

Original Research Article

Determining Error Underreporting Using Incident Reports in Omani Hospitals

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Abstract: Purpose: Medical errors is a major health-safety issue in many hospitals; however, many of those errors are went underreported. Willingness of nurses to report the errors accurately is a key role in overcoming the underreporting issue. Therefore, this study determined the frequency of errors, error underreporting in Omani hospitals, and nurses' perceptions of the adequacy of the processes of error reporting and the most common errors, as well as the beliefs about reasons for underreporting. **Method:** The study used a descriptive cross-sectional design. Data were collected from 31 units in 11 Omani hospitals from July 2016 to July 2017 using incident reports and surveys completed by 562 nurses. Nurses were asked about reasons for underreporting, common errors on their patient units, and the adequacy of error reporting processes. Data were analyzed using SPSS version 24. **Results:** The rate of errors determined by incident reports was compared to the rate provided by the Institute of Health Improvement using its trigger tool. In comparison to the predicted error rate of .40 identified by the trigger tool, the rate of errors across all units was .0164. There was a significant difference in reported and predicted rates ($z = 4.36, p < .001$). All units (31) had significantly lower than predicted error rates, indicating underreporting. Despite the belief that the error reporting processes were adequate, most nurses identified fear of punishment as a common reason for underreporting. **Conclusion:** Fear was identified as a common cause of underreporting; therefore, it is necessary to implement a culture of safety to address underreporting, inaccuracy in rates of medical errors, and patient safety.

Keywords: Medication errors, nursing, incident reporting, healthcare global trigger tool.

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1. INTRODUCTION

Medical errors are a universal health-related issue. Some organizations such as the U.S. Centers for Disease Control and Prevention (CDC) identified medical errors as the third leading cause of death in the United States (U.S.) [1]. An error is defined as "failure of a planned action to be completed as intended or the use of the wrong plan to achieve an aim" [2]. Medical errors may include falls, pressure ulcers, medication errors, and hospital-acquired infections (HAIs) [3,4]. Studies have addressed reporting and non-reporting of errors and explored reasons why errors are not reported [5,6]. It is estimated that 95% of errors go unreported [5].

Fear of reporting has been recognized as the most common reason nurses fail to report errors [5]. Lack of security, time, support, confidence, and knowledge about reporting processes have also been identified as reasons for underreporting [7,8].

Patient safety has been identified as a priority objective for the Omani Ministry of Health (MOH) and part of its organizational mission [9]. However, the incidence of medical errors in Oman is unknown because of incomplete information on reporting of errors in Oman. The only published report in Oman was limited to medication errors [10]. This report, *Drug Monitoring*

Centre Annual Feedback report, identified few incidents or errors over three years, which is inconsistent with literature on medication errors. Therefore, this study was conducted to determine the frequency of errors and their underreporting in Oman hospitals, and to explore nurses' perceptions of the adequacy of the processes of error reporting and the most common errors, as well as their beliefs about reasons for underreporting.

2. METHODS

A descriptive cross-sectional design was used in this study. Data from incident reports were collected from 31 units in 11 regional Omani hospitals. Data about reported falls, pressure ulcers, medication errors, and hospital-acquired infections were obtained and analyzed. Despite that the incident report system of determining the incidence of errors has been reported to underestimate the number of errors, [11] it is the only system used in Oman hospitals. Prior to distribution of the questionnaire to nurses, the first author went to all units and invited nurses to participate in the study and explained the study purposes and the significance of the study. Data about nurses' opinions and beliefs about errors and reporting of errors were collected through limited-choice questions.

This study was conducted in 11 governmental hospitals that were selected based on the administrative divisions and geographical locations in Oman. The study included 31 medical-surgical units in the 11 hospitals. A convenience sample ($N = 562$ nurses) was included in study. Of the 562 nurses who participated in the study, 512 were bedside nurses, 33 nurse managers, and 17 unit supervisors. Participation in this study was voluntary and nurses were approached by the first author and asked to complete the survey.

Incident reports for falls, pressure ulcers, medication errors and hospital-acquired infections submitted for one year (June 2016 – June 2017) were collected from the Quality Assurance (QA) and the Infection Control (IC) units of each hospital. The numbers of patients admitted to those units within the same period were collected from the hospitals' Statistics Units. Underreporting was determined using the number of patients admitted to each unit and number of errors occurred during the same period. The numbers of admissions and errors in each hospital were used to determine the rate of errors. The reported rate of errors for each unit was then compared to the rate of predicted by the Institute of Health Improvement's (IHI) Global Trigger Tool (GTT).

The IHI developed the GTT to measure errors in adult inpatients.¹² The tool calculates the predicted rate of errors based on admission rate. In this study, the terms errors and adverse events are used interchangeably since the IHI tool measures harm to patients [12]. The IHI tool defines adverse events as a physical injury that can harm

the patient; this harm might result from different types of medical errors.

The IHI Global Trigger Tool (GTT) is a reliable and valid tool that had been used by many countries and its statistical properties have been tested using the level of agreement between different reviewers [13]. The GTT Researchers (30) reported a significant level of agreement when testing the GTT with a percent of agreement ranged from 66.7% to 93.9% ($k=0.164$ to 0.703). The literature indicated that there is a moderate level of agreement with inter-rater agreement ($k=0.45$) between review team members. Prior to use in this study, the three qualitative questions with limited choices used to explore nurses' opinions were evaluated for content validity by two expert researchers.

An IRB approval was obtained from the Oman Ministry of Health Research Review Approval Committee. The researchers obtained the incident reports from the Infection Control units and Quality Assurance Department in each hospital. Data provided to the researchers were limited to a description of the incidents and number of incidents. Admission data were provided by the Statistics Unit in each hospital. The three limited-options questions were included in a survey distributed to the nurses. The participation was voluntary and informed consent was provided for all participants before being enrolled in the study. No names were included in the survey.

Data were analyzed using SPSS Version 24.0 (IBM Corp., Armonk, New York, USA). The data from the incident reports were analyzed using numbers and percentages to calculate the rate of errors/adverse events reported by each unit. The calculated rates for individual units and the combined average rates of errors of all units were compared to the predicated rate of errors suggested by the IHI trigger tool using z test. The limited-choice questions that addressed nurses' perceptions of errors and reporting systems were analyzed using counts of responses and percentages.

3. RESULTS

A total of 31 medical-surgical units were included in the study with more than 50% of the staff on each unit completed and returned the questionnaire. Most of the units ($n = 28$; 90.3%) had a response rate of 60% or more; three units (9.7%) had a response rate between 50% and 55%. Data from four units were excluded due to the failure in meeting meet this criterion.

A total of 562 nurses (bedside nurses, nurse managers and unit supervisors) from the 31 medical-surgical units were included. Of these, 512 (74.9%) agreed to participate in this study. The final sample, out of 562, included 512 (51.20%) bedside nurses, 33 (4.4%) nurse managers and 17 (2.26%) unit supervisors. Characteristics of the sample are shown in the Table 1.

Table 1: Characteristics of the Sample:

Characteristics of the Sample	Bedside Nurses		Administrative Nurses	
	N	%	N	%
Birth Year				
1970-1980	125	(24.4%)	30	(60%)
Nationality				
Omani	211	(41.2%)	43	(86%)
non-Omani	299	(58.4%)	7	(14%)
Nursing Experience				
1-5 years	291	(58.8%)	3	(6%)
16-20 years	15	(2.9%)	19	(38%)
> 20	4	(0.8%)	10	(20%)
Gender				
Male	107	(20.9%)	30	(60%)
Female	405	(79.1%)	20	(40%)

The mean number of admissions per year across the 31 units was 1,872.9 (SD = 734.8), with a range of 178 to 3,216 admissions. The number of incidents or errors reported ranged from (0 to 80) with a total mean of 22.42 (± 22.05) errors. The error rate for each unit was calculated by dividing the total number of errors reported by the number of admissions for that unit over the same period. For instance, the error rate of the unit that reported 80 errors was calculated by dividing the unit's total number of admissions of 1,798 patients by 80, resulting in an error rate of 4.45% or .0445, which is well under the predicted error rate IHI number of .40, or 40%.¹² Error rates were calculated for all units using the same way.

The mean error rate across the 31 units was calculated as 1.64% or 0.0164 and was compared to the predicted error rate of 40% or 40 identified by the IHI using the z test of single proportion. The z -test is used to compare data from one large sample or groups when data collected in the form of proportions, percentage or

frequencies are compared with the identified proportion [14]. The difference in actual error rate compared to predicted error rate was significant: $z = 4.36$, $p < .001$, which is significantly lower than the rate predicted by the IHI [12].

Results for the Three Limited-Choice Questions

A total of 562 nurses answered three limited-choice questions about their perceptions about common errors, perceptions of the adequacy of error reporting, and beliefs about reasons for underreporting on their units. Of the 512 bedside nurses, 291 (56.8%) specified that they believed the process of error reporting in their hospital was acceptable. Of 50 administrative nurses (nurse managers and nurse supervisors), 22 (44.0%) believed that the reporting process was adequate. A total of 105 (18.6%) nurses from both groups (bedside and administrative nurses) identified reasons for their perceptions that their hospital reporting process was inadequate. The nurses' responses about the adequacy of reporting process are summarized in Table 2.

Table 2: Nurses' Explanations of Why they Believed that Their Hospital's Reporting Process is Inadequate (N=105):

Nurses' Responses about the Adequacy of Reporting Process	N (%)
Nurses QA = fear mistakes will be kept in their personal file and fear of punishment	25 (23%)
No feedback	10 (9.5%)
No clear understanding of the reporting process	6 (5.7%)
Nurses are not involved in making decisions about mistakes occurring in their units	6 (5.7%)
Staff shortage and increased patient-to-staff ratio	6 (5.7%)
Increased workload	5 (4.8%)
Nurse supervisors should be more serious about supervising staff in following guidelines and hospital's policies	5 (4.8%)
Lack of tool and equipment used in error reporting and dependence on incident report	4 (3.8%)
Staff do not want to harm hospital's reputation	4 (3.8%)
Lack of communication within unit	4 (3.8%)
Lack of trust between staff and QA unit staff	4 (3.8%)
Lack of confidentiality between staff and in-charges	4 (3.8%)
No support from administration	4 (3.8%)
Lack of time and lack of follow up and investigation	4 (3.8%)
Staff afraid to ask questions when they feel something is wrong	4 (3.8%)
Staff nurses need mandatory workshops and courses to educate them about reporting errors and reporting process	4 (3.8%)
Staff do not want to harm hospital's reputation	4 (3.8%)

QA = Quality Assurance

Of the 484 bedside nurses who responded to the question about causes of underreporting, the majority identified workload as the most common cause of underreporting (317, 65.5%). Table 3 summarizes causes of underreporting identified by nurses. In the administrative nurses' group, 32 (64%) also identified workload as the main cause of underreporting of errors

in their hospitals. They identified other causes as time constraints, poor communication among nurses and doctors, poor nursing documentation, lack of validation and verification of patients' previous medications, and non-adherence of nurses to guidelines when conducting a clinical procedure or when administering medications.

Table 3: Causes of Underreporting as Identified by Nurses (N=484)

Cause of Underreported	N (%)
Heavy workload	317 (65.5%)
Poor documentation	175 (36.2%)
Poor communication among nurses and doctors	175 (36.2%)
Lack of validation and verifications of patient pervious medication	167 (34.5%)
Non-adherence to guidelines when conducting procedure or when administering medication	75 (15.5%)
Lack of clinical skills	73 (15.5%)
Attention slip	48 (9.9%)
Others	45 (9.3%)

In response to the question about the most common errors in their hospital, 512 of bedside nurses replied. Of these 34% and 4.1% identified hospital-acquired infections and medication errors, respectively, as the most common errors. Falls was identified as the least common error by both bedside nurses and administrative nurses.

4. DISCUSSION

This study findings revealed underreporting of medical errors on the 31 units of 11 hospitals in Oman in which this study was conducted. The mean error rate of the 31 units in the 11 hospitals was well below the predicted error rate suggested by the IHI. The issue of underreporting of errors is global [15] and many studies have identified it as a significant problem. However, no study has provided a clear tool, percent, rate, or formula to calculate underreporting. The findings of this study indicating underreporting of errors in Omani hospitals were consistent with the findings of the pilot study [16] and the MOH report on medication errors in hospitals [9]. The findings were also consistent with previous international research [4].

To further understand underreporting, nurses' views about the reporting process and their perceptions of the reasons of underreporting were explored because incident reports are documented more often by staff nurses than other health care personnel [17]. The majority (56.8%) of bedside nurses in this study believed that the reporting process in their units were adequate, while fewer than half (44%) of the administrative nurses group did so.

Previous researchers have investigated nurses' and physicians' awareness of the reporting systems in their hospitals and barriers to their use to report errors [17-19] and found that nurses had greater awareness of the reporting process than physicians. The results of this study add to the current literature for nurses, hospital administrators, and other healthcare professionals.

The perceptions of bedside and administrative nurses about causes of inadequate reporting and barriers to error reporting recognized in this study were consistent with those recognized in existing literature: poor documentation systems, fear of the information being included in nurses' personnel file, and lack of follow-up by administrators on reported incidents. Similar to nurses in other studies, [17-19] fear of having errors held against them was the most common cause of inadequate reporting of errors reported by nurses in the hospital, this study reported as the in their hospitals.

The causes of underreporting reported by participants in this study were consistent with what was reported in the literature [17-19]. However, there were some differences in the findings of this study and those of previous studies. Fear of peers, managers, punishment, and lawsuits has been identified as among the most common reasons for underreporting [17-19]. Time constraints and workload were identified as the most common reasons of error underreporting in this study.

Poor interdepartmental operations, incompetent physicians, and poor nursing assessment skills identified by participating nurses as possible causes of underreporting of errors. The differences in findings might be a result of previous studies being conducted in Europe and the U.S., where working conditions (e.g., shift duty, workload and staff shortage), may be different than in Oman and where lawsuits are less common. Other differences might be due to nurses' greater awareness about the consequences of medical errors, the process of error reporting, and extensive research and patient safety efforts in those countries [17].

In this study, nurses reported that that they did not know about the error reporting process and that lead to errors underreporting. The finding from this were consistent with previous studies [17-19]. In addition, 2% of nurses in this study perceived physicians as

incompetent and that might be because physicians believed that error reporting is mostly nurses' responsibility [19- 20].

Bed side nurses in this study reported that hospital-acquired infection (HAI) is the most common error occurring in their hospital, while 50% of staff in administrative position reported medication errors as the most common error in their hospital. Furthermore, falls was reported by bedside nurses as the least common errors in hospital.

This study's results revealed that nurses perceived HAI to be the most common reported error across the 11 hospitals. The real number of medical errors and of HAIs is unknown because of underreporting. However, comparing with the recent studies reported that medication errors were found to be the most common reported errors, [20, 21] the bedside nurses in this study believed that HAIs is the most common error.

Literature indicated that around 98,000 hospitalized patients in the U.S. developed infection and one out of seven patients die because of HAIs [21]. Kelevans and colleagues found that HAIs resulted in increase of : deaths rate , hospital stay and cost of healthcare [22]. The AHRQ and CDC have reported more recent declines in HAIs, including central line-associated blood stream infections and methicillin-resistance staphylococcus aureus infections, [23,24] which may be a result of increased awareness of HAI and improved care provided to patients.

The results reported in this study about common errors can be justified because based on errors reported process followed in Infection control department where they do their own reporting and data entry. While in general words in the hospital they do not have specific personnel who report errors rather it is responsibility of nurses themselves.

According to finding from this study, fall was reported to be the least common adverse events occurring in Omani hospitals, and these results are inconsistency with what was reported in the literature [25]. Literature reported that 2% to 12% of inpatients experience fall at least once during [25]. The inconsistency between results in literature and this study is because falls is not considered an error that should be reported by nurses working in Omani hospitals. Nurses in Omani hospital should report falls as an error because such errors cause harm to patient, prolong hospital stays, increase costs, and increase the patient mortality rate, [21] attention to reporting falls is essential.

Limitations

Several limitations of this study must be identified. The use of a convenience sample may have resulted in a biased sample [14]. Although the sample

included nurses from hospitals throughout Oman and from all shifts, the results cannot be generalized to critical care or specialty units of Omani hospitals. Despite these limitations, the study provides the first national data using error incident reports to examine underreporting. Another limitation is the use of a self-report questionnaire to explore nurses' opinions, which may have resulted in socially desirable responses [24]. Nonetheless, the data are valuable because the responses represent opinions of nurses from multiple Omani hospitals. These data may be useful in future research to further explore the issue of underreporting of errors.

5. CONCLUSION

This study, the first to examine error reporting in Omani hospitals, used information obtained from incident reports to analyze the nature and type of errors reported and identified underreporting as an issue in Omani hospitals. Data about nurses' perceptions of the adequacy of the error reporting process and about reasons of underreporting and common errors in Oman hospitals were collected through limited-choice questions included in a survey completed by nurses from 31 units in 11 Omani hospitals. This study provided valuable information that can be used by hospitals to strengthen their reporting systems. Oman MOH needs to establish policies and procedures to address this issue in order to provide quality of patient care as well as provide culture of safety in the hospitals.

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Ethical Approval: An IRB approval was obtained from the Oman Ministry of Health Research Review Approval Committee. The researchers obtained the incident reports from the Infection Control units and Quality Assurance Department in each hospital. The participation was voluntary and all participants provided informed consent before being enrolled in the study. The study was performed in accordance with the Declaration of Helsinki.

Authors Contributions: All authors of this study qualify for authorship and met all the journal criteria for authorship such as substantial contributions to the conception and design of the study, analysis and interpretation of data, and drafting and revising the article. ZMA, SCS and Tk conceived and designed the study, helped in data collection and data analysis, and interpretation of the data. ZMA and MAA helped in writing the article and provided the logistic support. All authors critically reviewed and approved the final draft of the article and are responsible for the content and similarity index of the article.

REFERENCES

- Centers for Disease Control and Preventions (CDC). National Vital Statistic Report [Internet]. 2013. Available from: http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm.
- Institute of Medicine (US) Committee on the Work Environment for Nurses and Patient Safety. Keeping Patients Safe: Transforming the Work Environment of Nurses. Page A, editor. Washington (DC): National Academies Press (US); 2004.
- Teixeira TCA, Cassiani SHB. Root cause analysis of falling accidents and medication errors in hospital. *ACTA Paul Enferm* 2014 Feb; 27(2): 100-107. <https://doi.org/10.1590/1982-0194201400019>
- Halfon, P., Eggli, Y., Van Melle, G., & Vagnair, A. (2001). Risk of falls for hospitalized patients: a predictive model based on routinely available data. *Journal of clinical epidemiology*, 54(12), 1258-1266.
- Mayo, A. M., & Duncan, D. (2004). Nurse perceptions of medication errors: what we need to know for patient safety. *Journal of nursing care quality*, 19(3), 209-217.
- Amrollahi, M., Khanjani, N., Raadabadi, M., Hosseinabadi, M. B., Mostafaei, M., & Samaei, S. E. (2017). Nurses' perspectives on the reasons behind medication errors and the barriers to error reporting. *Nursing and Midwifery Studies*, 6(3), 132-136.
- Sammer, C. E., Lykens, K., Singh, K. P., Mains, D. A., & Lackan, N. A. (2010). What is patient safety culture? A review of the literature. *Journal of nursing scholarship*, 42(2), 156-165.
- Bates, D. W., Leape, L. L., Cullen, D. J., Laird, N., Petersen, L. A., Teich, J. M., ... & Seger, D. L. (1998). Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. *Jama*, 280(15), 1311-1316.
- Ministry of Helth (MOH). Drug Monitoring Centre Annual Feedback 2013. Pharmaceutical Newsletter 2014 ; 22 (2):1-8.
- Al, Harmali, Z. & Smeltzer, S.C. (2021). Psychometric Evaluation of IWPS-R: Pilot study. *EAS J Nurs Midwifery*. 3(4):154-9. <https://doi.org/10.36349/easjnm.2021.v03i04.003>
- Institute of Health Improvement (IHI). IHI Global Trigger Tool for Measuring Adverse Events. 2009.
- Classen, D. C., Lloyd, R. C., Provost, L., Griffin, F. A., & Resar, R. (2008). Development and evaluation of the institute for healthcare improvement global trigger tool. *Journal of Patient Safety*, 4(3), 169-177.
- Mattsson, T. O., Knudsen, J. L., Lauritsen, J., Brixen, K., & Herrstedt, J. (2013). Assessment of the global trigger tool to measure, monitor and evaluate patient safety in cancer patients: reliability concerns are raised. *BMJ quality & safety*, 22(7), 571-579.
- Classen, D. C., Resar, R., Griffin, F., Federico, F., Frankel, T., Kimmel, N., ... & James, B. C. (2011). 'Global trigger tool' shows that adverse events in hospitals may be ten times greater than previously measured. *Health affairs*, 30(4), 581-589.
- Levinson DR. Washington, DC: US Department of Health and Human Services, Office of the Inspector General; January 2012. Report No. OEI-06-09-00091.
- Keers, R. N., Williams, S. D., Cooke, J., & Ashcroft, D. M. (2013). Prevalence and nature of medication administration errors in health care settings: a systematic review of direct observational evidence. *Annals of Pharmacotherapy*, 47(2), 237-256.
- Chiang, H. Y., & Pepper, G. A. (2006). Barriers to nurses' reporting of medication administration errors in Taiwan. *Journal of nursing scholarship*, 38(4), 392-399.
- Waring JJ. Beyond blame: cultural barriers to medical incident reporting. *Soc Sci Med* 2005 May; 60(9):1927-35. doi: 10.1016/j.socscimed.2004.08.055. Epub 2004 Nov 18.
- Kim, J., & Bates, D. W. (2013). Medication administration errors by nurses: adherence to guidelines. *Journal of clinical nursing*, 22(3-4), 590-598.
- Uribe, C. L., Schweikhart, S. B., Pathak, D. S., Marsh, G. B., & Fraley, R. R. (2002). Perceived barriers to medical-error reporting: an exploratory investigation. *Journal of Healthcare Management*, 47(4), 263.
- Agency of Healthcare Research and Quality (AHRQ). Patient safety primers: healthcare-associated infections [Internet]. 2012. Available from: <https://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/hais/index.html>
- Levinson DR. Washington, DC: US Department of Health and Human Services, Office of the Inspector General; January 2012. Report No. OEI-06-09-00091.
- Menachemi, N., Brooks, R. G., Clawson, A., Stine, C., & Beitsch, L. (2006). Continuing decline in service delivery for family physicians: is the malpractice crisis playing a role?. *Quality Management in Healthcare*, 15(1), 39-45.
- Polit, D., & Beck, C. (2020). *Essentials of nursing research: Appraising evidence for nursing practice*. Lippincott Williams & Wilkins.
- Danasekaran, R., Mani, G., & Annadurai, K. (2014). Prevention of healthcare-associated infections: protecting patients, saving lives.

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