionnaire was developed by Uribe in 2002 and includes two

sections; individual and systemic factors, which assess the perceived barriers to reporting of MEs. The reliability of questionnaire was confirmed in the present study using Cronbach's alpha ($\alpha=0.87$). In this study, a total of 327 subjects were selected based on the sample size (single proportion) formula with the confidence interval set at 95%, precision at 3% and prevalence at 9%.

$$n = \frac{\left(Z 1 - \frac{\alpha}{2}\right) P (1 - P)}{d^2} = 350$$

All data were analysed using SPSS software (v. 16). We used frequencies and percentages to describe the medical errors. The Chi-square test was used to compare the association between two categorical variables. The level of significance was set at p values of less than 0.05.

Results

In 2013, a total of 4379 MEs were recorded in the 10 studied hospitals. The highest number of MEs was related to the largest hospital (2405 MEs, 54.9%). The frequency of MEs is shown in Table 1.

According to Table 2, most of the MEs in the hospitals were reported in the nursing practice category (2951 or 67.3%) followed by physicians and other personnel's practices (20.2% and 12.4%, respectively). Besides, the highest frequency was related to systemic errors (27.1%) followed by technical and treatment errors. The results

Table 1: Frequency of medical errors recorded in the studied hospitals in 2012 to 2013

Frequency (%)	Hospitals no.	Hospital size
115 (2.63)	1	Below 100 beds
342 (7.82)	2	100–299 beds
234 (5.34)	3	
177 (4.04)	4	
52 (1.18)	5	
288 (6.58)	6	
72 (1.65)	7	
91 (2.07)	8	
603 (13.77)	9	Above 300 beds
2405 (54.92)	10	
4379 (100)	10	Total

Table 2: The recorded medical errors based on individuals and hospitals departments

Frequency (%)	Components	Variables
885 (20.2)	Physician	Individual committing the error
2951 (67.3)	Nurse	
543 (12.4)	Services personnel	
1590 (36.3)	Internal	Ward
392 (9.0)	Lab	
519 (11.9)	Operation room	
182 (4.2)	Intensive care unit	
188 (4.3)	CCU	
187 (4.3)	ENT	
84 (1.9)	EYE	
457 (10.4)	Surgery	
43 (1.0)	X RAY	
18 (0.4)	IVF	
76 (1.7)	NICU	Type of medical errors
357 (8.2)	Emergency	
23 (0.5)	Pharmacy	
58 (1.3)	Neurosurgery	
192 (4.4)	Women	
9 (0.2)	Others	
240 (5.4)	Diagnosis	
771 (17.6)	Treatment	
754 (17.2)	Drug	
526 (12.0)	Record	
1189 (27.1)	Systemic	Time of medical error
899 (20.5)	Technical	
2410 (55.0)	Morning	
1195 (27.2)	Afternoon	
774 (17.6)	Night	

showed that 55% of the errors had occurred in the morning shift. In each of the three groups (physicians, nurses, and services) also, most of the MEs had occurred in the morning.

Table 3 shows the association between three working groups of the personnel and MEs.

According to the results of Chi-square test, there was a significant association between MEs and the wards of hospitals ($p < 0.001$). Moreover, based on the result of Pearson test, MEs were different in various hospitals ($p < 0.001$).

Overall, 284 participants responded to the ME reporting barriers questionnaires (response rate: 81%). The mean age of the respondents was 28.2±8.4 years and 223 participants (78.5%) were female. Besides that, the majority of the participants were nurses (76.8%) and the others (23.2%) were physicians. Moreover, 54% of the participants had less than 5 years of working experience and 49.6% were contractual employees. The study results indicated that the means of individual and organisational factors (12.1±3.27 and 46.6±9.31) were higher compared to the basic means (10 and 32.5, respectively). Therefore, these two factors were considered as the barriers to reporting the MEs in the study hospitals. Furthermore, the results of one-way ANOVA revealed a significant correlation between the MEs reporting barriers and working experience ($p = 0.041$).

Discussion

The present study aimed to describe MEs and the perceived barriers to reporting them in Shiraz public hospitals, Iran. MEs are a challenge in every country, and health systems suffer from human and economic expenditures due to these errors. In this study, 4379 MEs were recorded within 12 months, which is a great risk for the hospitals because any error can harm patients and sometime patients die due to MEs (2). MEs may also contribute to significant increases in patient morbidity and mortality and impose costs on both patients and health systems so that the cost of hospitalisation increased by \$677 to \$9022 due to the increase in the length of hospital stay (5). Pham indicated that the frequency of errors was 78 reports per 100,000 visits in the emergency department in the US (17). Landrigan also studied 10 hospitals and reported 25.1 ME per 100 admissions in the hospitals (18). Sirriyeh stated that “there is consistent evidence for the widespread impact of medical errors on health system staff” (19).

Vazin in her study found that the rate of errors was alarming and required implementation of a serious solution. She also concluded that errors occurred when the staff were busy and tired (20) or worked in long shifts (21). Similarly, Dorian found that consecutive shifts were a contributing factor to the occurrence of errors (22). The majority of the patients in developing countries prefer to be admitted in public hospitals, because of their inability to afford hospital costs. However, higher workload in these hospitals can increase the frequency of MEs. Therefore, considering

Table 3: The association between type and time of errors with individuals committing errors

p value	df	Value	Individual			Components	Variables
			Services personnel	Nurse	Physician		
<0.001	24	8.229	33 (13.7)	98 (40.8)	109 (45.5)	Diagnosis	Error types
			9 (1.2)	600 (77.8)	162 (21.0)	Treatment	
			66 (8.8)	417 (55.3)	271 (35.9)	Drug	
			28 (5.5)	415 (78.8)	83 (15.7)	Recorded	
			361 (30.4)	717 (60.3)	111 (9.3)	Systemic	
			46 (5.0)	704 (78.4)	149 (16.6)	Technical	
<0.001	18	1.203	313 (13.1)	1502 (62.3)	595 (24.6)	Morning	Time
			152 (12.7)	834 (69.7)	209 (17.4)	Afternoon	
			78 (10.2)	615 (79.4)	81 (10.4)	Night	

• Chi-square test

the human and financial burden of MEs, senior managers and staff should pay more attention to MEs reducing strategies in health systems, particularly in hospitals. These strategies may include light workloads, favourable working conditions, effective systems, good policies and procedures, proper communications among the medical staff, and use of appropriate technologies. Since having enough knowledge can prevent the incidence of MEs, medical personnel, particularly physicians, are also suggested to increase their professional knowledge (23).

Our study showed that systematic and administration errors were the most important MEs. This finding is consistent with that of the study by Patanwala, showing systematic errors as the second factor resulting in MEs (24).

The systematic factors that can lead to MEs are staffing levels, nurses' skills (proportion of care given by nurses), shift length, patient acuity, and organisational climate (5). There is also a wide range of system-related human factors that can impact MEs. These factors include characteristics of individual providers (e.g. training, fatigue levels), nature of the clinical work (e.g. need for attention to details, time pressures), and design of the physical environment (e.g. designing rooms to reduce spread of infection and patient falls) (2). According to these results, systematic factors should be reduced through appropriate planning, revising the organisational process, and paying more attention to appropriate interpersonal communication in hospitals.

The present study findings demonstrated that nurses reported their errors more than physicians and other groups, perhaps because the

nurses believe that ME reporting tends to lead to positive outcomes in the hospital (25). Besides, the nursing job is very critical and nurses spend eight hours in each shift, fatigue and burnout might have led to MEs. These results were in line with those of the study by Pham, indicating that nurses reported 54% of the errors (17).

Moreover, MEs were found to be more frequent in larger hospitals compared to the smaller ones. A previous study showed that MEs in large hospitals resulted from crowd and fast-paced nature of care (17). This could be as formal reporting structures in large hospitals rather than small hospitals. Nonetheless, hospitals' top and middle managers should consider reporting validation and prevention of errors in large hospitals.

The result of this study showed that most of the errors occurred in the morning shift, which might be due to the fact that the personnel's workload is higher and they are forced to do their tasks faster at this time. Since the studied hospitals were public and more people tend to be admitted in public hospitals (because of inability to pay in private sector), especially in the morning, workload is quite high in this shift and the personnel, particularly nurses, are faced with more duties compared to other shifts. All these factors can result in commitment of errors by nurses and other personnel. However, Pham indicated that the highest percentage of errors occurred in the evening shift. On the other hand, a study in Iran revealed that MEs occurred more at night shifts (26). A study in developed countries also found that MEs were more frequent at night and hospital employees were at an increased risk of

injuries in the evening and night shifts compared to morning shifts (17). The high rate of errors in the morning might be associated with workload in hospitals. Hence, clinical staff, especially nurses, should be more cautious in morning shifts to prevent errors in the hospitals.

According to the current study results, systematic and individual factors were the barriers to reporting MEs. Kalra and Lederman believed that systematic factors, such as managerial policies and fear of litigation in response to error disclosure, (27) lack of training, lack of enough time to enter the errors, and lack of access to a computer were important factors in refusal to report MEs (25). Since proper disclosure of MEs and adverse events is the key factor for quality improvement (26), error reporting strategies are critical to reduce MEs (5). Some studies found that the most significant systematic and individual barriers to reporting were a hierarchical hospital structure where the clinical staff disagreed about the definition of reportable errors, fear from the response and reaction of hospital administrators and colleagues to a reported error, and lack of time for documenting and reporting an error (28-31). Also, it is recommended that hospitals adopt electronic incident reporting to save the staff's time (25).

In conclusion, several strategies are recommended to increase the reporting of MEs, including agreement on the definition of MEs, simplification of errors and supporting the individuals committing errors, improvement of patient safety culture that rewards and learns from error reporting, and establishment of a feedback system to determine the factors contributing to error. Using these simple strategies, managers and staff can prevent a high percentage of deaths and costs in hospitals.

Conclusion

MEs were highly frequent in the studied hospitals especially in the larger hospitals, morning shift and in the nursing practice. Moreover, systemic errors had the highest frequency of MEs and individual and organisational factors were considered as the barriers to reporting MEs. Errors can be decreased through strategies, such as training the nurses and other providers regarding safe practices and changing the systems and technologies. Yet, further research is needed to identify the interventions which can reduce these risks and to evaluate the effectiveness of these interventions.

Implications for Policymakers

- 1 - The recorded medical errors were highly frequent in the hospitals.
- 2 - The most frequent errors were systematic errors.
- 3 - Most of the errors occurred in larger hospitals, internal wards, and morning shifts.
- 4 - Individual and organisational factors were the barriers to reporting of medical errors in the hospitals.
- 5 - Strategies, such as training the nurses and other providers regarding safe practices and changing the systems and technologies, can reduce medical errors.

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Conflict of Interest

None.

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Authors' Contributions

Study design: MK, RR
 Data gathering: MK, RR, EB, FS
 Data analysis: MK
 Preparation of the manuscript: RR, EB, FS
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