

Knowledge of Medication Safety among Dentists in Saudi Arabia

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Received: 17-08-2020;

Accepted: 03-12-2020

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Access this article online



www.ijpcs.net

DOI:
10.5530/ijpcs.2021.10.5

ABSTRACT

Objectives: The present study aimed to affirm the dentist's knowledge of medication safety in the Kingdom of Saudi Arabia. **Methods:** It is an analysis of a cross-sectional survey that conferred dentists' knowledge of medication safety in Saudi Arabia. Self-reported an electronic survey of dentists, comprising dentists from internship to the consultant, dental specialisms in Saudi Arabia. The survey contained respondents' demographic information about dentists and knowledge information of designated medication safety elements, and the resources of knowledge of medication safety elements in dental care. The 5-point Likert response scale system was employed with closed-ended questions. The data analysis of the dentist's knowledge of medication safety is completed through the survey monkey system. The statistical package of social sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft excel sheet (version 16) were used in the study. **Results:** The total number of responding dentists was 242, with the mainstream of them coming from the central region 95 (39.26%) with statistically substantial among the areas ($p < 0.05$). Of those, 144 (59.75%) were male, while 97 (40.25%) were female, with statistically significant between them ($p < 0.05$). The total average scores of dentist knowledge of medication safety in dental care were 2.78 with high scores element, knowledge of the high alert medication in dental care was 3.48, consider the Medication Errors (MEs) as a sentinel event (3.25), and familiar with medications reconciliation in dental care (3.23). The most resources employed for medication safety for dental care were health practitioners [129 (54.20%)] and scientific literature [118 (49.58%)]. The reliability test was evaluated in McDonald's ω (0.955) and Cronbach alpha (0.955). **Conclusion:** The dentist's knowledge of medication safety was insufficient in the kingdom of Saudi Arabia. Targeting training and education of dental medication safety during undergraduate and postgraduates school of dentistry is highly suggested to improve patient's safety in dental care in Saudi Arabia.

Key words: Knowledge, Experiences, Medication Safety, Dentists, Saudi Arabia.

INTRODUCTION

Errors in medication use in practice are a patient safety concern globally.¹ Efficient and effective care requires oral health professionals to have a structured plan to address pharmacological risks and benefits, including disclosure, and assess the patient's knowledge and compliance. There is a widening emphasis on patient safety during healthcare delivery, including oral health care.

^{2,3} A systematic review identified 45 studies of medication errors from 10-15 Middle Eastern countries.⁴ A more recent review of 54 studies from the Gulf Cooperation Council countries revealed prescribing error rates as high as 91% of primary care prescriptions and adverse drug events in 8.5 to 16.9 per 100 admissions, with up to 30% of these preventable.⁵ Globally, the estimated cost of medication errors has been estimated at USD 42 billion annually.¹ Over the past years, Saudi Arabia recognized total quality standards for healthcare professionals and institutions.⁶ The first version underlined each department's standards, while the update standards highlighted health care or services and mandatory healthcare accreditation standards. One of the compulsory standards was medication safety services or elements. During the period (2013-2014), the national medication safety program was also recognized with numerous

Saudi Arabia programs.⁷⁻⁹ The medication safety covered all medications for all healthcare specialties, including dental care.⁶ The dental care standards were part of total quality standards for healthcare organizations. However, it was not encompassed in full detail in medication safety procedures, and it was comprised as part of medication management and use. The patient safety services were approved of total quality standards in Saudi Arabia. It enclosed the majority of features of safety in dental care. Various international or local studies were directed about the dental knowledge or perception or practice of patient's safety aspects for dental care.¹⁰⁻¹³ However, dental care medication safety was not examined yet in Saudi Arabia or gulf and Arabic countries.¹⁴⁻¹⁷ The authors are not acquainted with any scientific indication about medication safety in dental care. The current study's objective is to discover the dental knowledge of medication safety aspects in Saudi Arabia.

METHODS

It is an analysis of a cross-sectional survey that conferred dentist's knowledge of medication safety in Saudi Arabia. Self-reported an electronic survey of dentists, comprising dentists from internship to the consultant, dental specialties in

Saudi Arabia. All non-dentists or students and non-completed surveys will be omitted from the study. The survey involved respondents' demographic information about dentists and knowledge information of selected medication safety elements, and the resources of knowledge of medication safety elements in dental care. The 5-point Likert response scale system was used with closed-ended questions. According to the earlier literature with unlimited population size, the sample was planned as a cross-sectional study, the confidence level 95% with z score of 1.96, margin of error 5-6.5%, population percentage 50%, and drop-out rate of 10%. As a result, the sample size will equal 251 to 432 with a power of study of 80%.¹⁸⁻²⁰ The response rate obligatory of calculated sample size at least 60-70% and above.²⁰⁻²¹ The survey was dispersed through social media of WhatsApp application and telegram groups of dentists. The reminder message had been sent every 1-2 weeks. The survey was authenticated through the revision of expert reviewers and pilot testing. Besides, various reliability tests like McDonald's ω , Cronbach alpha, Gutmann's λ_2 , and Gutmann's λ_6 had been done with the study. The data analysis of the dentist's knowledge of medication safety is completed through the survey monkey system. Besides, the statistical package of social sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft excel sheet version 16 with description and frequency analysis, good of fitness analysis, correlation analysis, inferential analysis of factors affect dentist's knowledge of medication safety. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) steered the current study's reporting.²²⁻²³

RESULTS

The total number of responding dentists was 242, with the mainstream of them coming from the central region 95 (39.26%) with statistically significant among the areas ($p < 0.001$). Of those, 144 (59.75%) were male, while 97 (40.25%) were female, with statistically substantial between them ($p < 0.001$). Most of the responders were in age (24-35) years 214 (88.43%) with statistically momentous between all ages level ($p < 0.001$). Almost half of the dentists were general practitioner 144 (47.11%), followed by intern 60 (24.79%), with the majority of them were holding dental staff jobs 158 (65.29%) with statistically significant between them ($p < 0.001$). Most dentists had skilled three years and less 179 (74.27%) with nearly half of them non-specialized dentists 96 (44.65%) with statistically significant between them ($p < 0.001$) (Table 1 and 2).

The total average scores of dentist knowledge of medication safety in dental care were 2.78 with high scores element, knowledge of the high alert Medication in dental care was 3.48, consider the Medication Errors (MEs) as a sentinel event (3.25), and acquainted with medications reconciliation in dental care (3.23). In contrast, the lowest scores were drug quality reporting (OVR for non-qualified drug) in dental care (2.38), non-formulary dental medications system (2.54), and the drug allergies system executed in dental care (2.57) with statistically significant between answers ($p < 0.05$). However, in three features, there is no statistical significance between responses ($p > 0.05$); presenting of safety center in Saudi Arabia, understanding with looks alike sound-alike of dental medications during prescribing, and knowledge of dental drugs wastage as discovered (Table 3). The most resources employed for medication safety for dental care were health practitioners 129 (54.20%) and scientific literature 118 (49.58%), followed by internet 94 (39.50%) and drug information resources 91 (38.24%) (Table 4). The reliability test covers McDonald's ω (0.955), Cronbach alpha (0.955), Gutmann's λ_2 (0.956), and Gutmann's λ_6 (0.966).

Gender

There is no noteworthy difference between males or females in most medication safety knowledge facets ($p > 0.05$). Except for the concept of medication safety and dental medications wastages, the male had a big difference with more inadequate knowledge than the female. While knowledge of prohibited abbreviation, the female had much incomplete knowledge. Moreover, the male had complete knowledge than the females in looks alike sound like with significant difference ($p < 0.05$). There are no substantial gender types and resources of knowledge of medication safety aspects ($p > 0.05$).

Age

There is no statistically significant alteration between all age levels and all knowledge parts of medication safety in dental care ($p > 0.05$). There is no statistically significant difference between all age levels and all types of medication safety resources in dental practice ($p > 0.05$).

Experience

There is no statistically noteworthy difference between all years' experiences and all-comprehensive knowledge facets of medication safety in dental care ($p < 0.05$). In contrast, the dentists with 4-6 years of experiences had more fractional knowledge in the legal medicine act of medications error and non-approved

indications system [11 (33.33%), 14 (42.42%)] than who had 1-3 years of experiences [12 (15%), 13 (16.25%)] or less than one year of experiences [29 (27.62%), 22 (21.15%)] respectively, with statistically significant difference ($p < 0.05$).

Also, the dentists had (4-6 years) 11 (33.33%) of experiences had more knowledge of medications reconciliation than (1-3 years) experiences 12 (15%) with a statistically significant difference ($p < 0.05$). There is no statistically significant difference between the level of experiences and the types of medication safety resources ($p > 0.05$). Except, the less than one year experiences 19 (18.1%) was more used of relative and friends as medications safety resources more than (1-3 years) of experiences 5 (6.33%) with statistically significant difference ($p < 0.05$). In comparison, those who had (4-6 years) of experiences 10 (30.3%) were more used of medication error courses as resources of medications safety than those who had less than one-year experiences 13 (12.38%) with a statistically noteworthy difference ($p < 0.05$).

Table 1: Demographic, social information.

Nationality	Response Count	Response Percent	p-value (X2)
Central area	95	39.26%	<0.001
North area	20	8.26%	
South area	45	18.60%	
East area	35	14.46%	
West area	47	19.42%	
Answered question	242		
Skipped question	0		
Gender	Response Count	Response Percent	
Male	144	59.75%	<0.001
Female	97	40.25%	
Answered question	241		
Skipped question	1		
Age	Response Count	Response Percent	
24-35	214	88.43%	<0.001
36-45	22	9.09%	
46-55	4	1.65%	
> 55	2	0.83%	
Answered question	242		
Skipped question	0		

Dentists Qualifications

There is no statistically significant difference between all dentist's specialisms (intern, residents, general practitioner, specialist, and

consultant) and knowledge of medications safety facets in dental care ($p>0.05$). Except for the ADR reporting system, the residents [10 (30.3%)] had more experience than intern [8 (12.9%)], with a statistically

significant difference ($p<0.05$). Also, the general practitioner [13 (11.11%)] had more information than intern [1 (1.64%)] in the drug quality reporting system in dental care with a statistically substantial difference ($p<0.05$). Moreover, the general practitioner [19 (16.24%)] had more knowledge of deliberation the medications errors as a near-miss than residents [1 (3.03%)] with statistically significant difference ($p<0.05$) in the comparison of the general practitioner [29 (25%)] had more knowledge than intern [7 (11.48%)] in dental medications wastage with statistically significant difference ($p<0.05$).

There is no statistically important difference between dentists' qualifications and resource types of medication safety knowledge in dental care ($p>0.05$). However, the intern [33 (54.1%)] was used more drug information resources than residents [7 (21.21%)], general practitioner [40 (34.48%)] and specialist [2 (11.76%)] with statistically significant difference ($p>0.05$), while the consultant [13 (65%)] was used SDAFA website than residents [7 (21.21%)] with statistically significant difference ($p<0.05$). Also, the residents 5 [(15.15%)] was used than intern [2 (3.28%)] and consultants 0 (0%) of consciousness lectures as medications safety resources with statistically significant difference ($p<0.05$); in the contract, the specialist 1 (5.88%) was used of health insurance companies than intern 0 (0%) as resources of medications safety with statistically significant difference ($p<0.05$). Moreover, the general practitioner [19 (16.38%)] was used pharmaceutical companies than intern [2 (3.28%)] as medication safety resources with a statistically significant difference ($p<0.05$).

Position

There is no statistically noteworthy difference between dentists' positions and all knowledge facets of medication safety in dental care ($p>0.05$). Except, the director of the dental unit had inadequate knowledge of medications errors reporting system 15 (30%) than dental staff 21 (13.04%) with statistically significant difference ($p<0.05$). There is no statistically significant difference between all kinds of dental positions and type of medication safety ($p>0.05$). In contrast, the dental director 11 (37.93%) was employed more medical guidelines as sources of medication safety in dental care than the director of dental unit 6 (12%), with a statistically significant difference ($p<0.05$). Moreover, the assistant director of dental unit 3 (37.5%) more used alertness lectures than the dental director 0 (0%), with a statistically significant difference ($p<0.05$).

Table 2: Demographic, social information.

Dentist Qualifications	Response Count	Response Percent	p -value (X2)
Intern	60	24.79%	<0.001
Resident	32	13.22%	
General Practitioner	114	47.11%	
Specialist	15	6.20%	
Consultant	21	8.68%	
Answered question	242		
Skipped question	0		
Position Held	Response Count	Response Percent	
Director of dental unit	47	19.42%	<0.001
Assistant director of dental unit	8	3.31%	
Dental Director	29	11.98%	
Dental staff	158	65.29%	
Answered question	242		
Skipped question	0		
Years of experiences at Dentists career	Response Count	Response Percent	
< 1	104	43.15%	<0.001
1 – 3	75	31.12%	
4 – 6	32	13.28%	
7 - 9	9	3.73%	
> 9	12	4.98%	
Answered question	241		
Skipped question	1		
Dentist Specialties	Response Count	Response Percent	
Dental Public Health	10	4.65%	<0.001
Endodontics	14	6.51%	
Oral and Maxillofacial Surgery	11	5.12%	
Oral Medicine and Pathology	3	1.40%	
Oral and Maxillofacial Radiology	0	0.00%	
Orthodontics and Dentofacial Orthopedics	11	5.12%	
Pediatric Dentistry	15	6.98%	
Periodontics	7	3.26%	
Prosthodontics	10	4.65%	
Restorative dentistry	9	4.19%	
Special needs dentistry	1	0.47%	
Non-applicable	22	10.23%	
General practitioner	96	44.65%	
Other (please specify)	6	2.79%	
Answered question	215		
Skipped question	27		

Table 3: Medications safety knowledge assessment.

Items	Complete knowledge		Incomplete knowledge		Partial knowledge		Little knowledge		No knowledge		Total	Weighted Average	p-value
	%	n	%	n	%	n	%	n	%	n			
Have you ever heard about the concept of medication safety in dental care?	14.23%	34	21.34%	51	29.29%	70	20.50%	49	14.64%	35	239	3.00	< 0.05
Have you ever heard about the concept of Medication error reporting system in dental care	16.32%	39	16.32%	39	28.45%	68	19.67%	47	19.25%	46	239	2.91	< 0.05
In Saudi Arabia, are there legal provisions in the medicines act that provide for Medication Errors (MEs) activities?	14.29%	34	13.87%	33	23.53%	56	21.43%	51	26.89%	64	238	2.67	< 0.05
In Saudi Arabia, is there a patient safety center?	22.50%	54	16.25%	39	20.83%	50	15.42%	37	25.00%	60	240	2.96	> 0.05
In your institution, is there an official standardized system of medication safety in dental care?	18.91%	45	9.66%	23	23.53%	56	11.76%	28	36.13%	86	238	2.63	< 0.05
Do you know the adverse drug reaction reporting system?	21.25%	51	12.50%	30	24.58%	59	23.33%	56	18.33%	44	240	2.95	< 0.05
Do you know drug quality reporting (OVR for non-qualified drugs) in dental care?	9.62%	23	10.46%	25	21.34%	51	25.10%	60	33.47%	80	239	2.38	< 0.05
Are you familiar with prohibited abbreviations during prescribing?	18.41%	44	11.30%	27	21.76%	52	24.27%	58	24.27%	58	239	2.75	< 0.05
Are you familiar with looks alike sound-alike of dental medications during prescribing?	18.49%	44	18.49%	44	26.47%	63	17.65%	42	18.91%	45	238	3.00	> 0.05
Do you know high alert Medication in dental care?	34.31%	82	13.39%	32	25.10%	60	20.50%	49	6.69%	16	239	3.48	< 0.05
Do you know to consider the Medication Errors (MEs) as a sentinel event?	23.01%	55	18.41%	44	28.45%	68	20.50%	49	9.62%	23	239	3.25	< 0.05
Do you know to consider the Medication Errors (MEs) as a near miss?	12.97%	31	15.90%	38	27.62%	66	20.92%	50	22.59%	54	239	2.76	< 0.05
Do you know the disclosure system of medications errors system	14.77%	35	13.92%	33	28.69%	68	18.57%	44	24.05%	57	237	2.77	< 0.05
In your institution, do you know the drug allergies system implemented in dental care?	18.91%	45	8.40%	20	20.17%	48	15.55%	37	36.97%	88	238	2.57	< 0.05
Are you familiar with medication reconciliation in dental care?	31.51%	75	13.87%	33	21.01%	50	13.45%	32	20.17%	48	238	3.23	< 0.05
Do you know the proper storage of dental medications?	26.58%	63	13.08%	31	25.74%	61	17.72%	42	16.88%	40	237	3.15	< 0.05
Do you know dental medications wastage?	21.10%	50	12.66%	30	21.94%	52	20.25%	48	24.05%	57	237	2.86	> 0.05
Are you familiar with off-labeling (non-approved indications) prescribing system in dental care	18.07%	43	7.98%	19	24.79%	59	17.65%	42	31.51%	75	238	2.63	< 0.05
Do you know the non-formulary dental medications system?	14.77%	35	11.39%	27	20.68%	49	19.83%	47	33.33%	79	237	2.54	< 0.05
Answered											240		
Skipped											2		

Table 4: The most resources used for Medications safety information in dental care.

Answer Choices	Responses	
Health practitioners	129	54.20%
Scientific literature	118	49.58%
Peer discussions	70	29.41%
Medical association literature/ guidelines/recommendations	55	23.11%
Drug information resources (Lexi comp-drug information, Micromedex, Epocrates .etc.)	91	38.24%
SFDA website	88	36.97%
Drug Bulletin	53	22.27%
Relatives and friends	29	12.18%
Medication errors education courses	40	16.81%
Internet	94	39.50%
The drug information center at the hospital	34	14.29%
Awareness lectures in a hospital	47	19.75%
Awareness lectures primary healthcare center	19	7.98%
Healthcare care awareness events at the market	5	2.10%
Health insurance companies	8	3.36%
Pharmaceutical companies	24	10.08%
Answered	238	
Skipped	4	

There is no association with no statistically significant difference ($p>0.05$) between all factors gender, age, years of experiences, academic qualifications, and dental positions, and all aspects of medication safety in dental care.

DISCUSSION

Dentists look at many different medical conditions and cases suffering from numerous dental diseases related to pains or infections, or injuries.²⁴⁻²⁵ The pain is categorized as simple pain associated with the cause of superficial dental caries. The patient senses pain when eating sugars or eating cold or hot things and severe pain, causing the arrival of decay or inflammation of the tooth's pulp. In most cases, the dentist wants to use analgesics, antibiotics, or tranquilizers in some cases.²⁴⁻²⁵ Some cases that come to the dental clinics have a disease history. The dentist must take medicines history to confirm that no problems or complications ascend from dental treatment, such as heart patients with a pacemaker or patients with weak immunity such as organ transplant patients or diabetics. Hence, it was compulsory

to know the dentist for medication given to patients, such as preserving their health or their lives. Therefore, this study was finished to assess the extent of a dentist's knowledge about the medicine's safety measures and tools to prevent drug-related problems. We conducted this study with vertically complete dentists from the trainee's internship dentistry to the consultants. There was an appropriate number of responses within a considered sample with good power of the study. Also, the questionnaire was authenticated by several methods and biostatistical analysis, which was not prepared before.

The sample was nearly male or female without any statistically noteworthy difference, reproducing both genders' reality in dental practice. Most of the responders were young dentists with general practitioners and less than three years of experience. It contained routine young with new graduates and still not dedicated. Also, the young responders were relaxed for them in the electronic survey. The study of fourteen selected medication safety elements in dental practice with a low score with insufficient knowledge of medication safety tools.^{26,27} The best knowledge scores were high varying medications or sentinel events of medication errors and medications reconciliation system. Most of those high scores items compulsory from total quality management for healthcare organizations accreditation wanted all practitioners to be acquainted with them.²⁸ In contrast, the lowest scores were unsafe in the dental practice. Still, they might not be accustomed to drug quality reporting systems or non-formulary dental medications and drug allergies. While most medications' safety elements bad scores despite essential facet. There was a statistically significant between answers ($p<0.05$) in each single medication aspect reflected a wide variation between the responses. However, only three elements were not statistically significant between answers ($p>0.05$), comprising presenting a safety center in Saudi Arabia, familiarity with looks alike sound-alike of dental medications during suggesting. Also, knowledge of dental medicines wastage reflected some knowledge among the responders because the features were required for healthcare organization accreditation in Saudi Arabia.²³ The most resources of medication safety for dentists are from their colleagues or scientific literature or internet general in the study. However, the critical resources were approaching from the fourth one, and it was drug information resources. It appeared the dentists not familiar with the best resources for medication safety knowledge in their practice. We need to surge dentists' knowledge sources by courses as endures education programs or before that as part of the pre-graduation study.

Several factors exaggerated the dentist's knowledge of medication safety in dental care, gender, age, experiences, academic qualifications, and career positions. There was no statistically substantial difference between males and females in most of the facets of medication safety knowledge except the male. They had more knowledge in medications safety storage and looks like sound-alike aspects than a female that might be related to the male dentists convoluted in some quality management committee, and they deliberated a lot in this matter. In comparison, the female had more knowledge in prohibition abbreviations because the female had more training skills in prescribing, and they were very tiny precise in writing the prescription. In comparison, the age levels did not play significant factors in the knowledge of medications safely. As a result, the insufficient knowledge from young or old dentists highlights the dentists exposed to education or training during dental careers or healthcare organizations. The number of years of experience will also not meaningfully affect the dentist's knowledge of medication safety except some knowledge related to regulation and law dental practice. There was no significant exaggerated dentist's knowledge of medication safety by the dental qualifications in most facets due to the absence of a medication safety program in dental care.

In contrast, the residents had more information in reporting medication errors, which was mandatory for the residents as part of the healthcare specialties residency program's Saudi counsel. Concurrently, the general practitioner had more knowledge in the medication's safety [drug quality reporting system] than intern dentists related to compulsory practice to monitor any imperfection of dental medicines. Also, the general practitioner had more knowledge in the near-miss system of medication safety because they wanted in the daily practice to expose more medication errors even and they want to differentiate between potential types of medication errors. The dental position was not exaggerated significantly in the knowledge of medication safety, except the director of dental units more cognizance of medication errors reporting system related to all problems and complaining of medication errors will denote to him through the internal regulations.

On the other hand, there was no noteworthy difference between male and female or age levels in the medication's safety resources, emphasizing insufficient knowledge of medications safety irrespective of those factors. The number of years of experience was not correlated a lot in the dentist's medication safety knowledge. However, the low years of expertise among dentists employed their friends in their knowledge and imitated reality. In comparison, more sharing the training courses because

the high experiences knew the system, they admittance to getting the training courses more than low years of experience. There is no statistically significant difference among all types of academic qualifications of dentists and resources medications safety. However, the intern had more booked to internet resources than all other academic qualifications because of the internet much knowledge of resources and internet use through the mobile system. The residents are more applied to the lecture than others due to the residency requirements of delivering healthcare professionals' courses.

In contrast, the dentist's specialist covers health insurance resources because it might depict many others, and general practitioners use the pharmaceutical companies' resources because they are unprotected to them as the first customer for medical representatives. The dentists' position did not exaggerate the dentist's knowledge of medication safety because the dental director utilized medication guidelines and alertness lectures as knowledge of resources. After all, the dental leaders were obligated to set up medication therapy guidelines or give education lectures in the dental practice.

Limitations

The study discovered first-time grades with valid self-assessment surveys and followed-up STROBE guidelines in the writing report. The study had numerous limitations, comprising the sample size calculated based on more than five percent margin or error, which wanted more sample size and nearly four hundred responders. Further, the study is first done in the dental field, with the majority of responders were new with little years of experience. It was a practical sample without equal number distribution of sample size in ages or years of experiences, academic qualifications, and dental positions.

CONCLUSION

The dentist's knowledge of medication safety was inadequate. Recognized education and training programs about dental medications safety unguarded or post-graduate at dysentery schools are suggested. Realized the dental medication safety program is obligatory to implement for all dental institutions in Saudi Arabia.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

Funding

None

Consent for Publications

Informed consent was obtained from all the participants

Ethical Approval


This research is exempted from research and ethical committee or an institutional review board (IRB) approval.

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

ABBREVIATIONS

MOH: Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **SPSS:** Statistical package of social sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology; **MEs:** Medication Errors.

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