

Pharmacist Privilege in Saudi Arabia: Pharmacist Prescribing and Therapeutic Interchange

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Received: 11-10-2019;

Accepted: 13-12-2019

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www.ptbreports.org

DOI:
10.5530/PTB.2020.6.9

ABSTRACT

Objectives: To survey the pharmacist privilege in Saudi Arabia with an emphasis on pharmacist prescribing and therapeutic interchange. **Methods:** This is a 4-month cross-sectional survey of pharmacists privilege in Saudi Arabia. The study consists of two parts: the first part collects demographic information and the second part comprises 28 questions divided into four domains. These domains were derived from the previous literature and from the standards and regulations described by the American Society of Health-System Pharmacists (ASHP). The domains were privilege management and resources, pharmacist prescribing and therapeutic interchange, clinical and administration privilege, drug monitoring and healthcare education. We used 5-point Likert response scale system with close- and open-ended questions to obtain responses. The questionnaire was distributed in an electronic format to the director of pharmacy of various hospitals, deputy director, pharmacy quality management, clinical pharmacy coordinators, or any pharmacist assigned on behalf of hospital's director of pharmacy. The study discussed and analyzed pharmacist privilege in Saudi Arabia with an emphasis on pharmacist prescribing and therapeutic interchange. All data were obtained through the Survey Monkey system. **Results:** The survey was distributed to 36 hospitals. The pharmacist privilege of prescribing was available only at 12 (32.14%) hospitals. over-the-counter (OTC) medications (19 (90.48%)) and vitamins (14 (66.67%)) were most of the medications with pharmacist privilege of prescribing followed by minerals (11 (52.38%)) and electrolytes (10 (47.62%)), whereas NSAIDs (23 (63.89%)), Vitamins (19 (52.78%)), electrolytes (17 (47.22%)) and antihistamine (15 (41.67%)) were through therapeutic interchange program. Most of the pharmacists prescribing medication was through ambulatory care clinic (19 (52.78%)) and when prescription was cosigned by the physician (19 (52.78%)). The average score of pharmacist privilege in the hospital's computerized physician order entry (CPOE) was 3.17 (63.46%), whereas the average score of pharmacist privilege in the hospital's CPOE alerting system was 2.97 (59.46%). **Conclusion:** In the Kingdom of Saudi Arabia, pharmacist privilege in prescribing medications is very low. Most of the medications prescribed by the pharmacist were OTC drugs. The pharmacist privilege in the Computerized Physician Order Entry is not adequate. We highly recommend the implementation of a comprehensive pharmacist privilege system and regulations in Saudi Arabia.

Key words: Pharmacist, Privilege, Prescribing, Therapeutic, Interchange, Saudi Arabia.

INTRODUCTION

The profession of a pharmacist has developed over the past few years in the KSA.¹ It has changed the role of a pharmacist from the distribution phase to the patients directed care.² Recently, the privileges of a pharmacist has increased to provide services, including total parenteral nutrition, anticoagulant and pharmacokinetics services.³⁻⁵ The pharmacy is active in prescribing medications, change orders and request laboratory tests for monitoring drug therapy. Pharmacists demonstrated excellent clinical outcomes and avoided unnecessary economic burden on the healthcare system.^{3,6} Multiple international studies have shown that pharmacists have the privilege of dependent or independent prescribing.⁷⁻⁹ Moreover, the pharmacist plays an active role as a prescriber and improves patient outcomes.^{10,11} Investigations related to the pharmacist privilege of prescribing are seldom in the Middle Eastern countries.^{5,12} The therapeutic intervention described the system of switching from patent to generic medications with the same chemical name or change from one drug to different drug names with the same therapeutic efficacy and safety and indications.^{13,14} Therapeutic interchange is a tool

used to keep all medications available 24/7 for patients, improve drug therapy adherence to hospital formulary and avoid unnecessary economic burden on the healthcare services. Various studies have shown that the pharmacist has the privilege of a therapeutic interchange system.^{11,13,15,16} It could be an independent therapeutic interchange or one according to the approved guidelines of the pharmacy and therapeutic interchange system. Few studies have been conducted about pharmacist privilege with an emphasis on the therapeutic interchange system in Saudi Arabia or in Middle Eastern countries.⁵ In this study, we aimed to declare the pharmacist privilege with an emphasis on prescribing and therapeutic interchange in the kingdom of Saudi Arabia (KSA).

METHODS

This is a 4-month cross-sectional survey of prescribing privilege of pharmacists in the KSA. The study consisted of two parts: First parts collected demographic information and the second part comprised questionnaire with 28 questions divided into four domains. The domains were derived from the previous literature and American

Society of Health-System Pharmacists (ASHP's standards and regulations).^{9,17-20} The domains were privilege management and resources, pharmacist prescribing and therapeutic interchange, clinical and administration privilege and drug monitoring and healthcare education. We used 5-point Likert response scale system with close-ended questions to obtain responses. The questionnaire was distributed in an electronic format and was distributed to the hospital director of pharmacy, deputy director and pharmacy quality management. The responders were followed-up via email and telephone after every 1-2 weeks. All primary healthcare centers, regional pharmacy administration at MOH were excluded from this study. This study discussed and analyzed the pharmacist privilege in Saudi Arabia with an emphasis on pharmacist prescribing and therapeutic interchange. All data were obtained through the Survey Monkey system and analyzed with the use of SPSS version 20 software. There were three methods of validation and more than two authors reviewed the survey independently. The pilot study was conducted and the survey data was corrected accordingly. Cronbach's alpha test for internal validity was analyzed. This survey was exempted from the international guidelines of IRB.²¹

RESULTS

The survey was distributed to 36 hospitals. Of them, 19.44% of the hospitals had 100–199 bed capacity; and had <50 bed capacity; while 13.89% of the hospitals had 50–99 bed capacity, 300–399 bed capacity and ≥600 bed capacity each. Of the total 36 hospitals, 18 (50.00%) hospitals were accredited by the CBAHI, 17 (47.22%) hospitals were accredited by the Saudi Commission of Health Specialties and 13 (36.11%) hospitals were accredited by the Joint Commission, whereas 5 (13.89%) hospitals were not accredited by any organization and 13 (36.11%) hospitals covered 50–74% of their patients by health insurance. Furthermore, 17 (47.22%) responders were in the age group of 41–65 years. Most of the responders were Saudi nationals (32 (88.89%)) (4 (11.11%) responders were non-Saudi nationals). Most of the responders had obtained Diploma in Pharmacy (14 (38.89%)) and Bachelor of Science in Pharmacy (12 (33.33%)). Most of the responders had <1 year (46.67%) of experience in pharmacy, whereas 30.77% of the responders had 4–6 years of experience in clinical pharmacy and 43.75% had >6 years of experience in pharmacy administration (Tables 1 and 2). Furthermore, only 12 (32.14%) hospitals had pharmacist privilege of prescribing. Most of the medications with pharmacist privilege of prescribing was for OTC medications (19 (90.48%))

Table 1: Demographic information about responder's qualifications.

Nationality	Response Count	Response Percent	No. of hospital Licensed Beds	Response Count	Response Percent
Saudi	32	88.89%	< 50	7	19.44%
Non-Saudi	4	11.11%	50-99	5	13.89%
Answered question	36		100-199	7	19.44%
Skipped question	0		200-299	1	2.78%
Age	Response Count	Response Percent	300-399	5	13.89%
20-30 years	2	5.56%	400-499	3	8.33%
31 - 40 years	16	44.44%	= or > 600	5	13.89%
41 - 65 years	17	47.22%	Medical City	3	8.33%
more than 65 years	1	2.78%	Answered question	36	
Answered question	36		Skipped question	0	
Skipped question	0		The hospital accreditation	Response Count	Response Percent
Academic qualifications	Response Count	Response Percent	CIBAHI	18	50.00%
Diploma Pharmacy	3	8.33%	Joint Commotion USA	13	36.11%
Bsc. Pharm	12	33.33%	Canada	0	0.00%
M.S	2	5.56%	Saudi Council	17	47.22%
Msc. Clinical Pharmacy	6	16.67%	None	5	13.89%
Pharm.D.	14	38.89%	Answered question	36	
Ph.D	1	2.78%	Skipped question	0	
MBA	6	16.67%	Total number of patients covered by health insurance	Response Count	Response Percent
Pharmacy Residency Two years (R1)	2	5.56%	Non	6	16.67%
Pharmacy Residency one year (R2)	0	0.00%	< 25%	8	22.22%
Fellowship	1	2.78%	25-49%	6	16.67%
Other (please specify)	2	5.56%	50-74%	13	36.11%
Answered question	36		75-100% of our patients.	3	8.33%
Skipped question	0		Answered question	36	
			Skipped question	0	

Table 2: Responder's professional experience.

Years of experience	Pharmacy Practice	Percent	Clinical Pharmacy	Percent	Pharmacy Administration	Percent	Response Count
0	4	30.77%	4	30.77%	5	38.46%	13
< 1 year	7	46.67%	4	26.67%	4	26.67%	15
1-3	9	39.13%	6	26.09%	8	34.78%	23
4-6	7	26.92%	8	30.77%	11	42.31%	26
> 6 years	14	43.75%	4	12.50%	14	43.75%	32
Answered question							36
Skipped question							0

and vitamins (14 (66.67%)) followed by minerals (11 (52.38%)) and electrolytes (10 (47.62%)), whereas through therapeutic interchange program, most of the medications were having pharmacist prescribing privilege was for NSAIDs (23 (63.89%)), vitamins (19 (52.78%)), electrolytes (17 (47.22%)) and for antihistamine (15 (41.67%)) (Tables 3 and 4). The pharmacist prescribes medication through ambulatory care clinic (19 (52.78%)) and when prescription is cosigned by the physician (19 (52.78%)), followed by drugs under prescribing protocol (18 (50.00%)) and pharmacokinetic consultation (18 (50.00%)) (Table 5). The average score of pharmacist privilege in the hospital's Computerized Physician Order Entry (CPOE was 3.17 (63.46%)). Most pharmacy department with pharmacist privilege in prescribing belonged to outpatient pharmacy (3.61 (72.20%)) followed by drug information (3.39 (67.8%)) and prepackaging section (3.14 (67.80%)) (Table 6). The average score of pharmacist prescribing privilege in the hospital's Computerized Physician Order Entry (CPOE alerting system was 2.97 (59.46%)). Most of the pharmacy department with pharmacist privilege in prescribing alerting system was for drug information (3.31 (66.2%)) followed by outpatient pharmacy (3.28 (65.6%)) and inpatient pharmacy (3.14 (62.80%)) (Table 7).

DISCUSSION

The pharmacist privilege of prescribing was started in the 1990s when the clinical pharmacists were involved in providing TPN services with full independent prescribing of TPN order in hospital practice.⁴ While in the early 2000s, usually, the pharmacist had the complete authority of dispensing medications without prescription, which are called the OTC medications. The pharmacist was responsible for excellent clinical outcomes and considerable reductions in the cost of healthcare services.³ In addition, the therapeutic interchange system was started almost in the early 2000s during the group gulf medications purchases tenders. The pharmacist can switch automatically from providing patented drug to the generic drug of the same chemical name without the approval of a physician and perform fully independent therapeutic interchange. In this study, we focused on the privilege of pharmacists with an emphasis on prescribing and therapeutic interchange. We found that about one-third of the participants responded that they had a system similar to the previous studies^{7,8} with some improvement from a previous local study.⁵ Our results were less than that of a previous study because of the lag time of system implementation at different countries.⁹ The pharmacist privilege in prescribing was more for OTC medications. Although the type of medication prescribed by the pharmacists were similar; however, this result differed from a previous study because the pharmacist privilege in prescribing was implemented at hospitals, whereas in this study, the pharmacist prescribing privilege was implemented at community pharmacies.⁸ Moreover, majority of the responders were working at private hospitals and they had implemented the OTC system within their pharmacies. Most of the medications that had the privilege of prescribing

were OTC, vitamins and minerals similar to a previous study,⁵ which represented the OTC drug list approved by the Saudi Food and Drug Authority.²² Majority of the medications used for therapeutic interchange were nonsteroidal anti-inflammatory drugs, vitamins and electrolytes similar to the previous study.^{5,16} All therapeutic interchange medications were available for the aforementioned medications and much easier to switch from one product to the other one. Most of the privileges of prescribing was countersigned by a physician, which is similar to the results of previous study.⁵ Our results were much better through prescribing protocol and at ambulatory clinics privileges and become resemble of previous study.⁵ The pharmacist to take an active role in the independent prescribing at ambulatory care clinics. Two-thirds of the responders had

Table 3: Pharmacist privilege in prescribing.

Pattern of the pharmacist have the privilege to write medication orders or prescriptions		
Answer Choices	Responses	
Yes	12	32.14%
No	24	67.86%
Answered	36	
Skipped	0	
The class of medication that you have privilege prescribing		
Answer Options	Response Count	Response Percentages
Aminoglycoside	3	14.29%
Antibiotics	6	28.57%
Anticoagulant	8	38.10%
OTC Medications	19	90.48%
Anti-Hypertensive	4	19.05%
Pain management medications	3	14.29%
Electrolytes	10	47.62%
Vitamins	14	66.67%
Minerals	11	52.38%
Thrombolytic	2	9.52%
Anti-depressions	4	19.05%
Anti-Psychotics	1	4.76%
Anti-convulsing	2	9.52%
Other (most commonly prescribed medication)	2	9.52%
Answered	21	
Skipped	15	

Table 4: The class of medication involved in therapeutic interchange program with pharmacist privilege.

Answer Options	Response Count	Response Percentages
Antacid	10	27.78%
Vitamins	19	52.78%
Electrolytes	17	47.22%
Cephalosporin	8	22.22%
Laxatives	10	27.78%
Topical Corticosteroids	7	19.44%
NSAIDs	23	63.89%
Vaginal Antifungal	3	8.33%
Anti-Histamine	15	41.67%
OTC Drugs	5	13.89%
Non any medications	4	11.11%
Answered	36	
Skipped	0	

Table 5: The type of method with prescribing privilege.

Answer Options	Response Count	Response Percentages
Pharmacokinetic consultation	18	50.00%
When prescription cosigned by physician	19	52.78%
Drugs under prescribing protocol	18	50.00%
Medications Refill Clinic	17	47.22%
Ambulatory Care Clinic	19	52.78%
Supply and ostomy products	10	27.78%
Non	3	8.33%
Answered	36	
Skipped	0	

Table 6: The pharmacist privilege in a Computerized Physician Order Entry (CPOE) in various departments.

Answer Options	1	2	3	4	5	Rating Average	Percent Average	Response Count
Inpatient pharmacy	10	2	9	5	10	3.08	61.60	36
IV admixture Pharmacy	8	3	10	6	9	3.14	62.80	36
Outpatient pharmacy	5	2	8	8	13	3.61	72.20	36
Satellite pharmacy	14	2	7	5	7	2.69	53.80	35
Emergency pharmacy	10	4	7	5	10	3.03	60.60	36
Drug information	6	2	12	4	12	3.39	67.80	36
Clinical Pharmacy	8	2	10	4	12	3.28	65.60	36
Prepackaging section	6	4	8	6	12	3.39	67.80	36
Pharmacy Store	7	2	10	7	10	3.31	66.20	36
Pharmacy home care	12	2	10	5	7	2.81	56.20	36
						3.17	63.46	
answered question								36
skipped question								0
1-No activity to implement 2-Discussed for possible implementation in the pharmacy but is not implemented at this time 3-Partially implemented for some or all patients, prescriptions, drugs, or hospital department 4-Fully implemented for some patients, prescriptions, drugs, or hospital departments 5-Fully implemented for ALL patients, prescriptions, drugs, or hospital departments								

the privilege of prescribing during CPOE with an emphasis on ambulatory care clinic and drug information services. This is because OTC medications are easy to prescribe and implementation of the drug information service including the formulary guidelines.¹¹ The pharmacists privilege of prescribing during therapeutic interchange demands certain guidelines and pharmacy law to standardize the policies and procedures between the two systems in the kingdom of Saudi Arabia (KSA).

CONCLUSION

The pharmacist have prescribing privilege and therapeutic interchange utilization in the KSA. The pharmacist plays an active role in prescribing or perform therapeutic interchange of OTC medications through

pharmacy law. The electronic entry of pharmacist privilege has not reach its optimal level. Full implementation of the comprehensive pharmacist privilege system and regulations through in-depth guidelines about prescribing and therapeutic interchange is highly recommended in the KSA.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

Table 7: Alerting system during pharmacist privilege in a Computerized Physician Order Entry (CPOE).

Answer Options	1	2	3	4	5	Rating Average	Percent Average	Response Count
Inpatient pharmacy	8	3	10	6	9	3.14	62.80	36
IV admixture Pharmacy	11	3	6	7	9	3.00	60.00	36
Outpatient pharmacy	7	2	12	4	11	3.28	65.60	36
Satellite pharmacy	15	3	7	2	9	2.64	52.80	36
Emergency pharmacy	11	4	9	3	9	2.86	57.20	36
Drug information	8	3	7	4	13	3.31	66.20	35
Clinical Pharmacy	11	2	10	4	9	2.94	58.80	36
Prepackaging section	11	3	10	3	9	2.89	57.80	36
Pharmacy Store	9	2	10	4	11	3.17	63.40	36
Pharmacy home care	15	3	9	3	6	2.50	50.00	36
Average						2.97	59.46	
answered question								36
skipped question								0

1-No activity to implement 2-Discussed for possible implementation in the pharmacy but is not implemented at this time
3-Partially implemented for some or all patients, prescriptions, drugs, or hospital department
4-Fully implemented for some patients, prescriptions, drugs, or hospital departments
5-Fully implemented for ALL patients, prescriptions, drugs, or hospital departments

ABBREVIATIONS

MOH: Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **CBAHI:** Saudi Central Board for Healthcare Accreditation; **ASHP:** American Society of Health-System Pharmacists; **SPSS:** Statistical Package of Social Sciences; **CPOE:** Computerized Physician Order Entry; **OTC:** over the counter; **TPN:** total parenteral nutrition.

REFERENCES

- Alomi YA, Alghamdi SJ, Alattyh RA. History and Strategies of Drug Information Services at Ministry of Health in Saudi Arabia. *Pharmacol Toxicol Biomed Reports*. 2019;5(1):1-3.
- Asiri YA. Emerging frontiers of pharmacy education in Saudi Arabia: The metamorphosis in the last fifty years. *Saudi Pharm J*. 2011;19(1):1-8.
- Alomi1 YA, Fallatah AO, Al-Shubaar N, Qohal AA, Alameer LY. The Clinical Outcomes of Pharmacist Interventions in Total Parenteral Nutrition services in Riyadh City, Saudi Arabia. *Int J Pharm Heal Sci*. 2019;2(2):135-40.
- Alomi YA, Aljudaibi SM, Alghamd SJ. National Survey of Total Parenteral Nutrition Practice in Saudi Arabia: Prescribing and Transcribing at MOH Hospitals. *EC Nutr*. 2016;4(1):795-803.
- Alomi YA, Alghamdi SJ, Alattyh RA, Shorog E, Alshahran A, Alasmay S, et al. National Survey of Pharmacy Practice At Ministry of Health Hospitals in Saudi Arabia 2016-2017: Prescribing and Medication Management. *J Pharm Pr Community Med*. 2018;(5):S54-9.
- Alomi YA, Fallatah AO, Bahadig FA, Qahtani AAAL. The Economic Outcomes of Pharmacist Interventions in Total Parenteral Nutrition Services in Saudi Arabia. *Pharmacol Toxicol Biomed Reports*. 2019;5(3s):S40-9.
- Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Prescribing and transcribing: 2013. *Am J Heal Pharm*. 2014;71(11):924-42.
- Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Prescribing and transcribing: 2016. *American Journal of Health-System Pharmacy*. 2017;74(17):1336-52.
- Guirguis LM, Hughes CA, Makowsky MJ, Sadowski CA, Schindel TJ, Yuksel N. Survey of pharmacist prescribing practices in Alberta. *Am J Heal Pharm*. 2017;74(2):62-9.
- Tsuyuki RT, Houle SKD, Charrois TL, Kolber MR, Rosenthal MM, Lewanczuk R, et al. Randomized Trial of the Effect of Pharmacist Prescribing on Improving Blood Pressure in the Community. *Circulation*. 2015;132(2):93-100.
- Kang A, Thompson A, Rau J, Pollock A. Effects of clinical decision support and pharmacist prescribing authority on a therapeutic interchange program. *Am J Heal Pharm*. 2018;75(17S):S72-6.
- Alomi YA, Alghamdi SJ, Alattyh RA. National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017 : Clinical Pharmacy Services. *J Pharm Pr Community Med*. 2018;4(1s):1S-8S.
- Oh T, Franko TG. Comprehensive therapeutic interchange program in a community hospital. *Am J Hosp Pharm*. 1991;48(7):1471-7.
- Carroll NV. Formularies and therapeutic interchange: The health care setting makes a difference. *Am J Heal Pharm*. 1999;56(5):467-72.
- Carroll NV. Therapeutic interchange in community pharmacies in Virginia. *Am J Heal Pharm*. 2000;57(9):882-6.
- Schachtner JM, Guharoy R, Medicis JJ, Newman N, Speizer R. Prevalence and cost savings of therapeutic interchange among U.S. hospitals. *Am J Heal Pharm*. 2002;59(6):529-33.
- Burns AL. Credentialing and Privileging of Pharmacists: A Resource Paper from the Council on Credentialing in Pharmacy Council. *Consult Pharm*. 2015;29(11):757-70.
- Jordan TA, Hennenfent JA, Lewin JJ, Nesbit TW, Weber R. Elevating pharmacists' scope of practice through a health-system clinical privileging process. *Am J Heal Pharm*. 2016;73(18):1395-405.
- Blair MM, Carmichael J, Young E, Thrasher K. Pharmacist privileging in a health system: Report of the Qualified Provider Model Ad Hoc Committee. *Am J Heal Pharm*. 2007;64(22):2373-81.
- Christel G, Svingen. Clinical Pharmacist Credentialing and Privileging: A Process for Ensuring High-Quality Patient Care. *Parctioner Forum*. 2019;36(4):155-7.
- The Office for Human Research Protections. Human Subject Regulations Decision Charts. Chart. 2016. [cited 2019 Nov 4]. Available from: <https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts/index.html>
- Saudi Food and Drug Authority. List of human medicine and herbal health. Herbal and Drugs. 2019. [cited 2019 Jun 17]. Available from: <https://www.sfda.gov.sa/en/drug/resources/Pages/DrugsUnderRegistrations.aspx>