

Knowledge, attitude and practice on medication error reporting among health practitioners in a tertiary care setting in Saudi Arabia

Salma L. Alsulami, MBBS, Habibah O. Sardidi, MBBS, Raghad S. Almuzaini, MBBS, Malak A. Alsaif, MBBS, Hanin S. Almuzaini, MBBS, Afaf K. Moukaddem, MS, Mubashar S. Kharal, MD.

ABSTRACT

الأهداف: قياس معرفة وأساليب وممارسات الممارسين الصحيين تجاه الإبلاغ عن الخطأ الدوائي بين الممارسين الصحيين في مدينة الملك عبد العزيز الطبية، الرياض.

الطريقة: أجريت دراسة مقطعية باستخدام استبيان بين عينة من الأطباء والمرضات في مدينة الملك عبد العزيز الصحية في الرياض 2017.

النتائج: تألفت العينة من 365 مشارك بمعدل استجابة 73%. كان لدى أغلبية المشاركين (97 في المائة) معرفة كافية و موقف إيجابي (90 في المائة) نحو الإبلاغ عن الأخطاء الدوائية. فيما يتعلق بممارسة الإبلاغ، يفضل بعض المشاركين (21.6 في المائة) تثقيف أولئك الذين قاموا بخطأ دوائي بدلاً عن الإبلاغ عنهم. ولم يُبلغ نصف المشاركين تقريباً (44.8 في المائة) عن أي خطأ في الدواء خلال فترة عملهم.

الخاتمة: أظهر المشاركون لدينا قدرًا كافيًا من المعرفة فيما يتعلق بالإبلاغ عن الأخطاء الدوائية. على الرغم من المعرفة الكافية والموقف الإيجابي تجاه الإبلاغ عن الأخطاء الدوائية، لا يزال هناك تقصير في الإبلاغ عن الأخطاء الدوائية. نوصي بإنشاء دورات السلامة الدوائية كشرط مسبق لجميع مقدمي الرعاية الصحية وتطبيق برامج رقمية تطلق انذارات عند الكشف عن الأخطاء لتقليل من الخطأ الدوائي.

Objectives: To assess knowledge, attitudes and practices towards the reporting of medication errors among health practitioners at King Abdulaziz Medical city in Riyadh, Kingdom of Saudi Arabia.

Methods: A cross-sectional study using a self-administered questionnaire was conducted in a convenient sample of 62 physicians and 303 nurses, between June and September 2017 at King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia.

Results: The sample consisted of 365 subjects, with a response rate of 73%. Approximately 97% had sufficient

knowledge and a favorable attitude (90%) towards medication error reporting. With regard to reporting practices, some participants (21.6%) preferred to educate those who made a medication error, rather than reporting it. Approximately 44.8% had not reported medication errors during their work experience.

Conclusion: Study participants demonstrated a sufficient knowledge base with regard to medication error reporting. Despite sufficient knowledge and favorable attitudes towards medication error reporting, there is still an under-reporting of medication errors when it comes to practice. We recommend the establishment of frequent medication safety courses as a prerequisite for all health care providers. We also advocate the application of error detecting alarms such as digital programs to minimize medication errors.

*Saudi Med J 2019; Vol. 40 (3): 246-251
doi: 10.15537/smj.2019.3.23960*

From the College of Medicine (Alsulami, Sardidi, Almuzaini R, Alsaif, Almuzaini H), from the Department of Medical Education (Moukaddem), King Saud bin Abdulaziz University for Health Sciences, and from the Department of Medication Safety (Kharal), National Guard Health Affairs, King Abdulaziz Medical City, Riyadh, Kingdom of Saudi Arabia.

Received 19th November 2018. Accepted 28th January 2019.

*Address correspondence and reprint request to: Dr. Salma L. Alsulami, College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Kingdom of Saudi Arabia. E-mail: alsulamisalma994@gmail.com
ORCID ID: orcid.org/0000-0001-9839-8499*

Understanding the importance of medication error reporting and comprehending the sequential negative impact of under-reporting has been an area of interest to many researchers.¹ Medication errors are conventionally defined as any preventable event that may result in an inappropriate medication usage

which has the potential to harm patients.¹ Other definitions have been used to define medication errors, such as failures in the treatment process. In general, a medication treatment process is undertaken in stages, by a multidisciplinary team. The process commences with a doctor's prescription, followed by the pharmacist's check-up and the medication is finally administered to the patient by medical staff. Medication errors can occur at any of these 3 stages. Globally, medication errors have become a serious patient safety issue due to the increasing rates of morbidity and mortality associated with such errors.² The cost of medication errors on the National Health Service (NHS) of the United Kingdom reaches £1.1 bn annually.³ In the Kingdom of Saudi Arabia (KSA), medication errors represent approximately one-fifth of all errors encountered in primary care settings.⁴ The frequency of complaints differs among the provinces and specialties; surgical specialties and obstetrics/gynecology have a higher reporting frequency when compared to other specialties.⁵ Effective reporting ensures a better quality of care and a safer health setting which generates better health outcomes for all patients. Reporting medication errors can be used as a tool for learning and educational purposes, which may promote safer practices in the future. Safety reporting systems (SRS) are implemented by several hospitals around the world, to report incidents that are thought to breach patient safety.⁶ The system comprises an incident form describing the incident and includes detailed clinical and patient information. Active learning and safer health practices result in lower incidences of adverse events, thereby preventing the occurrence of similar errors in the future. The health care provider must appreciate that medication error reporting is not solely the fault of an individual, but rather a fault in the health-care system. When a multidisciplinary paradigm has been implemented in health care delivery, an error is rarely one individual's fault. A study conducted among the nurses and physicians of 4 hospitals in Denmark found that rate of reporting medication errors was higher for self-reporting (60%) than peer-reporting (37%).⁷ However, despite increased claims of error reporting, researchers believe that medication errors are under-reported in practice.^{8,9} In their report, Alsafi et al,¹⁰ showed that approximately 50% agreed there was under-reporting of medical errors in their hospital, due to the following barriers: staff shortages, lack of experience and training

and poor language and communications. In addition, most physicians (>60%) had not filed any error reports in the preceding year.¹⁰

In this study, we assessed the knowledge, attitudes and practices (KAP) of health practitioners (nurses and physicians) at King Abdulaziz Medical City (KAMC), Riyadh, KSA. We investigate medication error reporting using a cross-sectional, self-administered questionnaire. This study serves as an eye-opener for current medication error reporting systems and is timely in rectifying problematic issues that jeopardize patient safety.

Methods. A cross-sectional study was conducted using a self-administered questionnaire which was distributed to physicians and nurses over a period of 4 months between June and September 2017, in KAMC, Riyadh, KSA. King Abdulaziz Medical city is a 530-bed, large tertiary center and a referral hospital with almost 4000 staff. King Abdullah Specialized Children's Hospital (KASCH) is another prominent medical center at KAMC. This is a specialist children's hospital in KSA, with a 600 inpatient bed capacity and 180 beds for pediatric emergency/trauma and day care facilities. Our target population was physicians and nurses working in the following departments: pediatrics, surgery, medicine, and obstetrics and gynecology. Staff involved in patient safety and dentistry departments were excluded.

The questionnaire was developed by the co-investigators and was based on extensive literature reviews.¹¹⁻¹³ Search strategy was performed through PubMed database searching for cross-sectional studies and using the following keywords: medication errors reporting, Saudi Arabia, questionnaire.

A hard copy of our self-administered questionnaire was distributed to physicians and nurses. The questionnaire consisted of 4 sections: demographic characteristics including age, gender, nationality, category of health profession, location of specialty training, department, years of specialty experience at KAMC; knowledge of medication error reporting; attitudes towards medication error reporting and practice of medication error reporting. The questionnaire has not been translated into Arabic language.

Knowledge and attitudes sections were assessed using a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'. Participant responses were summed and the mean scores calculated for each participant. For knowledge and attitudes, health practitioners with a mean score of 4 or more were considered to have sufficient/favorable knowledge/attitude outcomes, and those with a mean scores of less than 4 were classified

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

as having insufficient/unfavorable knowledge/attitudes. The medication error reporting section was assessed by asking 5 questions regarding the practice of reporting during their careers. Questionnaires were distributed to physicians during morning rounds and departmental activities. Study participants were requested to return completed questionnaires to head nurses or individually, after a maximum of 7 days.

Validity and reliability. A panel of experts in medication safety department at KAMC reviewed the questionnaire to assess content validity. Their reviews and suggestions were put in the content including shortening of the questions length. The questionnaire was also piloted among a sample of 40 subjects working at KAMC, in a similar population, to assess face validity. The subjects agreed that they understood the questions and found them feasible. Those subjects were not enrolled later in the main study. Efforts were made to ensure settings and choice of participants were the same as for the main study.

Reliability analyses were performed with an overall Cronbach-alpha 0.84, which indicates a good internal consistency reliability.

The sample size was estimated using Raosoft, an online sample size calculator.¹⁴ With a margin of error of 5%, a confidence interval of 95%, a response distribution of 50%, and a total population of 5007, the minimum recommended cohort size was 365 participants. Convenience sampling was used in the selection of participants. Those who were available and willing to participate were approached and asked to fill out questionnaires.

Statistical analysis. The Statistical Package for Social Sciences (SPSS) Version 23 (IBM Corp., Armonk, NY, USA) was used for data entry and analysis. Categorical variables were reported as frequencies and percentages. Continuous variables were reported as means and standard deviations. Due to small counts in categories of some of the variables, category lumping was performed to overcome this problem, such as in-work experience at KAMC (<1 year and 1-5 years). Binary logistic regression was performed to calculate the odds ratio (OR) and 95% confidence intervals (CI). Any variable significantly associated with knowledge or attitudes at $p < 0.05$ was included in the multiple logistic regression model, showing the adjusted odds ratio (aOR). All tests were declared significant if $p < 0.05$.

Ethical considerations. Institutional Review Board (IRB) approval for the study was obtained from King Abdullah International Medical Research Centre (KAIMRC). Informed consent was obtained from all study participants. Participant confidentiality

was maintained throughout the study as no personal identifiers were gathered.

Results. A total of 365 participants participated in this study; 62 physicians and 303 nurses, with a 73% response rate. The demographics and professional characteristics of study subjects is shown in Table 1. It shows that 326 of 365 responders were female (89.3%) with a median age of 34.5±8.9 years. Nurses had a better response rate of 83% when compared to their physician colleagues, who had response rates of 68%. Approximately 50% participants had obtained their medical education and training in Asia (56.7%). The majority of participants had been in practice for less than 5 years (34.8%) and had been practicing at KAMC for 1-5 years (47.9%).

Knowledge and attitude of medication error reporting. The knowledge and attitude of health care practitioners, regarding medication error reporting, are shown in Tables 2 & 3. More than half of participants reported clear knowledge of the definition of medication errors (56.6%). Over half of participants (57.1%) acknowledged that it was their responsibility to report medication errors. A strong approval (61.7%) was recorded for the statement "I would report a medication error if a patient receives a medication not prescribed for them". Approximately 89.9% of participants were aware of the hospital Safety reporting system (SRS). Eighty percent of participants agreed on the importance of reporting errors even if it did not reach the patient. Some participants (21.6%) would have preferred to educate those who made a medication error, rather than reporting it. Approximately 60% of participants reported they would not hesitate before reporting a medication error and 23.5% feared being blamed if they reported a medication error they had made.

Practice of medication error reporting. When it came to the practice of medication error reporting, 90% of participants knew how to report a medication error. Almost half of participants (44.8%) did not report any medication errors during their work experience. For the remaining participants, 42% reported 1-4 medication errors, 8.5% reported 5-10 errors and 6.5% reported more than 10 errors. When asked about the number of medication errors they made themselves, 44% reported none, 43% recalled 1-4 errors, 8% remembered 5-10 errors and 5% recalled more than 10 errors. The majority of participants (57.5%) responded to a lack of knowledge when asked about the effects of the SRS on the number of medication errors, while 23% participants replied that the number of medication errors had decreased, 12% thought that it had increased and 7% replied it stayed the same. Half of participants

Table 1 - Demographic and professional characteristics of study participants (N=365).

Variable	n (%)
Gender	
Male	39 (10.7)
Female	326 (89.3)
Nationality	
Saudi	81 (22.2)
Non-Saudi	284 (77.8)
Location of specialty training	
Middle East	130 (35.8)
Europe/North America	8 (2.2)
Asia	206 (56.7)
Africa	12 (3.3)
Other	7 (1.9)
Department	
Surgery	91 (24.9)
Medicine	98 (26.8)
OB/GYN	80 (21.9)
Pediatrics	96 (26.3)
Work experience in specialty (years)	
<5 years	126 (34.8)
5-15 years	123 (34.0)
>15 years	113 (31.2)
Work experience at KAMC (years)	
<1 year	56 (15.3)
1-5 years	175 (47.9)
>5 years	134 (36.7)
OB/GYN - Obstetrics and Gynecology, KAMC - King Abdulaziz Medical City.	

stated they would report their colleagues if they made one medication error, 29% would report if they repeated the same error, 11% would never report a colleague, 7.1% agreed to report if they made 2-3 errors and 2.5% would report if more than 3 errors were made.

Bivariate and multivariate analysis of demographic predictors, with knowledge and attitudes of medication error reporting. Bivariate analyses showed that being a non-Saudi nurse was associated with having sufficient medication knowledge ($p < 0.05$). Regarding attitude, being a non-Saudi nurse was a significant factor associated with more favorable attitude towards reporting medication errors ($p < 0.05$).

Adjusted OR for the final multivariable logistic regression is shown in Table 4. The results showed that gender, nationality and profession did not have any association with knowledge. However, with regards to attitudes, health profession category was statistically associated with favorable attitude (OR=9.4, 95% CI: 1.9-46.4, $p = 0.003$).

Discussion. Our study assessed the knowledge, attitude and practice among health practitioners in KAMC, regarding the reporting of medication errors. Predictors including gender, nationality, location of

specialty training, profession, department and years of experience in both the specialty, and at the KAMC were studied in correlation with knowledge, attitude and practice, using multivariable logistic regression. The demographics of our participants reflected a female and nurse majority. In relation to other studies, this observation is common, in a study conducted by Bayazidi et al,¹⁵ females (83.9%) and nurses (96.8%) tended to participate more. The knowledge of participants of medication error reporting was sufficient and there was an agreement with the statement that medication error reporting is the responsibility of everyone. Our study participants agreed that reporting medication errors were due to either failure to deliver medication, the administration of a medication that was not prescribed, or failure to receive a medication as prescribed. However, a general tendency to not report if the patient received an inadequate dose of the prescribed medication was also revealed. This may be attributed to the fact that medication dosages are heavily dependent on the caring physician rather than nurses, and since the majority of our participants were nurses, there was a general objection to reporting a dosage error. Females and nurses displayed a greater reporting knowledge than their peers. This was in contrast to observations by Carandang et al,¹¹ where physicians manifested greater understanding than nurses. Work experiences, location of specialty training and department had no influences on knowledge in this study.¹¹ The attitude of participants towards reporting was greatly influenced by their professions. Nurses displayed more favorable reporting attitudes than physicians. A possible explanation for this could be that physicians favor the non-reporting of less serious medication errors, while nurses favor reporting regardless of the seriousness of the condition, which is also evident in our study.¹⁶

Although it is estimated that any healthcare personnel will commit at least one medication error throughout their career lifetime, it is evidently underreported, as 44.8% reported none. This was against our assumptions which presumably should result in a higher number of reporting either on oneself or colleagues. These results might be limited as high recall bias can occur in questionnaire-based studies.

In contrast to other studies, our participants demonstrated high reporting rates (55.2%), although we believe that underreporting does occur.^{10,17} Moreover, our study participants reported a sufficient amount of knowledge regarding reporting procedures. These results can be attributed to the attention our tertiary center provides in terms of courses and campaigns, namely, a pharmacy awareness campaign, patient safety

Table 2 - Health care professionals' knowledge of medication error reporting.

Statement	Strongly disagree	Disagree	Neutral n (%)	Agree	Strongly agree
I would report a medication error if patient is prescribed an inadequate dose.	167 (45.8)	118 (32.3)	30 (8.2)	33 (9.0)	17 (4.7)
I would report an error where medication was prevented from reaching the patient.	7 (1.9)	10 (2.7)	20 (5.5)	162 (44.3)	167 (45.6)
I would report a medication error if a patient does not receive a medication as prescribed.	22 (6.0)	27 (7.4)	31 (8.5)	127 (34.8)	158 (43.3)
I believe I have good knowledge of when a medication error should be reported.	8 (2.2)	10 (2.7)	32 (8.7)	163 (44.5)	153 (41.8)

Table 3 - Attitudes of healthcare professionals towards medication error reporting.

Statement	Strongly disagree	Disagree	Neutral n (%)	Agree	Strongly agree
Medication errors do not need to be reported if detected before reaching the patient.	145 (39.6)	150 (41)	32 (8.7)	29 (7.9)	10 (2.7)
Information I disclose when reporting a medication error will be confidential.	18 (4.9)	34 (9.3)	39 (10.7)	158 (43.2)	117 (32.0)
It is not my responsibility to report medication errors caused by someone else.	116 (31.7)	162 (44.3)	43 (11.7)	39 (10.7)	6 (1.6)
I prefer to educate people who make medication errors rather than report the errors.	85 (23.2)	111 (30.3)	91 (24.9)	61 (16.7)	18 (4.9)
I fear being blamed if I report a medication error I made.	82 (22.4)	117 (32.0)	81 (22.1)	55 (15.0)	31 (8.5)
I do not hesitate before I decide to report a medication error.	16 (4.4)	36 (9.9)	82 (22.8)	160 (44.0)	69 (19.0)

Table 4 - Final multivariable logistic regression model for medication error knowledge and attitudes, Kingdom of Saudi Arabia.

Variable	Knowledge		Attitude	
	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Gender	1.49 (0.30-7.50)	0.63		
Nationality	3.45 (0.44-26.9)	0.28	0.39 (0.08-1.94)	0.23
Health profession category	1.85 (0.22-15.48)	0.56	9.4 (1.90-46.4)	0.003*

aOR - adjusted odds ratio, CI - confidence interval.
*p<0.05 (statistically significant).

courses and SRS campaigns.^{11,18} These courses are provided to all health care practitioners as part of their practicing programs in different specialties. According to KAMC basic medication safety (BMS) statistics, the rate of medication error reporting increases after these campaigns, and rates continue to escalate, year on year. The number of events reported in 2013 had tripled by 2017. Furthermore, the trends vary per month. The highest reporting rate is in March, which is the month following the safety course and the rates decrease after this with the lowest reporting rates in January.¹⁹

Study limitations. This is a survey-based cross-sectional study which is subject to the standard limitations of

questionnaire based studies. These limitations include recall bias of participants, social desirability bias and communication barriers between investigators and participants may have yielded imprecise data. The study was conducted at one tertiary care center in Riyadh, Kingdom of Saudi Arabia and included 62 physicians and 303 nurses, therefore the study results cannot be generalized to the whole healthcare population.

Future research can be carried out to include more centers and more participants and to evaluate the barriers of under-reporting of medication errors despite having the sufficient knowledge and favorable attitude.

In conclusion, to err is human and mistakes are inevitable; however, patient safety must be the utmost priority for all health care professionals. Medication errors, despite being quite common in clinical practice, are believed to be underreported; disclosing a medication error is never an easy task.^{7,8} However, reinforcing error reporting along with strict policies, adequate training of health care providers and implementing systems like SRS do enhance the reporting process and ultimately improves on care delivered to patients.

Therefore, we recommend the establishment of compulsory medication safety courses for all health care providers and the application of error detecting alarms and software to minimize errors.

Acknowledgment. *The authors gratefully acknowledge all participants who helped us conduct this study. We also would like to thank the King Abdulaziz Medical City/King Abdullah Specialized Children's Hospital in Riyadh, Kingdom of Saudi Arabia. We would like to thank OXBRIDGE proofreading (<https://oxbridgeproofreading.co.uk/>) for English language editing.*

References

- Nute C. Reducing medication errors. *Nurs Stand* 2014; 29: 45-51.
- Wittich CM, Burkle CM, Lanier WL. Medication errors: an overview for clinicians. *Mayo Clin Proc* 2014; 89: 1116-1125.
- Torjesen I. Medication errors cost the NHS up to £2.5bn a year [Internet]. *The Pharmaceutical Journal*; 2014 [Accessed Nov 01, 2014]. Available from: <https://www.pharmaceutical-journal.com/news-and-analysis/medication-errors-cost-the-nhs-up-to-25bn-a-year/20066893.article?firstPass=false>
- Khoja T, Neyaz Y, Qureshi NA, Magzoub MA, Haycox A, Walley T. Medication errors in primary care in Riyadh City, Saudi Arabia. *East Mediterr Health J* 2011; 17: 156-159.
- Donaldson LJ, Kelley ET, Dhingra-Kumar N, Kieny MP, Sheikh A. Medication Without Harm: WHO's Third Global Patient Safety Challenge. *Lancet* 2017; 389: 1680-1681.
- Elliott P, Martin D, Neville D. Electronic clinical safety reporting system: a benefits evaluation. *JMIR Med Inform* 2014; 2: e12.
- Rishoej RM, Hallas J, Juel Kjeldsen L, Thybo Christesen H, Almarsdóttir AB. Likelihood of reporting medication errors in hospitalized children: a survey of nurses and physicians. *Ther Adv Drug Saf* 2018; 9: 179-192.
- Aljadhey H, Mahmoud MA, Hassali MA, Alrasheedy A, Alahmad A, Saleem F, et al. Challenges to and the future of medication safety in Saudi Arabia: A qualitative study. *Saudi Pharm J* 2014; 22: 326-332.
- Morrison M, Cope V, Murray M. The underreporting of medication errors: A retrospective and comparative root cause analysis in an acute mental health unit over a 3-year period. *Int J Ment Health Nurs* 2018; 27: 1719-1728.
- Alsafi E, Baharoon S, Ahmed A, Al-Jahdali HH, Al Zahrani S, Al Sayyari A. Physicians' knowledge and practice towards medical error reporting: a cross-sectional hospital-based study in Saudi Arabia. *East Mediterr Health J* 2015; 21: 655-664.
- Carandang RR, Resuello D, Hocson GB, Respicio KM, Reynoso C. Knowledge, Attitude and Practices on Medication Error Reporting among Health Practitioners from Hospitals in Manila. *Sch Acad J Pharm* 2015; 4: 293-300.
- Mohammad A, Aljasser I, Sasidhar B. Barriers to Reporting Medication Administration Errors among Nurses in an Accredited Hospital in Saudi Arabia. *British Journal of Economics, Management & Trade* 2016; 11: 1-13.
- Yung HP, Yu S, Chu C, Hou IC, Tang FI. Nurses' attitudes and perceived barriers to the reporting of medication administration errors. *J Nurs Manag* 2016; 24: 580-588.
- Raosoftware. Sample Size Calculator [Internet]. 2004 [Accessed Jan 03, 2019]. Available from: http://www.raosoftware.com/sample_size.html
- Bayazidi S, Zarezadeh Y, Zamanzadeh V, Parvan K. Medication Error Reporting Rate and its Barriers and Facilitators among Nurses. *J Caring Sci* 2012; 1: 231-236.
- Sarvadikar A, Prescott G, Williams D. Attitudes to reporting medication error among differing healthcare professionals. *Eur J Clin Pharmacol* 2010; 66: 843-853.
- Singh H, Thomas EJ, Petersen LA, Studdert DM. Medical errors involving trainees: a study of closed malpractice claims from 5 insurers. *Arch Intern Med* 2007; 167: 2030-2036.
- Vincent C. Incident reporting and patient safety. *BMJ* 2007; 334: 51.
- Malibari S. Safety Reporting System (SRS). [cited 2015]. Available from URL: file:///Users/Jing/Downloads/Safety_Reporting_System.pdf