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KNOWLEDGE OF AND BARRIERS TO REPORTING MEDICATION ERRORS IN PRIMARY HEALTH CARE PHYSICIANS IN AL-KHOBAR, QATIF, AND DAMMAM

Medicine

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ABSTRACT

Medication errors (ME) are among the most common medical errors. Their reporting is an integral part of health care quality improvement. Therefore, this cross-sectional study examined the knowledge and barriers to reporting of ME among physicians in primary health care centers in Al-Khobar, Qatif, and Dammam in Eastern Province, Saudi Arabia. A structured questionnaire was administered to 220 physicians (71% response rate). Only 14.5 % of the participants had good knowledge of ME; 69.1% were unaware of their center's ME reporting system. In terms of barriers to reporting, 59.1% of the participants reported heavy workload as a barrier. Such major gaps in knowledge of ME and their reporting system indicate the need for educational programs and to address the barriers to increase reporting rate.

KEYWORDS

Barriers, Medication Error, Reporting, Saudi Arabia

Medications have improved the quality of health care, resulting in better disease control, prolonged life expectancy, and even eradication of certain diseases. Consequently, the rate of medication use is increasing worldwide, causing medication error (ME) occurrences to soar as well (Payne, Franklin, Slight, & Avery, 2016). ME is important because medication is part of the daily clinical practice in all health care levels.

ME is defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer" (Ministry of Health [MOH], 2015; National Coordinating Council for Medication Error Reporting and Prevention [NCC MERP], n.d.).

Although ME is among the most common and preventable types of medical errors, its magnitude cannot be determined because of the varying classification systems for ME globally (Payne et al., 2016). ME not only intensifies the risk of morbidity and mortality in patients and increases their economic burden (Oshikoyaa et al., 2013), but also affects health care professionals' confidence and reputation. Accordingly, most health institutes apply strict policies and measures to address the problem and limit its occurrence. One measure is error reporting, which involves reporting to the responsible authorities to protect the practitioner, identify areas of defect, and avoid similar errors in the future (Mohammad, Aljasser, & Sasidhar, 2016).

In Saudi Arabia, Asad (2015) revealed that insufficient knowledge of pharmacology and pharmaceutical calculations among nurses (particularly male, of Arab origin, holding diploma, and heading a unit) contributes to ME. Although most health care professionals "had a good knowledge about medication errors concept and their dangers on patients," most hospitals lacked a clear mechanism for reporting errors (Abdel-Latif, 2016).

Underreporting ME is a challenge in improving the provision of quality care and ensuring patient safety. Barriers to reporting ME include health care professionals' insufficient knowledge of available reporting system (Abdel-Latif, 2016), lack of clarification on which incidents must be reported and of feedback given to reporters (Evans, 2006), and disagreement over the definition of ME (Hashish & El-Bialy, 2013).Other barriers are fear of consequences, work pressure, and lack of reporting policies (Alsulami, Conroy, & Choonara, 2012; Javadi et al., 2014; Mohammad et al., 2016; Tobaiqy & Stewart, 2013; Vrbnjak, Denieffe, O'Gorman, & Pajnkihar, 2015; Yung, Yu, Chu, Hou, & Tang, 2016).

Furthermore, recent studies reported unclear reporting protocols, negative administrative response, and reporting effort as barriers to reporting (Hammoudi, Ismaile, & Abu Yahya, 2017; Kang, Park, Oh, & Lee, 2017; Ogunleye et al., 2016; Sharma, Tabassum, Khurana, & Kapoor, 2016)

Amid the vast literature on knowledge of and reporting barriers in ME in hospital settings, few studies have focused on primary health care (PHC). To address this gap, this study assesses the knowledge of reporting system on ME and barriers to reporting among physicians in PHC centers in the cities of Al-Khobar, Qatif, and Dammam in the Eastern Province. Determining these concerns is a step to define ways to address the barriers to reporting. Addressing these barriers, in turn, could improve the quality of care in PHC in particular and Saudi Arabia's health care system in general.

Method

Participants

This was a cross-sectional study conducted with physicians in all PHC centers in Al-Khobar, Qatif, and Dammam from November 2017 to March 2018. The inclusion criteria were all general practitioners, family medicine residents, family medicine specialists, and consultants. The exclusion criteria were those working in administrative positions, dentists, preventive medicine professionals, and those who were absent from work during the period of the study.

During the study, 310 physicians were employed in PHC centers in the three cities based on a list obtained from each city's administrative

office. Only 220 (71% response rate) physicians completed the paper-based questionnaire administered to them.

Materials and Procedure

The structured questionnaire comprised four parts, namely, sociodemographic data (i.e., age, gender, nationality, current position, duration of practice in primary care clinic, attendance to a patient safety course, and work experience in an accredited center), knowledge of ME, knowledge of the reporting system, and barriers to reporting. The construct validity of the ME knowledge part of the questionnaire was obtained from the National guidelines, World Health Organization of the ME and a questionnaire validated by M. Asad (Asad, 2015; MOH, 2015; Payne et al., 2016). The parts on knowledge about ME reporting system and barriers to reporting ME were adapted from two validated questionnaires: Evans's (2006) and Almutary and Lewis's (2012). The questionnaire's content validity was evaluated by seven experts in the fields of total quality management and pharmacy to verify the importance and relevance of items to study objectives. The questionnaire was modified according to their feedback, and then piloted with 30 physicians to ensure clarity. No modification was needed after the pilot study. The pilot sample was excluded from this study. The Cronbach's alphas for knowledge of ME, knowledge of ME reporting system, and barriers to reporting were 0.7, 0.8, and 0.9, respectively.

Data Analysis

Data were entered and analyzed using Statistical Package for Social Science (SPSS) V.22. The data were cleaned and checked for accuracy. Continuous data were presented as mean, median, standard deviation (SD), and range. Categorical data were presented as percentage and frequency. Student's t-test and the analysis of variance (ANOVA) were used for comparing two and more than two independent variables, respectively. Post hoc test was used when there were significant outliers after ANOVA. Correlation was conducted to assess relationship between continuous data (i.e., age and years of experience with total cumulative knowledge score). Significance was determined at $p < 0.05$.

Responses to the 16 questions on knowledge of ME were "agree," "do not agree," and "I don't know." Each response was coded as correct = 1 and incorrect = 0; "I don't know" was coded as 0. The total correct score was 16. Scores were categorized by mean±1SD (10.3± 2.386) into good knowledge (≥ 12.7), average knowledge (<7.9–>12.7), and poor knowledge (≤ 7.9). Responses to the four questions on knowledge of ME reporting system were coded as "Yes" = 1 and "No" and "I'm not sure" = 2. The 17 questions on barriers to ME reporting had a 5-point Likert scale response (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). Responses 1, 2, 3 signified an item as not a barrier and were coded as 0. Responses 4 and 5 signified an item as a barrier and were coded as 1.

Ethics

This study was approved by the MOH. Responses to all questionnaires were anonymous and confidential. By answering the questionnaire, participants provided informed consent.

Results

Of 310 participants approached, 220 responded, showing a response rate of 71%.

Participants' Characteristics

Most participants were Saudi nationals (84.1%) aged 24–59 years; median age was 32 years. Female physicians represented 56.8% of the sample. Most participants were general practitioners (58.6%), had less than five years of experience (57.7 %), and did not attend a safety course (60.9%). About 49% of the participants did not work in an accredited center (Table 1).

Table 1. Sociodemographic characteristics of physicians in the primary health care centers in Al-Khobar, Qatif, and Dammam

Characteristic	Frequency (N = 220)	Percentage (%)
Age (24–59 years)		
≤32	120	54.5
>32	100	45.5
Gender		
Male	95	43.2
Female	125	56.8
Nationality		
Saudi	185	84.1
Non-Saudi	35	15.9
Years of experience (3 weeks–30 years)		
≤5	127	57.7
>5	93	42.3
Attended a safety course		
Yes	86	39.1
No	134	60.9
Working in an accredited center		
Yes	90	40.9
No	108	49.1
I don't know	22	10.0
Position		
General practitioner	129	58.6
Family medicine resident	42	19.1
Family medicine specialist	34	15.5
Family medicine consultant	9	4.1
Others	6	2.7

Knowledge About ME

The majority of participants correctly responded to the statement, "ME refers to doing something that leads to an undesirable outcome" (93.2%), and incorrectly to "The 5 R's of drug administration" (93.1%) (Table 2). On average, 74.1% of the participants had average level of knowledge, 14.5% had good knowledge, and 11.4% had poor knowledge (Figure 1).

Table 2. Knowledge of medication errors (ME) of physicians in primary care centers in Al-Khobar, Qatif, and Dammam area

Statement	Correct answers (N = 220)	
	n	%
1. ME refers to doing something that leads to an undesirable outcome.	205	93.2
2. In writing doses of drugs, it is best to place a zero before a decimal point (for example, 0.2 instead of .2).	203	92.3
3. In a prescription, insulin dose is expressed as "cc" or "ml."	195	88.6
4. ME can occur in prescribing, verifying, and dispensing drugs.	192	87.3
5. ME can occur in administration and monitoring.	191	86.8
6. Beta blockers can be administered safely to patients suffering from asthma.	189	85.9
7. When prescribing a medication dose expression for the pharmacist, a teaspoon is better than "mg" or "g."	185	84.1
8. Acetaminophen and paracetamol are the same.	175	79.5
9. ME can mean failing to do right things that can lead to an undesirable outcome.	167	75.9
10. Aspirin is the best analgesic for use in children suffering from scarlet fever.	152	69.1
11. Penicillin G is effective against gram-positive and gram-negative bacteria.	90	40.9
12. Universal abbreviation can be used in medication prescription.	78	39.1
13. Constipation is an adverse effect of iron therapy.	77	35.5
14. Antacids are prescribed as a prophylaxis with non-steroidal anti-inflammatory drugs (NSAID) for prevention of NSAID-induced ulcer.	76	35.0
15. Rash occurrence is a side effect of amoxicillin.	68	30.5
16. 5 R's of drug administration	15	6.8

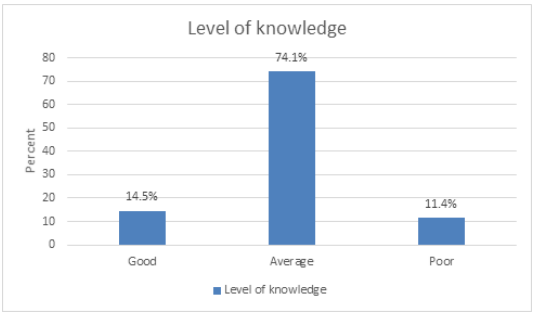

Figure 1. Level of knowledge of medication error of physicians in primary care centers in Al-Khobar, Qatif, and Dammam area.

Meanwhile, the mean score of knowledge of ME was significantly higher among family medicine consultants than general practitioners, and among family medicine specialists than general practitioners and family medicine residents ($p < 0.000$) (Table 3). No statistically significant association between total knowledge score and any sociodemographic characteristic was found.

Table 3. Association between mean score of knowledge of medication error and sociodemographic characteristics of participants (N = 220)

Characteristic	Mean±SD	p value
Gender Male Female	10.5±2.4 10.2±2.4	٠.331
Nationality Saudi Non-Saudi	10.4±2.4 10±2.5	0.292
Attended a safety course Yes No	10.4±2.7 10.3±2.2	0.694
Working in an accredited center Yes No I don't know	10.6±2.4 10.2±2.3 9.6±2.7	0.132
Position General practitioner Family medicine resident Family medicine specialist Family medicine consultant Others	9.8±2.4 10.5±2.1 11.7±2.0[a] 11.3±2.0[b] 11.2±2.5	0.000*

*$p \leq 0.05$; asignificant specialist compared with general practitioner and resident; bsignificant consultant compared to general practitione

Knowledge of ME Reporting

Few participants were aware of their center's ME reporting system (30.9%) and the form used to report ME (27.7%) (Table 4). Specifically, only 25.5% reported having knowledge of how to access the form, and 21.8% knew how to process a completed form.

Table 4. Knowledge of medication error (ME) reporting system of physicians in primary health care centers in Al-Khobar, Qatif, and Dammam (N = 220)

Statement	Yes n(%)	No n(%)	I'm not sure n(%)
1. I know that my center has an ME reporting system.	68(30.9)	65(29.5)	87(39.5)
2. I know the form used to report ME.	61(27.7)	111(50.5)	48(21.8)
3. I know how to access the form used to report ME.	56(25.5)	113(51.4)	51(23.2)
4. I know what to do with a completed ME reporting form.	48(21.8)	105(47.7)	67(30.5)

Meanwhile, a statistically significant difference was observed between attending a patient safety course and knowledge of the form used to report ME ($p = 0.027$) and of how to process a completed form ($p = 0.000$). Most participants who did not attend a patient safety course had no knowledge of the form (77.6 %) and the process (86.6 %). Moreover, most participants who did not know if their center has an ME reporting system (75.6 %) had less than five years of experience ($p = 0.015$).

Barriers to ME Reporting

Heavy workload (59.1%) was the most frequent barrier to ME reporting, followed by the lack of positive feedback from administrators (55.0%), and an administration focusing on the individual rather than the system as a potential cause of the error (51.8%). By contrast, the least frequent barriers were "the error reporting system does not help to improve care quality and safety" (14.5%), "the patient has not been harmed, hence there is no need to report" (14.1%), and "the supervisor advised not to report" (10%) (Table 5).

Table 5. Barriers to medication error (ME) reporting according to physicians in primary health care centers in Al-Khobar, Qatif, and Dammam

Statement	Answers (N = 220)	
	n	%
1. Heavy workload prevents immediate reporting.	130	59.1
2. There is a lack of positive feedback because the administrator does not provide strategies for correcting errors.	121	55.0
3. When ME occurs, the administration focuses on the individual rather than looking at the system as a potential cause of the error.	114	51.8
4. It is possible that I may face a lawsuit or legal action.	104	47.3
5. I will be blamed if something happens to the patient as a result of the ME.	101	45.9
6. I am not sure who should report an error committed by another doctor.	97	44.1
7. It is likely I would face punishment (repercussions or adverse consequences).	91	41.4
8. ME is not defined in my center.	79	35.9
9. I do not recognize an error that occurs.	73	33.2
10. Other employees in the hospital would become aware of my ME.	72	32.7
11. I would be viewed as incompetent by my colleagues.	42	19.1
12. The ME report form is too complicated.	39	17.7
13. ME reporting wastes too much time.	38	17.3
14. I may not think the error is important enough to be reported.	37	16.8
15. The error reporting system does not help to improve care quality and safety.	32	14.5
16. The patient has not been harmed, hence there is no need to report.	31	14.1
17. The supervisor advised not to report.	22	10.0

At the discretion of the authors, an analysis of association was conducted only for the barriers (top 3) that were perceived by more than half of the participants (Table 5). Most participants who did not attend a patient safety course (66.4 %) perceived heavy workload as a barrier to reporting ($p = 0.006$). More males than females perceived that the administration focused on the individual rather the system as a cause of the error ($p = 0.008$). Meanwhile, no statistically significant difference was found between any sociodemographic characteristic and a lack of positive feedback from the administrator. In terms of the level of knowledge of ME, only 9.4% of the participants with good knowledge considered as a barrier to reporting, other hospital employees becoming aware of their ME ($p = 0.003$).

In terms of the knowledge of ME reporting system, the most statistically significant barriers for physicians who knew they work in an accredited center were not being sure who should report an error committed by another doctor (27.9 %, $p < 0.001$), not recognizing an ME (23.5%, $p < 0.042$), and ME not being defined in their center (19.1%, $p < 0.001$). The most frequent barriers for physicians who were aware of the form used to report ME were not being sure who should report an error committed by another doctor (29%, $p < 0.007$), not recognizing an ME (23%, $p < 0.046$), and ME not being defined in their center (16%, $p < 0.000$). The least frequent barrier was their supervisor advising them not to report (3.3%, $p < 0.040$). The most frequent barriers in physicians who knew how to access the form used to report ME were not recognizing an ME (21.4%, $p < 0.031$), ME not being defined in their center (14%, $p < 0.000$), and their supervisor

advising them not to report (1%, $p < 0.018$). The most frequent barriers for physicians who knew how to process a completed ME reporting form were when the administration focuses on the individual rather than the system as a potential cause of the error (35.4%, $p < 0.010$), not being sure who should report an error committed by another doctor (29.2%, $p < 0.019$), and when the error is considered not important to be reported (27.1%, $p < 0.032$). The least frequent barrier was ME being not defined in their center (22.9%, $p < 0.034$).

Discussion

This study is the first to assess knowledge of and barriers to reporting ME among physicians in PHC centers in Saudi Arabia. In 2015, the MOH reviewed its national guideline for medication error reporting in PHC centers, which defined ME and contained policies for detecting and preventing it. The reporting process is paper-based and anonymous (MOH, 2015).

Most PHC physicians had an average level of knowledge of ME (74.1%) and only few had good knowledge (14.5%). This finding may be attributed to most physicians in PHC not having postgraduate education; postgraduate physicians exhibited higher knowledge level than general practitioners and residents. This study is consistent with that of Abdel-Latif (2016), revealing health professionals' basic knowledge of ME. Additionally, most physicians were unaware of their center's ME reporting system, which supports previous findings on the poor knowledge of health professionals of the availability of an ME reporting system (Abdel-Latif, 2016; Almutary & Lewis, 2012; Alsulami et al., 2012; Haw, Stubbs, & Dickens, 2014; Javadi et al., 2014; Tobaiqy & Steward, 2013; Vrbnjak et al., 2016).

The most frequent barriers to reporting found in this study were consistent with those in the previous studies: heavy workload (59.1%; Alqubaisi, Tonna, Strath, & Stewart, 2016; Coyle, 2005; Holmström et al., 2012) and the lack of feedback from administrators to the reporters (55.0%; Handler et al., 2007; Samsiah, Othman, Jamshed, & Hassali, 2016). During this study, there were inadequate formal or informal protocols for feedback in the PHC centers. Giving feedback was also not mandatory. The barrier to reporting concerning the individual-focused culpability exhibited the prevailing culture of blame among all health care providers (Alemu, Belachew, & Yimam, 2017; Hartnell, MacKinnon, Sketris, & Fleming, 2012; Lee, 2017; Mohammad et al., 2016).

Most studies on barriers to ME reporting have not indicated associated factors of perceiving a barrier. This study found that attendance to a patient safety course was associated with decreased perception of heavy workload as a reason for underreporting. This may be attributed to their awareness of the time needed for reporting an error, thereby enabling them to manage their time better. Having a good knowledge of ME also decreased the fear of being considered incompetent by others after reporting an ME, which could be attributed to their knowledge of the importance of learning from mistakes.

Therefore, to address the major gap in knowledge of ME and increase the reporting rate, educational programs and patient safety courses on ME, as well as workshops on ME reporting system processes must be offered to health professionals. System-related barriers must also be addressed.

Significance and Limitations of the Study

The significance of the study lies in its novelty in exploring the knowledge of and barriers to reporting ME among physicians in PHC centers. However, limitations of this study must be noted. First, being a cross-sectional study, it could not establish a temporal or causal relationship. Second, the results are not generalizable to the larger Saudi population, as the study was conducted only in three major cities in the Eastern Province. Hence, future studies must be conducted in different regions of Saudi Arabia. Moreover, the ME reporting rates among physicians and their attitude toward reporting must be examined.

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