

National Survey of Clinical Pharmacy Practice in Saudi Arabia-2017-2018: Performances and Activities

Yousef Ahmed Alomi*,  BSc. Pharm, MSc. Clin Pharm, BCPS, BCNSP, DiBA, CDE, Critical Care Clinical Pharmacists, TPN Clinical Pharmacist, Freelancer Business Planner, Content Editor and Data Analyst, Riyadh, Saudi Arabia.

Fatimah Al-Doughan, PharmD, Lecturer College of Pharmacy, Pharmacy Practice Department King Faisal University, Alahssa, Saudi Arabia.

Sultan Mohammed Al-Jarallah, Head, Ambulatory Care Pharmacy, Oncology and Hematology Clinical Pharmacist, Pharmaceutical Care Department, Security Forces Hospital, Riyadh, Saudi Arabia.

Yasir Ahmed Ibrahim, Pharm D Head of Pharmacy Practice Department Pharmacy Practice Department College of Clinical Pharmacy, King Faisal University, Alahssa, Saudi Arabia.

Adel Mehmas Alragas, Bsc. Pharm Staff Pharmacist Pharmacy Department Medical City King Saud University, Riyadh, Saudi Arabia.

Norah Omar Bin Haidarah, PharmD, Pharmacy Staff Outpatient pharmacy Dr Sulaiman Al-habib Hospital, Riyadh, Saudi Arabia.

Correspondence:

Dr. Yousef Ahmed Alomi, BSc. Pharm, MSc. Clin Pharm, BCPS, BCNSP, DiBA, CDE, Critical Care Clinical Pharmacists, TPN Clinical Pharmacist, Freelancer Business Planner, Content Editor and Data Analyst, Riyadh 11392, Riyadh, Saudi Arabia.

Phone no: +966504417712

E-mail: yalomi@gmail.com

Received: 06-07-2019;

Accepted: 13-10-2019.

Copyright: © the author(s), publisher and licensee Pharmacology, Toxicology and Biomedical Reports. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

This is an open access article distributed under the terms of the Creative Commons Attribution-Non-Commercial-ShareAlike 4.0 License

Access this article online



www.ptbreports.org

DOI:
10.5530/PTB.2020.6.8

ABSTRACT

Objectives: To explore the national survey of clinical pharmacy practice in Saudi Arabia from 2017-2018 with an emphasis on performances and activities. **Methods:** This is a 4-month cross-sectional national survey regarding clinical pharmacy practice in Saudi Arabia. The study consisted of two parts: The first part collected demographic information and the second part comprised a questionnaire with 51 questions divided into four domains. The questions were derived from the standards of the American Society of Health-System Pharmacists (ASHP) and Saudi Pharmaceutical Society (SPS) survey, the international standards of the Joint Commission of Hospital Accreditation, in addition to the local standards of Saudi Center of Healthcare Accreditation. The four domains were as follows: clinical pharmacy administration and management, performances and activities, education and training and workload documentation. The responses were obtained using a 5-point Likert response scale system with close- and open-ended questions. The survey questionnaire was distributed in an electronic format to the 31 directors of pharmacies at various hospitals in Saudi Arabia. In this study, we analyzed the national survey of clinical pharmacy practice at hospitals in Saudi Arabia with regard to performances and activities. All data were obtained through the Survey Monkey system. **Results:** The survey questionnaire was distributed to 31 hospitals. Majority of the specifications of clinical pharmacy services provided were for concurrent and routine monitoring of drug therapy of the patients (17 (54.84%)) and written medication history (16 (51.61%)). Majority of the clinical services recorded was for answering drug information inquiries (74.19%), error and adverse drug event reporting (70.97%) and medication administration (70.97%). Most of the pharmacy units had clinical pharmacy services for control and narcotics system (4.13 (82.60%)), unit dose system (4.07 (81.40%)) and adults emergency medication (3.45 (69%)). Most of the hospital programs had clinical services existed for stewardship antimicrobial (64.52%), medication safety (61.29%) and medication reconciliation/history-taking (54.84%). Most of the methods of clinical pharmacist prescribing privileges in relevant hospital programs was prescribing under physician supervision (66), followed by independent prescribing (49) and refill prescribing (20).

Conclusion: The performances of clinical pharmacy services monitoring of drug therapy only; that is including medication misadventures monitoring and prevention through antibiotics, medication safety-related services. The clinical pharmacist had inadequate prescribing privilege under physician supervision. Targeting of upgrading the clinical pharmacy performances and privilege is higher recommended with New Saudi vision 2030 to improve patient clinical outcome and avoid any economic burden of the healthcare system in Saudi Arabia.

Key words: Clinical, Pharmacy, Practice, Performances, Activities, Saudi Arabia.

INTRODUCTION

Minimization of the risks associated with the use of medicines, ensuring patient safety and maintaining it through the medication management pathway and optimizing patient outcomes are the objectives of clinical pharmacy activities. Clinical pharmacy activities support the collaborative approach with other healthcare professionals, patients and caregivers.¹ In the general practice, these activities and services cannot be met entirely because of the workload that can affect the safety and quality of care. Therefore, enhancing the service specification of clinical pharmacy can benefit the patients, general practice and can broaden the healthcare system.² Multiple local and international studies have investigated the role of clinical activities or performances of the clinical pharmacy services.³⁻⁶ Some studies have discussed only about fixed activities, whereas the others have partly studied clinical pharmacy practice and the others have studied key performance indicators. However, some international

studies conducted on clinical pharmacy services have focused on clinical activities.⁷⁻⁹ To the best of our knowledge, there are no studies conducted on clinical performances or activities of clinical pharmacists and related cost in detail.¹⁰ The New Vision of Saudi Arabia 2030 was launched during late 2016 and the Ministry of Health (MOH) has started to change the pharmacy model in Saudi Arabia in order to achieve this goal.¹¹ Enhancing service specification of clinical pharmacy, as well as ensuring the implementation of clinical pharmacy services in all the required aspects such as hospital programs and pharmacy units aimed toward the new pharmacy model, is one of the objectives.¹² Therefore, in this study, we aimed to declare the clinical pharmacy activities and performance through national survey of clinical pharmacy practice from 2017-2018 in the Kingdom of Saudi Arabia (KSA).

METHODS

This is a 4-month cross-sectional national survey of clinical pharmacy practice in Saudi Arabia. The study consisted of two parts: the first part collected demographic information and the second part comprises a questionnaire with 51 questions divided into four domains. These domains are derived from the American Society of Health-System Pharmacists (ASHP) and Saudi Pharmaceutical Society (SPS) survey, the international standard of Joint Commission of Hospital Accreditation, in addition to the local standards of Saudi Center of healthcare accreditation (CBAHI).^{6-9,13-27} The four sections were as follows: clinical pharmacy administration and management, performances and activities, education and training and workload documentations. The responses were obtained via a 5-point Likert response scale system with close- and open-ended questions. The questionnaire was distributed in an electronic format to 31 directors of pharmacies at various hospitals in Saudi Arabia. The follow-up was done via email and telephone after every 1-2 weeks. All primary healthcare centers and regional pharmacy administration at MOHs were excluded from the study. In this study, we analyzed national survey of clinical pharmacy practice at hospitals in Saudi Arabia regarding performances and activities. All data were analyzed through the Survey Monkey system and analyzed using Statistical Package of Social Sciences (SPSS) version 20. The data were validated by three different methods, more than two of authors reviewed the survey independently and the pilot study was conducted. The survey data were corrected accordingly and Cronbach's alpha value was calculated for internal validity. The survey was exempted from the international guidelines of institutional review boards (IRB).²⁸

RESULTS

The survey was questionnaire distributed to 31 hospitals. Most of the hospitals had 200–299 beds (7 (22.58%)) and 300–299 beds (6 (19.35%)) followed by 50–99 beds (5 (16.13%)) and 400–499 beds (5 (16.13%)). Of the total 31 hospitals, 19 (67.86%) hospitals were accredited by CBAHI, 5 (17.86%) hospitals were accredited by Saudi Commission of Health Specialties and 4 (14.29%) hospitals were only accredited by Joint Commission. Majority of the hospitals (23 (74.19%)) covered <25% of their patients with an health insurance. Most of the responders had obtained degree in Bachelor of Science in Pharmacy (13 (41.94%)) and Doctor of Pharmacy (9 (29.03 %)), whereas all hospitals (31 (100%)) were not certified by the Board of Pharmaceutical Specialties (BPS). Most of the responders (32.26%) had 1–3 years of experience in pharmacy, whereas 22.58% of the responders had 4–6 years of experience (Table 1). Most of the specifications of clinical pharmacy services provided was for concurrent and routine monitoring of drug therapy of patients (17 (54.84%)) and written medication history (16 (51.61%)) (Table 2). Most clinical pharmacy services were provided for answering drug information inquiries (74.19%), error and adverse drug event reporting (70.97%) and medication administration (70.97%). Most of the clinical pharmacy services provided for adults was for answering drug information inquiries (23 (74.19%)), error and adverse drug event reporting (22 (70.97%)) and medication administration (20 (64.52%)), whereas in pediatrics, it was for error and adverse drug event reporting (16 (51.61%)), answering drug information inquiries (15 (48.39%)) and answering poisoning inquiries (13 (48.39%)). For neonates, most of the clinical pharmacy services were provided for answering drug information inquiries (12 (38.71%)), error and adverse drug event reporting (12 (38.71%)) and monitoring of medication therapy (11 (35.48%)) (Table 3). Most of the pharmacy units had clinical pharmacy services for control and narcotics system (4.13 (82.60%)), unit dose system (4.07 (81.40%)) and adults emergency medication (3.45 (69%)) (Table 4). Most of the hospital programs had clinical services for stewardship antimicrobial (64.52%), medication safety

(61.29%) and medication reconciliation/history-taking (54.84%). Most of the programs with clinical pharmacy services provided for adults was antimicrobial stewardship program (20 (64.52%)), medication safety program (19 (61.29%)) and medication reconciliation/history-taking program (17 (54.84%)) and in pediatrics, it was for medication safety program (14 (45.16%)), patient counselling program (11 (35.48%)) and basic life support with CPR team (10 (32.26%)) and for neonates, it was for medication safety program (11 (35.48%)), pharmacy infection control (8 (25.81%)) and IV admixture preparation and administration (7 (22.58%)) (Table 5). Most of the methods of clinical pharmacist prescribing privileges in relevant hospital programs was for prescribing under physician supervision (66), followed by independent prescribing (49) and refill prescribing (20). Most of the hospital program had clinical prescribing through prescribing under physician supervision or independent prescribing the programs was antimicrobial stewardship services 12 (38.71%) and 9 (29.03%) respectively through both method of clinical prescribing, where were anticoagulation services 12 (38.71%) and 8 (25.81%) respectively and IV therapy services 12 (38.71%) 8 (25.81%) respectively through both method of clinical prescribing. However, by refill prescribing the programs were for antimicrobial services (4 (12.9%)), anticoagulation services (4 (12.9%)) and adult nutrition support services (4 (12.9%)) (Table 6). The Cronbach's alpha test value was 0.765.

DISCUSSION

Enhanced service specification of clinical pharmacy can benefit the patients, general practice and can broaden the healthcare system. With these enhanced services, patients can get the best use of their medications and resolve any medication-related issues. In addition, the reliance on the qualification of the pharmacists for independent prescribing can boost the time spent for the medications by the patients and also reduce the general practice workload and ensure the safer prescribing and quality of care.² Unfortunately, our result shows that pharmacist's qualification for independent prescribing have not been implemented. According to our results, the concurrent and routine monitoring of drug therapy of the patients and written medication history are the specifications that stand out compared to counseling of patients on their medications, rounds with medical staff and pharmacokinetic or nutritional support consultations. The latter services can be improved by enhancing the service specifications in order to reduce the general practice workload.² There are a wide range of clinical activities to serve patients of different age groups. All studied hospitals showed the application of the following three clinical activities: answering drug information inquiries, error and adverse drug event reporting and medication administration.^{10,15,25} Pharmacogenomics services was found to be the least-implemented service as they required more advance services.²⁹ In addition, pharmacoeconomic services was the least-implemented services, which needs to be improved to manage with the New Pharmacy Model for Vision 2030.¹² In addition to the unit dose system, the control and narcotics system was found to be the most implemented pharmacy units that had clinical pharmacy services, whereas IV drips medication preparation, IV admixture and pediatrics CPR medications box are the most absent services in the majority of participated hospitals. This might be because that there are not enough pediatric clinical pharmacists who can help in checking the pediatrics CPR medications box. IV drips medication preparation system has not been founded yet and is considered as one of the challenges in pharmacy practice that need to overcome. However, the stewardship antimicrobial program, medication safety program and medication reconciliation/history-taking programs are the most implemented programs that had clinical pharmacy services. This result is different from those reported in the previous studies, which might be due to the differences in education and the demand for the clinical pharmacy programs.^{8,15,25} Participation of clinical pharmacists in the antimicrobial

Table 1: Demographic information regarding responder qualifications.					
No. of hospital licensed	Response N	Response %	Response N	Response %	Response N
< 50	3	9.68%	Diploma. Pharmacy	3	9.68%
50-99	5	16.13%	Bsc. Pharmacy	13	41.94%
100-199	2	6.45%	Master of Science	7	22.58%
200-299	7	22.58%	Doctor of Pharmacy	9	29.03%
300-399	6	19.35%	Two years Residency (R1)	0	0.00%
400-499	5	16.13%	Three years Residency (R2)	1	3.23%
= or > 600	1	3.23%	Ph. D	1	3.23%
Medical City	2	6.45%	M.B.A.	0	0.00%
Answered question	31		Answered question	31	0.95%
Skipped question	0		Skipped question	0	1.90%
The hospital accreditation	Response N	Response %	Board of Pharmaceutical Specialty	Response N	Response %
CBAHI	19	67.86%	Board Certified Ambulatory Care Pharmacist	0	0.00%
Joint Commotion USA	4	14.29%	Board Certified Critical Care Pharmacist	0	0.00%
Canada	0	0.00%	Board Certified Nuclear Pharmacist	0	0.00%
Saudi Council	5	17.86%	Board Certified Nutrition Support Pharmacist	0	0.00%
None	0	00.00% 14.29% 0.00% 17.86%	Board Certified Oncology Pharmacist	0	0.00%
Answered question:	28		Board Certified Pediatric Pharmacy Specialist	0	0.00%
skipped	3		Board Certified Pharmacotherapy Specialists	0	0.00%
The patients covered by health issuance			Board Certified Psychiatric Pharmacist	0	0.00%
< 25%	23	74.19%	Non	31	100.00%
25-50%	3	9.68%	Answered question	31	
51-75%	3	9.68%	Skipped question	0	
76-100% of our patients.	2	6.45%	Years of Experiences in Clinical Pharmacy	Response N	Response %
Answered	31		< 1	3	9.68%
Skipped	0		1 – 3	10	32.26%
			4-6	7	22.58%
			>6	3	9.68%
<i>Answered question</i>				31	
<i>Skipped question</i>				0	

stewardship program plays a significant role in optimizing antimicrobial therapy for each patient, managing hospital formularies regarding new antimicrobials and giving advice on drug monitoring, in addition to many other useful tasks.³⁰ On the contrary, the pain management program was found to be the least-implemented program among other hospital programs.¹⁵ Pain management programs are considered as one of the vital programs in the hospitals and clinical pharmacists' services are needed, especially in managing patients with complex conditions and to avoid drug-related adverse events and medication errors.³¹ This is be-

cause the absence of a complete structural pain management program might lead to inadequate monitoring of patients.³²

CONCLUSION

According to our results, the performances of clinical pharmacy services are inadequate in the KSA and the clinical pharmacists have inadequate prescribing privilege. Upgrading the clinical pharmacy performances and increasing the prescribing privilege is highly recommended to cope with Saudi Vision 2030 and to improve clinical outcome of patients and

Table 2: Clinical pharmacist service specifications.

	Answer Options	Number	Percentage
1	Preparation of written medication histories when the patient is admitted to hospital.	16	51.61%
2	Counseling of patient on their medications either during their stay or at discharge. (do not check if counseling usually consists solely of review of prescription label directions with patient .)	14	45.16%
3	Concurrent, routine monitoring of drug therapy of the patients (check only if the monitoring involves (1) review of the patient's chart. and (2) oral or written follow up with prescriber when indicated .)	17	54.84%
4	Rounds with the medical and nursing staffs. With the pharmacist taking an active part in the educational discourse during rounds and at subsequent conferences dealing with patient's drug therapies.	13	41.94%
5	Pharmacokinetic or nutritional support consultations (check only if the consultations consists of. at minimum, review of clinical laboratory results or serum drug concentrations and oral or written follow up with prescriber when necessary.)	11	35.48%
6	none of the above	6	19.35%
Answered		31	
Skipped		0	

Table 3: Type of patient served by the clinical activities.

Answer Options	Adults		Pediatrics		Neonates		We do not have it		Services existed	Response N
Drug compatibility investigation	15	48.39%	7	22.58%	4	12.90%	16	51.61%	48.39%	31
Bedside response for high-priority patients	13	41.94%	5	16.13%	3	9.68%	17	54.84%	45.16%	31
Drug dosing based on organ dysfunction	16	51.61%	9	29.03%	6	19.35%	15	48.39%	51.61%	31
Drug interaction analysis	17	54.84%	10	32.26%	8	25.81%	14	45.16%	54.84%	31
Drug identification	17	56.67%	8	26.67%	6	20.00%	13	43.33%	56.67%	30
Medication selection based on diagnosis	15	50.00%	7	23.33%	5	16.67%	15	50.00%	50.00%	30
Monitoring of medication therapy	18	58.06%	11	35.48%	11	35.48%	13	41.94%	58.06%	31
Medication therapy management	17	54.84%	10	32.26%	8	25.81%	14	45.16%	54.84%	31
Medication reconciliation/history-taking	17	54.84%	11	35.48%	6	19.35%	14	45.16%	54.84%	31
Error and adverse drug event reporting	22	70.97%	16	51.61%	12	38.71%	9	29.03%	70.97%	31
Bedside toxicology management	11	35.48%	8	25.81%	7	22.58%	20	64.52%	35.48%	31
Targeted disease state counseling	11	35.48%	7	22.58%	5	16.13%	20	64.52%	35.48%	31
Culture and sensitivity testing follow-up	16	53.33%	8	26.67%	5	16.67%	14	46.67%	53.33%	30
Medication administration	20	64.52%	13	41.94%	10	32.26%	9	29.03%	70.97%	31
Vaccine administration	14	45.16%	7	22.58%	8	25.81%	16	51.61%	48.39%	31
Answering drug information inquiries	23	74.19%	15	48.39%	12	38.71%	8	25.81%	74.19%	31
PharmacEconomics services	9	29.03%	4	12.90%	2	6.45%	22	70.97%	29.03%	31
Pharmacogenomics services	8	25.81%	3	9.68%	2	6.45%	23	74.19%	25.81%	31
Answering poisoning inquires	19	61.29%	13	41.94%	10	32.26%	12	38.71%	61.29%	31
There is no Clinical Activities of Pharmacists	10	38.46%	5	19.23%	4	15.38%	16	61.54%	38.46%	26
Answered										31
Skipped										0

Table 4: Type of pharmacy units had clinical pharmacy services.

	76-100 % completed		51-75 %		25-50 %		< 25 %		We do not have any		Total	Weighted Average	Percent
Unit dose system	13	43.33%	12	40.00%	2	6.67%	0	0.00%	3	10.00%	30	4.07	81.40
IV admixture	3	9.68%	5	16.13%	3	9.68%	5	16.13%	15	48.39%	31	2.23	44.60
An electronic prescription	12	38.71%	5	16.13%	3	9.68%	1	3.23%	10	32.26%	31	3.26	65.20
Extemporaneous formulations	5	16.13%	8	25.81%	6	19.35%	1	3.23%	11	35.48%	31	2.84	56.80
Repackaging medication system	7	23.33%	6	20.00%	4	13.33%	3	10.00%	10	33.33%	30	2.90	58.00
Patient education	8	25.81%	4	12.90%	6	19.35%	6	19.35%	7	22.58%	31	3.00	60.00
Adults emergency medication	8	27.59%	9	31.03%	4	13.79%	4	13.79%	4	13.79%	29	3.45	69.00
Pediatrics emergency medication	7	22.58%	6	19.35%	5	16.13%	3	9.68%	10	32.26%	31	2.90	58.00
Adults CPR medications box	10	33.33%	6	20.00%	5	16.67%	1	3.33%	8	26.67%	30	3.30	66.00
Pediatrics CPR medications box	7	23.33%	5	16.67%	5	16.67%	1	3.33%	12	40.00%	30	2.80	56.00
IV drips medication preparation	4	12.90%	2	6.45%	3	9.68%	5	16.13%	17	54.84%	31	2.06	41.20
Control and Narcotics system	16	53.33%	8	26.67%	3	10.00%	0	0.00%	3	10.00%	30	4.13	82.60
Pharmacy infection control	5	16.13%	7	22.58%	6	19.35%	1	3.23%	12	38.71%	31	2.74	54.80
Drug utilization Evaluation	6	19.35%	5	16.13%	5	16.13%	5	16.13%	10	32.26%	31	2.74	54.80
Medication reconciliation	8	25.81%	4	12.90%	5	16.13%	3	9.68%	11	35.48%	31	2.84	56.80
Answered												31	
Skipped												0	

Table 5: The clinical pharmacy shares in the following programs.

Answer Options	Adults		Pediatrics		Neonates		We do not have it		Services existed	Response N
Stewardship Antimicrobial	20	64.52%	9	29.03%	6	19.35%	11	35.48%	64.52%	31
Pain management	8	25.81%	4	12.90%	2	6.45%	23	74.19%	25.81%	31
Anticoagulation	15	48.39%	5	16.13%	2	6.45%	16	51.61%	48.39%	31
Poisoning management	12	38.71%	9	29.03%	6	19.35%	19	61.29%	38.71%	31
Medication Safety	19	61.29%	14	45.16%	11	35.48%	12	38.71%	61.29%	31
Patient counselling	16	51.61%	11	35.48%	5	16.13%	15	48.39%	51.61%	31
Pharmacy Infection Control	15	48.39%	9	29.03%	8	25.81%	16	51.61%	48.39%	31
Medication therapy management (MTM)	14	45.16%	8	25.81%	6	19.35%	17	54.84%	45.16%	31
Medication reconciliation/history-taking	17	54.84%	9	29.03%	6	19.35%	14	45.16%	54.84%	31
Drug Related Problems system	13	41.94%	8	25.81%	6	19.35%	19	61.29%	38.71%	31
Advance Cardiac Life Support (ACLS)	11	35.48%	5	16.13%	3	9.68%	20	64.52%	35.48%	31
IV admixture preparation and administration	13	41.94%	8	25.81%	7	22.58%	17	54.84%	45.16%	31
IV drips preparation and administration	10	32.26%	5	16.13%	5	16.13%	20	64.52%	35.48%	31
Basic life support with CPR team	14	45.16%	10	32.26%	5	16.13%	17	54.84%	45.16%	31
Answered										31
Skipped										0

Table 6: Clinical pharmacist prescribing privileges in relevant hospital programs.

Answer Options	Independent Prescribing	Refill Prescribing	Prescribing under physician supervision	Not at all	Total				
Stewardship Antimicrobial services	9	29.03%	4	12.90%	12	38.71%	11	35.48%	31
Pain management services	5	16.13%	2	6.45%	7	22.58%	20	64.52%	31
Anti-coagulation services	8	25.81%	4	12.90%	12	38.71%	13	41.94%	31
IV therapy services	8	25.81%	2	6.45%	12	38.71%	13	41.94%	31
Adult nutrition support services	7	22.58%	4	12.90%	8	25.81%	17	54.84%	31
Pediatrics nutrition support services	8	25.81%	2	6.45%	8	25.81%	18	58.06%	31
IV chemotherapy services	4	12.90%	2	6.45%	7	22.58%	22	70.97%	31
Answered	49		20		66				31
Skipped									0

to avoid any economic burden on the healthcare system in the KSA.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

None.

ABBREVIATIONS

MOH: Ministry of Health; **ASHP:** American Society of Health-System Pharmacists; **SPS:** Saudi Pharmaceutical Society; **CBAHI:** Saudi Center for Healthcare Accreditation; **KSA:** Kingdom of Saudi Arabia; **SPSS:** Statistical Package of Social Sciences; **IRB:** Institutional Review Board; **IV:** Intravenous, **CPR:** Cardiopulmonary Resuscitation.

REFERENCES

- Management M, Health Q, Standards S, Aged N, Residential C, Chart M, *et al.* Overview : Standards of Practice for Clinical Pharmacy Services. 2013;43(2):6-9.
- Practice G, View F, England NHS, Reader I. Enhanced Service Specification. Meningococcal Freshers Vaccination Programme. 2018;1-14.
- Bond CA, Raehl CL, Franke T. Clinical Pharmacy Services, Pharmacy Staffing and the Total Cost of Care in United States Hospitals. *Pharmacotherapy.* 2002;22(2):134-47.
- Bond CA, Raehl CL, Franke T. Clinical Pharmacy Services, Pharmacist Staffing and Drug Costs in United States Hospitals. *Pharmacotherapy.* 1999;19(12):1354-62.
- Lo E, Rainkie D, Semchuk WM, Gorman SK, Toombs K, Slavik RS, *et al.* Measurement of clinical pharmacy key performance indicators to focus and improve your hospital pharmacy practice. *Can J Hosp Pharm.* 2016;69(2):149-55.
- 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(1):1S-8S.
- Cotter SM, Barber ND, McKee M. Survey of clinical pharmacy services in United Kingdom National Health Service hospitals. *Am J Hosp Pharm.* 1994;51(21):2676-84.
- Lanier C, Moss J, Tunney R, Baird R, Kelly K. Clinical Pharmacy Practice Patterns Among North Carolina Rural Hospitals. *J Pharm Pract.* 2019;89719001986632.
- Cillis M, Spinewine A, Krug B, Quennery S, Wouters D, Dalleur O. Development of a tool for benchmarking of clinical pharmacy activities. *Int J Clin Pharm.* 2018;40(6):1462-73.
- Alomi YA, Aldosary BA. Cost Analysis of Activities for Network Drug Information Centers at the Ministry of Health Hospitals in Saudi Arabia. *Int J Pharm Heal Sci.* 2019;2(1):45-51.
- Alomi YA, Alghamdi SJ, Alattyh RA, Elshenawy RA. The Evaluation of Pharmacy Strategic Plan in Past 2013-2016 and Forecasting of New Vision 2030 at Ministry of Health in Saudi Arabia. *J Pharm Pract Community Med.* 2018;4(2):93-101.
- Alomi YA. New Pharmacy Model for Vision 2030 in Saudi Arabia. *J Pharm Pract Community Med.* 2017;3(3):194-6.
- Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Dispensing and administration: 2014. *Am J Heal Pharm.* 2015;72(13):1119-37.
- Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Monitoring and patient education: 2015. *Am J Heal Pharm.* 2016;73(17):1307-30.
- Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: Prescribing and transcribing: 2016. In: *American Journal of Health-System Pharmacy.* 2017;74(17):1336-52.
- Ahmed AY, Jamaan AS, Abdullah AR, Shorog E, Alshahran A, Alasmary S, *et al.* National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Pharmacy Management and Resource. *J Pharm Pract Community Med.* 2018;4(1s):s1-16.
- Alomi YA, Alghamdi SJ, Alattyh RA, Shorog E, Alshahran A, Alasmary 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, Jamaan AS, Abdullah AR, Shorog E, Alshahran A, Alasmary S, *et al.* National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Preparation of Medications and Dispensing. *J Pharm Pract Community Med.* 2018;4(1s):s54-9.
- Alomi YA, Shorog E, Alshahrani A, Alasmary S, Alenazi H, Almutairi A, *et al.* National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Drug Monitoring and Patients Education. *J Pharm Pract Community Med.* 2018;4(1s):s17-22.
- Yousef AA, Saeed JARAA. National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Pharmacy Education and Training. *J Pharm Pr Community Med.* 2018;4(1):1S-8S.
- Yousef AA, Saeed JARAA. National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Pharmacy Inventory Control and Stock Management. *J Pharm Pr Community Med.* 2018;4(1):S28-33.
- Alomi YA, Alghamdi SJ, Alattyh RA. National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Pharmacy Computerized and Technology. *J Pharm Pract Community Med.* 2018;4(1s):s40-6.
- Ahmed AY, Jamaan AS, Abdullah AR, Shorog E, Alshahran A, Alasmary S, *et al.* National Survey of Pharmacy Practice at MOH Hospitals in Saudi Arabia 2016-2017: Prescribing and Medication Management. *J Pharm Pract Community Med.* 2018;4(1s):s34-9.
- Čufar A, Mirhar A, Robnik-Šikonja M. Assessment of surveys for the management of hospital clinical pharmacy services. *Artif Intell Med.* 2015;64(2):147-58.
- Bond CA, Raehl CL, Patry R. Evidence-Based Core Clinical Pharmacy Services in United States Hospitals in 2020: Services and Staffing. *Pharmacotherapy.* 2004;24(4):427-40.
- CIBAHI. Medication Management. In: *National Accreditation Standard. 2nd Edition.* Saudi Central Board for Accreditation of Healthcare Institutions. 2016. Available from: <http://insights.ovid.com/crossref?an=01222928-201713010-00016>
- The Joint Commission. 2016 Comprehensive Accreditation Manuals. Joint Commission Resources. 2016.
- 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>
- Arwood MJ, Chumnumwat S, Cavallari LH, Nutescu EA, Duarte JD. Implementing Pharmacogenomics at Your Institution : Establishment and Overcoming Implementation. *Clinical and Translational Science.* 2016;9(5):233-45.
- Mas-morey P, Valle M. A systematic review of inpatient antimicrobial stewardship programmes involving clinical pharmacists in small-to-medium-sized hospitals. *European Journal of Hospital Pharmacy.* 2018;25(e1):e69-73.
- Sourial M, Lesé MD. The pharmacist's role in pain management during transitions of care. *US Pharm.* 2017;42(8):HS-17-HS-28.
- Alomi YA, Ibrahim EK. KSA-Self Assessment of Pain Management Medication Safety for Hospitals. *J Pharm Pract Community Med.* 2017;3(4).