


National Survey of Pharmacokinetic Services in Saudi Arabia: Perceptions and Barriers of Service Implementations

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ABSTRACT

Objectives: To explore the pharmacokinetic services at the Ministry of Health (MOH) hospitals in Saudi Arabia with an emphasis on perceptions and barriers of service implementation. **Methods:** This is a 2-month cross-sectional national survey of pharmacokinetic services with a focus on pharmacy management and resources at MOH hospitals in Saudi Arabia. The study consisted of two parts: the first part collected demographic information and the second part consisted of 43 questions divided into three domains. The questions were derived from the American Society of Health-System Pharmacists (ASHP) guidelines and from the literature. We used 5-point Likert response scale system with close-ended questions to obtain responses. An electronic questionnaire was distributed to the coordinators of the clinical pharmacy services or drug information centers at MOH hospitals and it analyzed the perceptions and barriers of pharmacokinetic service implementations section through the Survey Monkey system. **Results:** A total of 43 hospital pharmacies responded to the questionnaire, with the response rate of 86%. The majority of pharmacokinetic services were provided to the adult patients (37 (86.05%)) followed by the pediatric and geriatric patients (19 (44.19%) and 13 (30.23%), respectively) with most of the responding hospitals having less than 20 beds (23 (53.5%)). The categories with most of the barriers of pharmacokinetic service implementation were lack of knowledge (20 (64.52%)), lack of pharmacokinetic education (16 (51.61%)) and lack of an expert pharmacist in pharmacokinetic services (16 (51.61%)). Most of the responders agreed that clinical pharmacokinetic services were necessary for hospitals (23 (53.5%)). The responders agreed that the clinical pharmacist through pharmacokinetic services had a positive financial impact and cost avoidance on healthcare system (23 (53.5%)). Most of the responders stated that pharmacokinetic services improve the safety and efficacy of patient care (33 (89.2%)). Most of the responders agreed that the pharmacokinetic services improved patients' clinical outcome (33 (89.2%)) and prevented drug-related problems (33 (89.2%)), whereas few of the pharmacokinetic services were provided only 10 (29.4%) over 24 hr per day. **Conclusion:** Despite the positive attitude of hospital management toward pharmacokinetic services, there was a lack of education and training regarding the same at MOH hospitals in Saudi Arabia. Revision of strategic planning of pharmacokinetic services with regard to their improvement and implementation are required at all MOH hospitals in Saudi Arabia.

Keywords: pharmacokinetics, Perceptions, Barriers Ministry of Health, Saudi Arabia.

INTRODUCTION

Clinical Pharmacokinetic Services (CPSs) are essential components of the drug Therapy Monitoring (TDM) in hospital setting. Several researchers have investigated the outcome of CPSs in various hospitals. These studies have shown that pharmacokinetic services may improve the clinical outcome of the patient, decrease drug-related problems, decrease length of hospital stay and avoid unnecessary drug therapy cost.^[1-9] However, to the best of our knowledge, there are no studies conducted on the perception, feeling and attitude of the CPSs or on barriers of pharmacokinetic service implementations in the Gulf or Middle Eastern countries or in other countries.^[10] Therefore, in this study, we aimed to explore the pharmacist's perception of barriers of implementation of pharmacokinetic services at MOH hospitals in Saudi Arabia.

METHODS

This is a 2-month cross-sectional national survey of pharmacokinetic services with a focus on pharmacy management and resources at MOH hospitals in Saudi Arabia. The study consisted of two part: the first part collected demographic information and the second part consisted of 43 questions divided into four domains. The questions were derived from the ASHP guidelines and from the literature.^[11-14] The domains were grouped as follows: Pharmacy management and resources, medication prescribing and dispensing, drug monitoring and pharmacy education and perceptions and barrier of service implementations. We used the 5-point Likert response scale system with close-ended questions to obtain responses. The questionnaire was prepared in an electronic format and was distributed to the coordinators of the CPSs or drug information centers at MOH hospitals. It analyzed the perceptions and

Table 1: Demographic information about hospital.

Number of beds at your hospital	Response Count	Response Percent
< 50	3	7.0%
50-99	6	14.0%
100-199	10	23.3%
200-299	14	32.6%
300-399	6	14.0%
400-499	4	9.3%
500-599	0	0.0%
= or > 600	0	0.0%
Medical City	3	7.0%
Answered question	43	
Skipped question	0	
The hospital accreditation	Response Count	Response Percent
CIBAHI	17	39.53%
Joint Commotion USA	11	25.58%
Canada	0	0.00%
Saudi commission of health accreditation	7	16.28%
Non	8	18.60%
Answered question	43	
Skipped question	0	

Table 2: Demographic information about responder qualification.

Academic Qualification (s):	Response Count	Response Percent
Diploma. Pharmacy	4	9.30%
Bsc. Pharmacy	22	51.16%
Master of Science	12	27.91%
Doctor of Pharmacy	11	25.58%
Two years Residency (R1)	1	2.33%
Three years Residency (R2)	0	0.00%
Ph. D	1	2.33%
M.B.A.	1	2.33%
Answered question	43	
Skipped question	0	
Board of Pharmaceutical Specialty	Response Count	Response Percent
Board Certified Ambulatory Care Pharmacist (BCACP)	0	0.0%
Board Certified Critical Care Pharmacist (BCCCP)	0	0.0%
Board Certified Nuclear Pharmacist (BCNP)	0	0.0%
Board Certified Nutrition Support Pharmacist (BCNSP)	0	0.0%
Board Certified Oncology Pharmacist (BCOP)	0	0.0%
Board Certified Pediatric Pharmacy Specialist (BCPPS)	0	0.0%
Board Certified Pharmacotherapy Specialists (BCPS)	0	0.0%
Board Certified Psychiatric Pharmacist (BCPP)	0	0.0%
Non	38	100.0%
Other (please specify)))	0	0.0%
Answered question	38	
Skipped question	5	
Total years of Experiences in Pharmacokinetic services	Response Count	Response Percent
< 1 year	4	9.3%
1 – 3 years.	9	20.9%
4-6 years.	7	16.3%
= or > 6 years.	9	20.9%
No experiences	11	25.6%
Other (please specify)	3	7.0%
Answered question	43	
Skipped question	0	

barriers of service implementations through the Survey Monkey system.

RESULTS

A total of 43 hospital pharmacies responded to the questionnaire, with a response rate of 86%. Majority of the hospitals responded had 200–299 beds (14 (32.6%) and 100–199 beds (10 (23.3%)). Most of the hospitals had accreditation from CBAHI (17 (39.53%)) and from Joint Commotion USA (11 (25.59%)) and 8 (16.6%) hospitals had no accreditations (Table 1). The highest level of education of the responders was Bachelor Degree in Pharmacy (22 (51.2%)), Master of Science (12 (27.91%)) and Doctor of Pharmacy (11 (25.58%)). Most of the responders had more than 6 years of experience in CPSs (9 (20.9%)). None of the responders had accreditation from the Board of Pharmaceutical Specialties (Table 2). The majority of pharmacokinetic services were provided to the adult patients (37 (86.05%)) followed by pediatric and geriatrics patients (19 (44.19%) and 13 (30.23%), respectively), with most of the responders having less than 20 beds (23 (53.5%)). Most of the pharmacokinetic services were provided through the inpatient pharmacy (27 (62.79%)) and outpatient pharmacy and discharge services (9 (20.93%)). Most of the hospital pharmacies (33 (76.7%)) received less than 100 prescriptions for CPSs daily (Table 3). Most of the barriers to the implementation of pharmacokinetic services was lack of knowledge (20 (64.52%)), lack pharmacokinetic education (16 (51.61%)) and lack of expert pharmacist in pharmacokinetic services (16 (51.61%)) (Table 4). Most of the responders agreed that CPSs were necessary for hospitals (23 (53.5%)). The responders agreed that the clinical pharmacist through pharmacokinetic services had a positive financial impact and cost avoidance on the healthcare system (23 (53.5%)). Most of the responders stated that pharmacokinetic services improved the safety and efficacy of patient care (33 (89.2%)). Most of the responders also agreed that the pharmacokinetic services improved patient clinical outcome (33 (89.2%)) and prevented drug-related problems (33 (89.2%)), whereas few of the pharmacokinetic services provided only 10 (29.4%) over 24 hrs per day (Table 5).

DISCUSSION

Although the MOH hospitals started providing the pharmacokinetic services from a long time ago, the program has not been extended to other hospital pharmacies in the KSA. This might be related to the perception of the pharmacist about the program, or might be due to the barriers existed which prevented

Table 3: General information of clinical pharmacokinetic services.

No. of Beds covers Pharmacokinetic services	Response Count	Response Percent
<20	23	53.5%
20-29	3	7.0%
30-39	0	0.0%
40-49	1	2.3%
50-59	4	9.3%
60-69	3	7.0%
70-79	0	0.0%
80-89	1	2.3%
90-99	3	7.0%
= or > 100	5	11.6%
Answered question	43	
Skipped question	0	
The type of section they are receiving Pharmacokinetics services at the hospital	Response Count	Response Percent
Discharge Patient	9	20.93%
Ambulatory care clinic	5	11.63%
Inpatient pharmacy	27	62.79%
Outpatient pharmacy	9	20.93%
Home care	4	9.30%
Critical Care	1	2.33%
Non	9	20.93%
Answered question	43	
Skipped question	0	
The type of patients you service at Pharmacokinetics services	Response Count	Response Percent
Adults	37	86.05%
Pediatrics	19	44.19%
Geriatric	13	30.23%
Neonates	11	25.58%
Non	6	13.95%
Answered question	43	
Skipped question	0	
The number of prescription needed for pharmacokinetics services	Response Count	Response Percent
<100	33	76.7%
100-199	4	9.3%
200-299	3	7.0%
300-399	0	0.0%
400-499	0	0.0%
500-599	2	4.7%
600-699	0	0.0%
700-799	0	0.0%
800-899	0	0.0%
900-999	0	0.0%
= or > 1000	1	2.3%
Answered question	43	
Skipped question	0	

the implementation of the program. In this study, we explored the elements of perception or barriers during a national survey of pharmacokinetic services. According to the findings, perfect perception related to the benefit of the program, which prevent drug-related problems and improved patient care. We could not compare this result with other studies since there are no studies conducted on the same and the program was not developed properly. This might be related to several barriers of implementation. we found that the common barrier was lack of knowledge and education of pharmacokinetic program. This shows that there is no short educational course or a long-term training program in the field of pharmacokinetic service. The results almost lower than what reported by another study, because the pharmacokinetic services established well developed than the site of the study research.^[10] In many instances, healthcare systems and organizations are not optimally collaborating with academic institutions. Several opportunities exist to optimize the partnership between academic institutes with the hospital. This will require a leadership that sets a direction and establishes performance targets that are measurable, meaningful and mandatory. First, however, collaboration is needed to generate innovation and achieve higher performance. Collaboration between academia and healthcare systems to continue educating the pharmacists and keep them updated with the recent advances in medications, pharmacokinetic properties and all about the TDM required for medications. The partnership can foster innovation by providing effective leadership, adopting new approaches to professional education and training and cultivating future innovators. To achieve a productive partnership, the partners must achieve a shared vision and collaborate in the education and training of pharmacists.^[15] Furthermore, the number of clinical or expert pharmacists specialized in pharmacokinetic services was diminished at MOH hospitals. This result could not be compared with other publications since no data exists in this regard. The General Administration of Pharmaceutical Care should include an emphasis on the removal of by increasing the number and type of education of pharmacokinetic courses and increase the quantity and quality of clinical pharmacists at MOH hospitals in KSA.

CONCLUSION

The implementation of CPSs was found to be perceived as excellent by the pharmacists at MOH institution in KSA. There was incomplete of the pharmacokinetic services at most of the hospitals because of missing the pharmacokinetic

Table 4: The barriers of pharmacokinetic services implementation at hospitals.

Answer Options	No. of Hospital Beds:								Response Count	Response Percent
	<50	50-99	100-199	200-299	300-399	400-599	= or > 600	Medical City		
Lack of Pharmacokinetics practical knowledge	1	2	5	8	1	3	0	0	20	64.52%
Lack of Pharmacokinetics containing education topics	0	2	3	7	1	3	0	0	16	51.61%
Lack of pharmacist expert in pharmacokinetics services	0	1	4	7	1	3	0	0	16	51.61%
Poor understanding of health care professional other than pharmacist of pharmacokinetics services	0	1	3	6	2	2	0	0	14	45.16%
Poor understanding of pharmacist pharmacokinetics services	0	1	1	5	0	2	0	0	9	29.03%
There is no pharmacokinetic lab	0	0	0	0	1	0	0	0	1	3.23%
Lack of support to establish service from head professional at hospital.	0	0	0	0	1	0	0	0	1	3.23%
Levels and results are performed at a specialized regional Toxicology center and where the main concerns is to measure levels	0	0	0	1	0	0	0	0	1	3.23%
Lack of material	0	0	1	0	0	0	0	0	1	3.23%
Answered question									31	
Skipped question									12	

Table 5: The perceptions of pharmacokinetic services implementation at hospitals.

is it important to have Pharmacokinetics services clinical pharmacist at your hospital?	Response Count	Response Percent
Yes	23	53.5%
No	3	7.0%
I do not know	0	0.0%
Answered question	39	
Skipped question	4	
clinical function of the pharmacist in the Pharmacokinetics services has led to a positive financial impact through avoidance of costs that may otherwise have incurred.	Response Count	Response Percent
Yes	23	53.5%
No	3	7.0%
I do not know	0	0.0%
Answered question	39	
Skipped question	4	
are the Pharmacokinetics services improve the safety and effectiveness of patients care?	Response Count	Response Percent
Yes	33	89.2%
No	1	2.7%
I do not know	3	8.1%
Answered question	37	
Skipped question	6	
Pharmacokinetics services decrease the worsening of clinical outcomes. (medication errors, death.)	Response Count	Response Percent
Yes	32	88.9%
No	2	5.6%
I do not know	2	5.6%
Answered question	36	
Skipped question	7	
is the existence of the pharmacist in Pharmacokinetics services enhance the prevention of drug-related problems?	Response Count	Response Percent
Yes	33	89.2%
No	2	5.4%
I do not know	2	5.4%
Skipped question	37	
Answered question	6	
Are pharmacists available in the Pharmacokinetics services 24 hrs, especially at the weekend?	Response Count	Response Percent
Always	6	17.6%
often	4	11.8%
sometimes	8	23.5%
rarely	16	47.1%
Skipped question	34	
Answered question	9	

education and expert clinical pharmacokinetics pharmacist. It is necessary to overcome the barriers and improve the services and then improve the clinical outcome of patients and avoid the additional economic burden on the healthcare system at the MOH hospitals in KSA.

ACKNOWLEDGMENT

None.


CONFLICTS OF INTEREST

None.

ABBREVIATIONS

KSA: Kingdom of Saudi Arabia; **MOH:** Ministry of Health; **CPS:** Clinical Pharmacokinetic Services; **ASHP:** American Society of Health-System Pharmacists; **TDM:** Therapeutic drug monitoring.

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