


National Survey of Medication Safety Practice: Medication Administration at Primary Healthcare Centers/Community Pharmacies in Riyadh, Saudi Arabia

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ABSTRACT

Objective: To explore the national medication safety practice with emphasis on medication administration at primary healthcare centers (PHCs) and community pharmacies (CPs) in Riyadh city, Kingdom of Saudi Arabia. **Methods:** This is a four-month cross-sectional medication safety practice survey conducted at PHC pharmacies and CPs in Riyadh city. The survey consisted of the modified version of the Medication Safety Self-Assessment® for Community/Ambulatory Pharmacy from the Institute of Safe Medication Practice (ISMP). The survey consisted of a demographic section and 10 domains with 198 questions. The domains included questions on patient information; drug information; communication of drug orders and other drug information; drug labeling and packaging and nomenclature; use of devices; environmental factors; staff competency and education; patient education; quality processes; and risk management domain. In this study, we emphasized on medication administration; it is a finding from medication safety self-assessment for community/ambulatory pharmacy in Riyadh city. **Results:** The survey was distributed to 13 PHC pharmacies and 23 CPs. The average score of all ISMP-self assessment items of medication safety at PHCs was 2.75 ± 0.36 (54.94%) (95% CI=2.55–2.95; $P < 0.05$; range=2.04–3.38). The average score of all ISMP-self assessment items of medication safety at CPs was 3.14 ± 0.42 (62.86%) (95% CI=2.90–4.38; $P < 0.05$; range=2.40–3.88). The average score of drug standardization, storage and distribution domain at PHCs was 2.35 ± 0.41 (47%) (95% CI=2.17–2.53; $P < 0.05$; range=1.33–3.09) and in CPs, it was 3.4 ± 0.54 (68%) (95% CI =3.16–3.54; $P < 0.05$; range=2.22–4.25). The average score of medication devices acquisition, use and monitoring domain at PHCs was 3.62 ± 0.14 (72.4%) (95% CI=3.26–3.978; $P < 0.05$; range=3.45–3.70) and in CPs, it was 2.78 ± 0.23 (55.6%) (95% CI=2.21–3.349; $P < 0.05$; range=2.63–3.05). **Conclusion:** The medication administration safety was inadequate at PHCs while acceptable at CPs. Targeting to drug standardization, storage and distribution with emphasis on medication devices use and monitoring are highly recommended at PHCs in the Kingdom of Saudi Arabia.

Key words: Medication, Safety, Administration, Primary care centers, Community pharmacy, Riyadh, Saudi Arabia.

INTRODUCTION

A typical healthcare team consists of physicians; they are responsible for prescribing medications to the patients. The pharmacist is responsible for preparing and dispensing the medicines to their patients,¹ whereas the nurse is responsible for administering those medicines to the patients. However, the pharmacist plays a vital role in the administration stage,² for example, he/she needs to standardize the dilution of drugs to deliver a specific dosage. In addition he/she can regulate the frequency and time of administration, as well as the route of administration including oral, topical, or parentally.² Any error during the administration of medication may harm the patient. In the PHCs, the pharmacy center maintains list of medications, which are mainly prescribed for oral administration. However, some medications are administered during an emergency situation, for instance, cardiopulmonary resuscitation medications, intravenous fluid and pediatric formulations.³ All medications should be standardized to deliver particular dose of medication. The usage of medical devices for the administration of

medication needs to be standardized with respect to the concentration and administration period. CPs may deal with ready-made and backed medications, for instance, pediatric formulations, geriatrics preparation, the medications devices and frequency of medications administration. Several studies have reported on the occurrence of error during the administration of medication. Drug-related administration errors can be prevented by following preventive measures. One such method is to follow the assessment tool of medications safety practice at PHC pharmacies and CPs.⁴ Two studies published in the United States showed that the safety score level of medication administration was drug standardization from 73 to 81% and medical devices from 69 to 70%.^{5,6} In a local study conducted at the group of hospitals during the Hajj period the percentage safety levels found in the drug standardization core elements was 71.8% and Medication devices was 59.4%.⁷ However, to the best of our knowledge, there are no investigations in Saudi Arabia, Gulf and Middle Eastern countries. Therefore, the objective of this study was to explore the national survey of medications safety practice: medication administra-

tion at PHC pharmacies and CPs in Riyadh city, Saudi Arabia.

METHODS

This is a four-month cross-sectional medication safety practice survey conducted at PHC pharmacies and CPs in Riyadh city. The survey consisted of the modified version of the Medication Safety Self-Assessment⁷ for Community/Ambulatory Pharmacy from the ISMP.⁸ The survey consisted of a demographic section and 10 domains with 198 questions. The 10 domains included patient information; drug information; communication of drug orders and other drug information; drug labeling, packaging and nomenclature; use of medical devices; environmental factors; staff competency and education; patient education; quality processes; and risk management domain. The survey was conducted at PHC pharmacies of MOH and CPs located in Riyadh city. The responses were collected using a 5-point Likert response scale system. The scoring key identified as number (1) was equal to (A): No activity to implement, (2) was equal to (B): Considered, but not implemented, (3) was equal to (C): Partially implemented in some or all areas, (4) was equal to (D): Fully implemented in some areas and (5) was equal to (E): Fully implemented throughout. The survey was distributed to the directors of PHC pharmacies and CPs. The authors distributed the questionnaire and followed-up on a daily basis by physically visiting or by making a telephonic call. The survey was prepared in an electronic format and the results were analyzed through the Survey Monkey system and Microsoft Excel version 10. Based on GIPC and CBAHI standards, we suggested some solutions to improve the scores of the medication safety practice and the results of ISMP self-assessment.^{9,10} The 10 domains were divided into several parts for the sake of analysis, discussion and solution. Part one consisted of patient information. Part two consisted of drug information and part three consisted of medication preparation and dispensing (communication of drug orders and other drug information, drug labeling, packaging and nomenclature). Part four consisted of medication administration (drug standardization, storage and distribution, medication devices acquisition, use and monitoring). Part five consisted of environmental factors, workflow, staffing and staff competency and part six consisted of patient education, quality processes and risk management. In this study, we emphasized on part one; it is the finding from medication safety self-assessment for community/ambulatory pharmacy in Riyadh city.

RESULTS

The survey was distributed to 13 PHCs and 23 CPs. Most of the PHCs were types M1 and M3 (4 (30.8%) and 3 (23.1%), respectively). Most of the CPs were large (8 (33.3%)) and medium type (8 (33.3%)). The majority of PHCs and CPs had obtained accreditation from the Saudi Commission of Health Specialties (7 (70%) and 20 (87%), respectively). Most of the PHCs dispensed more than 100 prescriptions daily (7 (53.9%)), whereas CPs dispensed less than 20 prescriptions daily (11 (45.8%)). Most of the responders in PHCs were females (9 (69.2%)) (4 (30.8%) were males) and in CPs, all were males (25 (100%)). The majority of responders in PHCs were Saudi professionals (12 (92.3%)), whereas in CPs, all were non-Saudi professionals (25 (100%)). Most of the responders in PHCs were in the age group of 30–44 years (9 (69.2%)) and those in CPs were in the age group of 18–29 years (15 (62.5%)). Most of the responders in PHCs had obtained a diploma, a BSc in Pharmacy degree, or Master of Science in Clinical Pharmacy degree (2 (22.2%), 3 (33.3%) and 2 (22.2%), respectively). Most of the responders in CPs had obtained a BSc degree in Pharmacy (22 (88%)). The majority of the pharmacy staff had not obtained accreditation from the Board of Pharmaceutical Specialties (8 (88.9%) and 21 (91.3%) working in the PHC and CP, respectively) (Tables 1 and 2). The average score of all ISMP-self assessment items of medication safety at PHCs was 2.75 ± 0.36 (54.94%) (95%

CI=2.55–2.95; $P < 0.05$; range=2.04–3.38). The average score of all ISMP-self assessment items of medication safety at CPs was 3.14 ± 0.42 (62.86%) (95% CI=2.90–4.38; $P < 0.05$; range=2.40–3.88). The average score of drug standardization, storage and distribution domain at PHCs was 2.35 ± 0.41 (47%) (95% CI=2.17–2.53; $P < 0.05$; range=1.33–3.09) and in CPs, it was 3.4 ± 0.54 (68%) (95% CI (3.16–3.54; $P < 0.05$; range=2.22–4.25). The average score of medication devices acquisition, use and monitoring domain at PHCs was 3.62 ± 0.14 (72.4%) (95% CI=3.26–3.978; $P < 0.05$; range=3.45–3.70) and in CPs, it was 2.78 ± 0.23 (55.6%) (95% CI=2.21–3.349; $P < 0.05$; range=2.63–3.05) (Table 3).

At PHC pharmacies, the highest score of the drug standardization, storage and distribution key element with core “Prescribed medications are accessible to patients and dispensed in a safe and secure manner” was for the statement “When patients have a legitimate need for prescription medications, all pharmacists are empowered to take appropriate action to ensure that critical doses are not missed” (2.58 (51.6%)), whereas in CPs, the highest score was obtained for the statement “There is an efficient and timely process in place to obtain critically needed medications” (4.25 (85%)). The lowest score at PHCs and CPs was obtained for statement “The pharmacy is open 24-hours a day, seven days a week with scores” (1.33 (26.6%) and 3.05 (61%), respectively) (Table 4). At PHCs and CPs, the highest score of the drug standardization, storage and distribution key element with core “Medications and other necessary drug supplies are stored, dispensed and returned to stock in a manner that reduces the likelihood of an error” was obtained for the statement “Medication container labels face forward when stored upon shelving” (2.92 (58.4%) and 2.92 (58.4%), respectively). The lowest score at PHC pharmacies was obtained for the statement “An automated dispensing system that incorporates robotics and/or bar code verification systems is used to support the dispensing system in the pharmacy” (2.17 (43.4%)), whereas at CPs, it was obtained for the statement “To guide selection of the proper drug, a computer graphic appears on the screen with each prescription to show the appearance of the product” (2.74 (54.8%)) (Table 5).

At PHC pharmacies, the highest score of the drug standardization, storage and distribution key element with core “Hazardous drugs and chemicals are safely sequestered and not accessible in drug preparation areas” was obtained for the statement “An appropriately secured area of the pharmacy has been established to temporarily place discontinued, outdated or recalled medications until they are destroyed or removed from the pharmacy in a timely fashion” (3.09 (61.8%)) and at CPs the highest score was obtained for the statement “All topical substances, caustics and other non-drug substances are clearly labeled and stored separately from all other medications and supplies in the pharmacy’s drug inventory” (3.79 (75.8%)). The lowest score at PHC pharmacy was obtained for the statement “The pharmacy does not store chemical substances for distribution to a laboratory, doctor’s office or hospital” (1.91 (38.2%)) and at CPs, the lowest score was obtained for the statement “The bulk chemicals used in the pharmacy for compounding are clearly labeled with contents, the date the product” (2.22 (44.4%)) (Table 6). At PHC pharmacies, the highest score for the use of devices key element with core “Sanitary practices are followed when using devices and equipment to store and prepare medications” was obtained for the statement “Dispensing devices (e.g., counting trays, mortar and pestle) are washed after being used to prepare chemotherapy, penicillin, sulfonamide, opiate, or NSAID prescriptions” (3.70 (74%)). At CPs, the highest score was obtained for the statement “Staff members use gloves or proper hand washing when handling individual loose oral solid products” (3.21 (64.2%)). The lowest score at PHCs was obtained for the statement “Staff members use appropriate hand washing procedures prior to compounding any prescription products” (3.45 (69%)) and at CPs, it was obtained for the statement “Only clean (washed) measuring devices are used for compounding liquids, ointments and capsules” (2.63 (52.6%)) (Table 7).

Table 1: Demographic information related to hospital.

Region of work	Primary care centers		Community pharmacies	
	Response Count	Response Percent	Response Count	Response Percent
M1: Referral PCC for post graduate studies services up to 32,000 of population.	4	30.8%	Super Pharmacy	7 (29.2%)
M2: Referral internal sector PCC services up to 32,000 of population.	0	0.0%	Large Pharmacy	8 (33.3%)
M3: Referral PCC services internal cities up to 44,000 of population.	3	23.1%	Medium Pharmacy	8 (33.3%)
M4: Referral PCC services internal cities with housing up to 32,000 of population	1	7.7%	Small Pharmacy	1 (4.2%)
M5: Referral external sector PCC services up to 16,000 of population.	0	0.0%	Other (please specify)	0 (0.0%)
M6: Referral external sector with housing PCC services up to 16,000 of population.	0	0.0%	Answered question	24
M7: Referral small PCC services up to 32,000 of population.	1	7.7%	Skipped question	1
A0: primary care centers located at more than 35 Km distance and services 2,000-9,000 of population	2	15.4%		
B1: Big primary care center located at outside cities and within, 35 Km distance from referral PCC, services 15,000-25,000 of population.	1	7.7%		
B2: Big primary care center located at outside cities and within, 35 Km distance from referral PCC, services 12,000-15,000 of population.	0	0.0%		
B3: Big primary care center located at outside cities and within, 35 Km distance from referral PCC, services 3,000-12,000 of population.	0	0.0%		
Other (please specify)	1	7.7%		
Answered question	13			
Skipped question	0			
The hospital accreditation				
CIBAHI	1	10.0%	3	13.0%
Joint Commotion USA	0	0.0%	0	0.0%
Canada	1	10.0%	0	0.0%
Saudi commission of health accreditation	7	70.0%	20	87.0%
Non accredited	1	10.0%	0	0.0%
Answered question	10		23	
Skipped question	3		2	
Number of prescriptions per day				
No more than 20 prescriptions	0	0.0%	11	45.8%
No more than 30 prescriptions	0	0.0%	5	20.8%
No more than 50 prescriptions	1	7.7%	2	8.3%
No more than 70 prescriptions	1	7.7%	1	4.2%
No more than 100 prescriptions	3	23.1%	4	16.7%
more than 100 prescriptions	4	30.8%	1	4.2%
100-499 prescriptions	2	15.4%	0	0.0%
500-999 prescriptions	0	0.0%	0	0.0%
= or > 1000 prescriptions	1	7.7%	0	0.0%
Other (please specify)	1	7.7%	0	0.0%
Answered question	13		24	
Skipped question	0		1	

Table 2: Demographic information related to responder qualifications.

Gender	Primary care centers		Community pharmacies	
	Response Count	Response Percent	Response Count	Response Percent
Female	9	69.2%	0	0.0%
Male	4	30.8%	25	100.0%
Answered question	13		25	
Skipped question	0		0	
Nationality				
Saudi	12	92.3%	0	0.0%
Non- Saudi	1	7.7%	25	100.0%
Answered question	13		25	
Skipped question	0		0	
Age				
<18	1	7.7%	0	0.0%
18 - 29	3	23.1%	15	62.5%
30 - 44	9	69.2%	9	37.5%
45 - 59	0	0.0%	0	0.0%
60+	0	0.0%	0	0.0%
Answered question	13		24	
Skipped question	0		1	
Academic Qualification (s):				
Diploma Pharmacy	2	22.2%	1	4.0%
Bsc. Pharm	3	33.3%	22	88.0%
M.S	0	0.0%	0	0.0%
Msc. Clinical Pharmacy	2	22.2%	1	4.0%
Pharm.D.	1	11.1%	2	8.0%
Ph.D	0	0.0%	1	4.0%
MBA	0	0.0%	1	4.0%
Pharmacy Residency Two years (R1)	0	0.0%	0	0.0%
Pharmacy Residency one year (R2)	0	0.0%	0	0.0%
Fellowship	0	0.0%	0	0.0%
Other (please specify)	1	11.1%	1	4.0%
Answered question	9		25	
Skipped question	4		0	
Board of Pharmaceutical Specialty				
Board Certified Ambulatory Care Pharmacist (BCACP)	1	11.1%	0	0.0%
Board Certified Critical Care Pharmacist (BCCCP)	0	0.0%	1	4.3%
Board Certified Nuclear Pharmacist (BCNP)	0	0.0%	0	0.0%
Board Certified Nutrition Support Pharmacist (BCNSP)	0	0.0%	0	0.0%
Board Certified Oncology Pharmacist (BCOP)	0	0.0%	0	0.0%
Board Certified Pediatric Pharmacy Specialist (BCPPS)	0	0.0%	1	4.3%
Board Certified Pharmacotherapy Specialists (BCPS)	0	0.0%	0	0.0%
Board Certified Psychiatric Pharmacist (BCPP)	0	0.0%	0	0.0%
Non	8	88.9%	21	91.3%
Answered question	0		0	
Skipped question	9		23	

Table 3: The scores of key elements of Institute of Safe Medication Practice (ISMP): medication administration at primary healthcare centers/community pharmacies in Riyadh city.

	Medication Safety Items	Type of pharmacy	Mean score	SD	Confidence Level (95%)	Range	Median	Mode	Percent	SD %	Confidence Level (95%)	Range %	USA, 2000 Scores %	USA, 2011 Scores %	KSA, 2017 Scores %
V	Drug Standardization, Storage and Distribution	PCC	2.35	0.41	0.18	1.33 – 3.09	2.25	2.25	47	8.2	3.6	26.60 – 61.80	69.00	70.00	70.80
		CP	3.4	0.54	0.24	2.22 – 4.25	3.6	3.79	68	10.8	4.8	44.40 – 85.00			
VI	Medication Devices acquisition, Use and Monitoring	PCC	3.62	0.14	0.358	3.45 – 3.70	3.7	3.7	72.4	2.8	7.16	69.00 – 74.00	70.00	77.00	59.4
		CP	2.78	0.23	0.569	2.63 – 3.05	2.68	non	55.6	4.6	11.38	52.60 – 61.00			

Table 4: Items with highest and lowest scores in domain—Drug Standardization, Storage and Distribution with Core #7.

V: Drug Standardization, Storage and Distribution									
	Key elements	A	B	C	D	E	Rating Average	Percent	Response Count
	Core #7: Prescribed medications are accessible to patients and dispensed in a safe and secure manner	1	2	3	4	5			
	The highest scores items of Primary care center pharmacy								
67	When patients have a legitimate need for prescription medications, but have exhausted their supply while traveling, lost their medications, or cannot afford them, all pharmacists are empowered to take appropriate action to ensure that critical doses are not missed.	2	5	3	0	2	2.58	51.6	12
	The highest scores items of community pharmacy								
68	There is an efficient and timely process in place to obtain critically needed medications when they are not immediately available in pharmacy stock to dispense prescriptions.	0	0	5	5	10	4.25	85	20
	The lowest scores items of Primary care center pharmacy								
70B	The pharmacy is open 24-hours a day, seven days a week.	10	1	0	1	0	1.33	26.6	12
	The lowest scores items of community pharmacy								
70B	The pharmacy is open 24-hours a day, seven days a week.	3	5	4	4	4	3.05	61	20

DISCUSSION

Over the past few years, the pharmacy strategic plan at MOH institutions was updated with the New Saudi Vision; the medications safety system was one of the goals in the plan.⁹ Medication administration is a part of the medication safety procedures. Previously, we have explored the safety of medication administration stages at PHCs and CPs. According to the results, the score of the standardized concentration of drug-related issues at PHCs was lower than that of CP. This is because PHCs mostly use

oral and topical medications and they do not have facilities for the parenteral medications, whereas the CPs distributed the oral dosage forms with fixed standardized concentrations and nonparenteral medications registered in the SFDA. The PHCs safety scores of medication administration in the current study was lower than previous studies had been done in the hospitals, where CP safety scores was similar what had been reported in the international and local studies.⁵⁻⁷ This might be due to the greater emphasis placed on the medication safety issues in hospitals

Table 5: Items with highest and lowest scores in domain-Drug Standardization, Storage and Distribution with Core #8.

V: Drug Standardization, Storage and Distribution

	Key elements Core #8: Medications and other necessary drug supplies are stored, dispensed and returned to stock in a manner that reduces the likelihood of an error	A	B	C	D	E	Rating Average	Percent	Response Count
		1	2	3	4	5			
	The highest scores items of Primary care center pharmacy								
75	Medication container labels face forward when stored upon shelving.	5	0	1	3	3	2.92	58.4	12
79	If completed prescriptions are not ultimately dispensed to patients, the medications are returned to stock in a consistent manner that reduces the risk of an error (e.g., maintained on the shelf in the original prescription vial with drug, dose and expiration date highlighted and specific patient information redacted; returned to stock bottles after one individual pulls the appropriate stock bottles and another verifies accuracy via visual examination of the labels and products in each container, etc.).	1	3	5	2	1	2.92	58.4	12
	The highest scores items of community pharmacy								
75	Medication container labels face forward when stored upon shelving.	1	1	2	9	7	4.00	80	20
	The lowest scores items of Primary care center pharmacy								
76	When stocking shelves, staff ensures that wholesaler price labels do not interfere with critical drug information on the manufacturer's label.	6	2	2	0	2	2.17	43.4	12
77	To guide selection of the proper drug, a computer graphic appears on the screen with each prescription to show the appearance of the product.	5	3	2	1	1	2.17	43.4	12
78	An automated dispensing system that incorporates robotics and/or bar code verification systems is used to support the dispensing system in the pharmacy.	5	3	2	1	1	2.17	43.4	12
	The lowest scores items of community pharmacy								
77	To guide selection of the proper drug, a computer graphic appears on the screen with each prescription to show the appearance of the product.	5	4	4	3	3	2.74	54.8	19

than that of PHCs. Moreover, drug administration is highly needed at hospitals than that of CPs. Our results showed that the devices used for the administration of drugs at PHCs were more than those used in CPs. As a result, the PHC more frequently used the devices where is the CPs sell it not used them with more need of standardized of the drug^s devices to prevent mistakes. The healthcare staff at PHCs greatly demand to correct all medication administration-related errors using devices, whereas CPs did not.

The results of standardized concentration of drugs at PHCs is lower than those reported in the international and local studies,⁵⁻⁷ whereas the results of CPs were almost similar to the previous surveys due to standardized of the drug^s devices.⁵⁻⁷ The scores results of the medication

administration devices concentration at PHCs practically identical to the previous studies and better than local study, due to the standardized of the drug^s devices and the temporary usage of devices during Hajj period.⁵⁻⁷ However, the results related to CPs were found to be lower than the previously reported international and local studies.⁵⁻⁷ According to the results, for standardized drug concentration had the lowest score at both PHCs and CPs which open 24 hrs/7 days. This finding is normal at both institutions because not all of them are open 24/7. Maybe, there are opening at overtime and on-call duty coverage. Both of PHCs and CPs had low scored of the standardized drug concentration used with the automated distribution system and electronic prescription. The results was expected because most PHCs and CPs had not implemented auto-

Table 6: Items with highest and lowest scores in domain—Drug Standardization, Storage and Distribution with Core #9.

	Key elements Core #9: Hazardous drugs and chemicals are safely sequestered and not accessible in drug preparation areas	A	B	C	D	E	Rating Average	Percent	Response Count
		1	2	3	4	5			
	The highest scores items of Primary care center pharmacy								
86	An appropriately secured area of the pharmacy has been established to temporarily place discontinued, outdated or recalled medications until they are destroyed or removed from the pharmacy in a timely fashion.	4	0	2	1	4	3.09	61.8	11
	The highest scores items of community pharmacy								
84	All topical substances, caustics and other non-drug substances are clearly labeled and stored separately from all other medications and supplies in the pharmacy's drug inventory.	1	1	4	8	5	3.79	75.8	19
86	An appropriately secured area of the pharmacy has been established to temporarily place discontinued, outdated or recalled medications until they are destroyed or removed from the pharmacy in a timely fashion.	0	3	4	6	6	3.79	75.8	19
	The lowest scores items of Primary care center pharmacy								
82	Pharmacy does not store chemical substances (e.g., formalin, methanol, etc.) for distribution to a laboratory, doctor's office or hospital.	6	2	2	0	1	1.91	38.2	11
	The lowest scores items of community pharmacy								
81	Bulk chemicals used in the pharmacy for compounding are clearly labeled with contents, the date the product was first opened and the manufacturer's expiration date (if applicable).	7	5	3	1	2	2.22	44.4	18

Table 7: Items with highest and lowest scores in domain—Communication of drug orders and other drug information Core #10.

VI: Use of Devices									
	Key elements Core #10: Sanitary practices are followed when using devices and equipment to store and prepare medications	E	D	C	B	A	Rating Average	Percent	Response Count
		1	2	3	4	5			
	The highest scores items for Primary care center pharmacy								
34	C) Dispensing devices (e.g., counting trays, mortar and pestle, etc.) are washed after being used to prepare chemotherapy, penicillin, sulfonamide, opiate, or NSAID prescriptions.	2	0	2	1	5	3.70	74	10
35	D) Only clean (washed) measuring devices are used for compounding liquids, ointments and capsules.	2	0	1	3	4	3.70	74	10
	The highest scores items for community pharmacy								
60	A) Staff members use gloves or proper hand washing when handling individual loose oral solid products (e.g., capsules, tablets, etc.)	4	4	1	4	6	3.21	64.2	19
	The lowest scores items for Primary care center pharmacy								
34	B) Staff members use appropriate hand washing procedures prior to compounding any prescription products (e.g., liquids, ointments, capsules, etc.).	2	1	2	2	4	3.45	69	11
	The lowest scores items for community pharmacy								
60	D) Only clean (washed) measuring devices are used for compounding liquids, ointments and capsules.	6	4	4	1	4	2.63	52.6	19

mation or e-prescribing. The results showed of medications safety of the hazard drug inducing the chemical storage in the pharmacy or laboratory or doctor office had low scores of safety. Moreover, the statement “the bulk chemicals were not well labeled during their storage might lead to a point where any one of the visitors or the staff member might be exposed to the stored chemical” had lower scores of safety. Urgent action is needed in order to correct such practices. In this study, both PHCs and CPs had problems when dealing with hazardous material with hand washing and devices used to prepare the medications. As a result, the hazard material get exposure and pharmacy staff may contaminated. Therefore, we recommend that the hazard drug key elements should be revised and corrected at both PHCs and CPs in order to prevent any substance-related problems.

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CONFLICT OF INTEREST

None

ABBREVIATIONS

PHCs: Primary healthcare centers; Bachelor of Science, BSc; **CPs:** community pharmacies; **CI:** confidence interval; **CBAHI:** Saudi Central Board of Accreditation for Health Care Institutions; **ISMP:** Institute of Safe Medication Practice; **MOH:** Ministry of Health; **KSA:** Kingdom of

Saudi Arabia; **USA:** United States of America.

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