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RESEARCH ARTICLE

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Clinical Pharmacy Services and Workforce Requirements at MOH Hospitals during Ten years Mass Gathering Hajj (2006-2015) in Makkah and Al-Madina Regions, Saudi Arabia

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Abstract

Purpose: To explore the clinical pharmacy services and workforce requirements at Ministry of Health Hospitals during mass gathering Hajj over ten years (2006-2015) at Makkah and Al-Madina Regions in Saudi Arabia. **Methods:** It is a retrospective analysis of ten years (2006-2015) of MOH hospital pharmacies during mass gathering Hajj period (15-30 days). The clinical pharmacist should provide pharmaceutical to all patients either Pilgrim or not Pilgrim at Makkah region. It included Mona holy places hospitals; Arafat holy places hospitals, and Makkah city. The workforce requirements calculated based on MOH workforce standards of hospitals. The clinical activities drive from MOH critical care services, and emergency services, and mortality rate data. The nine clinical pharmacy services characterized by reduction mortality cost saving and mass gathering demand chosen. American College of Clinical Pharmacy (ACCP) model of clinical activities used. **Results:** The total number of Pilgrims was (1,952,817-3,161,573) with average of (2,445,208.1). The mean number of clinical pharmacists needed was (22.31 FTE) per each hospital at Makkah. The average number of clinical pharmacists needed was (18.71 FTE) per hospital in Al-Madina. The central clinical pharmacy needs (4.31FTE) of clinical pharmacist per each hospital in Makkah region. In Al-Madina region demand was (2.71 FTE) of clinical pharmacists. The patient-centered clinical pharmacy services need (12 FTE) of clinical pharmacist per each hospital at Makkah and Al-Madina regions. The administrative, clinical pharmacy activities need (4 FTE) of clinical pharmacist per each hospital at Makkah region, while (2 FTE) at Al-Madina. **Conclusion:** The clinical pharmacy services are essential during mass gathering Hajj period. The clinical pharmacy services prevent drug-related mortality and morbidity during Hajj period. Also, improve patient clinical outcome, patient quality of life, and avoid the unnecessary cost.

Key word: Clinical pharmacy, Workload, Workforces, Mass Gathering, Hajj, Makkah, Al-Madina, Ministry of Health.

INTRODUCTION

The Mass gatherings identified by attended a significant number of people at the same time; this might include social gatherings, Olympic Games, or religious events like hajj.

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These events usually require pre-planning and preparing to be safe with minimum or no hazards.[1] Hajj considered an excellent example of mass gathering, in which more than 2 million people gather every year in Makkah, Saudi Arabia to perform its rituals. Although Hajj performed in Makkah and holy places (Mina and Arafat), some people also visit Al-Madina to pray there. During this event, some health problems may occur, and they are due to not only a large number of individuals and the transmission of an infectious agent, but they also may be attributable to heat, tiredness, or uncontrolled-existing diseases. According to some studies, the most common diseases that occur during Hajj include; communicable diseases, dehydration, heat exhaustion, injuries, and chronic conditions.[2,3] Those patients usually are outpatient. However, not only a small number of pilgrims need to manage as an inpatient.[3] Most of the patients also require medications. The most common medications which dispensed include; Antibiotics, analgesics and antipyretics, and medications for chronic diseases.[4] For this reason, health care authorities in Saudi Arabia pay special attention to Hajj period and try to ensure the pilgrims always receive the best medical services by preparing medical facilities, staffing, and services. Pharmaceutical care considered of paramount importance during hajj and all mass gathering events. That needs to ensure that all patients receive the proper medication that is safe, efficient and contraindicated with their clinical conditions with high demanding of clinical pharmacist resources to do this job.[5] After very extensive literature review an only limited number of studies discussed utilized physician and nurses during mass gathering events but not pharmacists or clinical pharmacist.[6-8] The author not familiar with published studies discussed pharmacy workforces during mass gathering meeting or even during Hajj period in Saudi Arabia or Gulf countries and the Middle East countries with worldwide counties. Because of that, we have focused in our study on clinical pharmacist services and workforce requirements during hajj in ten years (2006 – 2015) in all places that attended by pilgrims (Makkah, holy places, and Al-Madina). It will help to improve health care system during Hajj or any other mass gathering like Olympic Games or other such events.

METHODS

It is a retrospective analysis of ten years (2006-2015) of MOH clinical pharmacists during mass gathering Hajj period (15 days) in Makkah region and nine years (2007-2015) of MOH clinical pharmacists during mass gathering Hajj period (15-30 days) in Al-Madina region. All data derived from Ministry of Health. Health Statistical Year Books.[9-18] The clinical pharmacist should provide pharmaceutical to all patients either Pilgrim or not Pilgrim at Makkah region. It included Mina holy places hospitals; Arafat holy places hospitals, and Makkah city. Also, there was extensive literature search review at open date periods with fifty databases. The Current Content via Web of Knowledge, Dentistry and Oral Science via EBSCO, Clinical Key -Nursing, Clinical Key- Physician, CINAHL via EBSCO, Central via ProQuest, CBCA via ProQuest, Canadian Science Publishing.Cambridge Journals via Cambridge University, Britannica Academic, BMJ Journals, BMJ Clinical Evidence via BMJ Best Practice, BMJ Best Practice, Biology Journals via ProQuest, ACM Digital Library, Academic Search Ultimate via EBSCO, Cochrane Library Pubmed, and Google Scholar. It included the type of studies (meta-analysis, randomized controlled studies, and observational studies, books, reports, etc.) in the English language. The search for the term of Hajj and workforce, Hajj and workforce, Hajj and human resources or mass gathering and workforce, mass gathering and workforce, mass gathering and human resources. The search term was in the title and key words. All setting of patient care services hospitals inpatient or ambulatory care or community services included. The search included pharmacist and clinical pharmacist. Pharmacy technician excluded from the study. The location of studies included Saudi Arabia as top propriety if not existed Gulf or Middle East countries included, if not found overall counties included. The hospitals included in the study located in *Makkah city with about ten hospitals included* Ajyad Emergency Hospital; the first hospital in Makkah, it was established in 1871 (1288 H). It is the only hospital that serves patients in Haram area (i.e., near Al-Ka'ba). It receives emergency cases and patients that need Intensive care Unit, with 20 beds. Al Noor Specialized Hospital; It established in 1983 (1403 H), it is about 3.7 km far from Haram area. It is a great hospital with 373 beds. Its emergency unit is considered a standard for emergency units in Makkah. Ibn Sina Hospital; since 1960 (1379), it is 7 km far from Makkah, and it has 142 beds. Its importance is in receiving referred cases from Makkah's center hospital, to make them available for pilgrims. Hera General Hospital; it was founded in 1984 (1404 H) near Makkah, it has about 277 beds. King Faisal Hospital; since 1384, it 17 km from Haram area, and serves about 200 beds. King Abdul-Aziz Hospital; it has 255 beds, it has several units for example; Intensive Care Unit, Emergency, and Surgery units. Khulais General Hospital; it was founded in 2008 (1429), 110 km from Makkah, provided with 66 beds. Alkamel Hospital; since 2003 (1424), it is 160 km from Makkah, and has 40 beds. Maternity and Children Hospital; since 1433, provided with287 beds. King Abdulla

Medical City; It founded in 2009; it is the third medical city in Saudi Arabia, it has all rare specialties and serves 1500 beds. *Hospitals in Holy places include* Jabal Rahma (Rahma Mountain Arafat Mecca); It is one of the most prominent hospitals due to its location near Mercy mountain. It serves 140 beds. Mina General Hospital, Mina Alwadi Hospital, Mina Al-Jisr Hospital; They all have Intensive Care Unit department, Emergency Room department, Surgery unit, Internal Medicine unit. Arafat Hospital; It has about 300 beds.[19-25] There are about nine hospitals in Al-Madina, they are King Fahd Hospital; which is the main hospital in Al-Madina; it receives a referral from all other hospitals in the area. Saudi Commission accredits the program of training clinical pharmacist for Health Specialties. Maternity and Children Hospital (400 beds). Ohud Hospital; which is one of the largest hospitals in Al-Madina, with 261 beds capacity. It is considered the hospital in choice for referrals in ophthalmology and otolaryngology. Al-Ansaar general Hospital; which achieves the highest number in receiving emergency cases in Saudi Arabia in 1432 H and 1433. Miqat General Hospital; It offers 65 beds for inpatients.[26-29] Pilgrims City Hospital. Al-Amal Hospital for Mental Health. Rehabilitation Hospital. The workforce requirements calculated based on MOH workforce standards of hospitals. The clinical activities drive from MOH critical care services, and emergency services, and mortality rate data. The nine clinical pharmacy services characterized by reduction mortality cost saving and mass gathering demand chosen. American College of Clinical Pharmacy (ACCP) model of clinical activities used.[30-32] The central pharmacy activities including drug information, drug utilization evaluation, while patient-centered clinical activity including critical care services, emergency services, cardiology services, infectious disease, pediatrics services, and ambulatory care services. Administrative pharmacy activities including medication safety, pharmacy research. Also, additional clinical pharmacy services or program impeded or supportive with first services for instant pharmacy Anticoagulation program, pharmacy pain management program, pharmacy infection control, and total parenteral nutrition clinical pharmacy and therapeutic drug monitoring. The pharmacy technician and nonclinical pharmacist workforce excluded in the calculations. All calculation done used Microsoft Excel version ten.

RESULTS

There were fifteen hospitals in Makkah city and holy places while twenty hospitals in Al-Madina region while nine hospitals only mentioned in MOH statistical book. The majority of clinical pharmacy services at Makkah city and holy places where the majority of them provided Drug Information Center 15 (100%), Antimicrobial stewardship program 15 (100%), Critical care clinical pharmacy 20 (100%), and Medication Safety 15 (100%). While at Al-Madina hospital had Medication Safety Services 20 (100%), few hospital had Drug Information Center 2 (10%), and Ambulatory care clinical pharmacy2 (10%) as explored in Table 1 and Table 2. Both Makkah and Al-Madina missed the following clinical pharmacy services including the patient-centered clinical activities with emphasis on Emergency Clinical Pharmacy, Cardiology clinical pharmacy, Pediatrics clinical pharmacy and in addition to Another clinical pharmacy program Pain management program and Anticoagulation programs explored in Table 1 and Table 2.

The total number of Pilgrims was (1,952,817-3,161,573) with average of (2,445,208.1). In Makkah Region; the total number of prescriptions (99,886-257,545) with average (180,120). While in Al-Madina Region; the total number of prescriptions (35,149-207,444) with average (142,080). These percentages represent 7.86% of pilgrims in Makkah region and 5.79 % of pilgrims in Al-Madina respectively. The mean number of clinical pharmacists needed was (22.31 FTE) per each hospital at Makkah. The average number of clinical pharmacists needed was (18.71 FTE) per hospital in Al-Madina. The central clinical pharmacy needs (4.31FTE) of clinical pharmacist per each hospital in Makkah region, while in Al-Madina region demand was (2.71 FTE) of clinical pharmacists. The patient-centered clinical pharmacy services need (12 FTE) of clinical pharmacist per each hospital at Makkah and Al-Madina regions. The administrative, clinical pharmacy activities need (4 FTE) of clinical pharmacist per each hospital at Makkah region, while (2 FTE) at Al-Madina. Other supportive clinical pharmacy services need (2 FTE) at Makkah and Al-Madina regions explored in Table 3 and Table 4.

DISCUSSION

The general administration of Pharmaceutical Care released several pharmacy practices and clinical pharmacy program with the new pharmacy strategic plan implementation at MOH hospitals.[33-34] Another supportive pharmacy administration services added to the program for established and expanding.[35] The Workforces of clinical pharmacy was among them, and that is part of new standards of hospital workforce. The clinical pharmacist represented almost sixty percent hospital pharmacy workforce with different specialties.[36] The author chosen

Table 1: Type of clinical pharmacy services provided through the hospitals in Makkah region

No.	Type of clinical pharmacy services	0-50	51-100	101-200	201-300	301-400	401-500	501-600	> 600	Not existed	Total existed
	The central clinical pharmacy activities										
1	Drug Information Center	2	4	4	3	0	2	0	0	0 (0%)	15 (100%)
2	Drug utilization evolution	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
	The patient-centered clinical activity										
3	Ambulatory care clinical pharmacy	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
4	Emergency Clinical Pharmacy	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
5	Antimicrobial stewardship program	2	4	4	3	0	2	0	0	0 (0%)	15 (100%)
6	Pediatrics clinical pharmacy	0	0	0	0	0	1	0	0	14(93.3%)	1(6.7%)
7	Cardiology clinical pharmacy	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
8	Critical care clinical pharmacy	2	4	4	3	0	2	0	0	0 (0%)	15 (100%)
	Administrative, clinical pharmacy activities										
9	Medication Safety	2	4	4	3	0	2	0	0	0 (0%)	15 (100%)
10	Pharmacy research	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
	Another clinical pharmacy program										
11	Infection control clinical pharmacy	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
12	TPN clinical pharmacy	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
13	Pharmacokinetics or TDM	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
14	Pain management program	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)
15	Anticoagulation program	0	0	0	0	0	0	0	0	15 (100%)	0 (0%)

Table 2: Type of clinical pharmacy services provided through the hospitals in Al-Madina Region

No.	Type of clinical pharmacy services	0-50	51-100	101-200	201-300	301-400	401-500	501-600	> 600	Not existed	Total existed
	The central clinical pharmacy activities										
1	Drug Information Center	0	0	0	0	0	1	1	0	18 (90%)	2 (10%)
2	Drug utilization evolution	0	0	0	0	0	0	1	0	19 (95%)	1 (95%)
	The patient-centered clinical activity										
3	Ambulatory care clinical pharmacy	0	1	0	0	0	0	1	0	18 (90%)	2 (10%)
4	Emergency Clinical Pharmacy	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
5	Antimicrobial stewardship program	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
6	Pediatrics clinical pharmacy	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
7	Cardiology clinical pharmacy	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
8	Critical care clinical pharmacy	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
	Administrative, clinical pharmacy activities										
9	Medication Safety	10	2	4	2	0	1	1	0	0(0%)	20 (100%)
10	Pharmacy research	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
	Another clinical pharmacy program										
11	Infection control clinical pharmacy	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
12	TPN clinical pharmacy	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
13	Pharmacokinetics or TDM	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
14	Pain management program	0	0	0	0	0	0	0	0	20 (100%)	0(0%)
15	Anticoagulation program	0	0	0	0	0	0	0	0	20 (100%)	0(0%)

Table 3: Number of calculated Full Time Employee clinical pharmacist based on MOH hospital standards at Makka city and Holy places over ten years in Makkah region

			Makka city				Holy places				
Y (H)	Y (G)	Pilgrims number	Hospital Number	Bed Number	Total clinical pharmacist	No. Clinical pharmacist per hospital	Hospital Number	Bed Number	Total Clinical Pharmacist	No. Clinical pharmacist per hospital	No. of Clinical pharmacist per hospital in Makka region
1427	2006	2,378,636	8	1,528	183.36	22.92	7	822	98.64	14.09	18.80
1428	2007	2,454,325	8	1,574	188.88	23.61	7	1,005	120.6	17.23	20.63
1429	2008	2,408,849	7	1,537	184.44	26.35	7	1,076	129.12	18.45	22.40
1430	2009	2,313,278	9	1,485	178.2	19.8	7	1,060	127.2	18.17	19.09
1431	2010	2,789,399	9	1,457	174.84	19.43	7	1,080	129.6	18.51	19.03
1432	2011	2,927,717	7	1,457	174.84	24.98	7	1,080	129.6	18.51	21.75
1433	2012	3,161,573	8	2,068	248.16	31.02	8	1,447	173.64	21.71	26.36
1434	2013	1,980,249	8	2,068	248.16	31.02	8	1,447	173.64	21.71	26.36
1435	2014	2,085,238	8	1,570	188.4	23.55	8	1,316	157.92	19.74	21.65
1436	2015	1,952,817	8	2,507	300.84	37.61	8	1,102	132.24	16.53	27.07
		2,445,208.10	8.00	1,725.10	207.01	26.03	7.40	1,143.50	137.22	18.47	22.31

Table 4: Number of calculated clinical pharmacist based on MOH hospital standards over nine years in Al-Madina region

Y (H)	Y (G)	Pilgrims number	Hospital Number	Bed Number	Total clinical pharmacist	No. of clinical pharmacist
1428	2007	2,454,325	4	723	86.76	21.69
1429	2008	2,408,849	4	687	82.44	20.61
1430	2009	2,313,278	4	755	90.60	22.65
1431	2010	2,789,399	5	863	103.56	20.71
1432	2011	2,927,717	4	811	97.32	24.33
1433	2012	3,161,573	7	811	97.32	13.90
1434	2013	1,980,249	7	811	97.32	13.90
1435	2014	2,085,238	7	811	97.32	13.90
1436	2015	1,952,817	9	1,255	150.60	16.73
		2,452,605	6	836	100.36	18.71

essential clinical pharmacy services needed during mass gathering hajj based on mortality rates type of disease and the impact of clinical pharmacy services on reduction mortality, and mobility in addition to cost avoidance.[31,32] The mass gathering clinical pharmacy was a significant part of the original program mass gathering pharmaceutical care in Saudi Arabia.[5-37] After starting clinical pharmacy services at MOH, several studies conducted to show the benefit the services at overall the Kingdom of Saudi Arabia.[38-43] In this study, we have assessed the clinical pharmacists' activities during Hajj period. There was a much more demand than other hospitals due to the crowding and increased need for medications. There is a dramatic decrease in the number of prescriptions in the last years in Makkah, compared with the previous years. While in Al-Madina, there is a fluctuation of the results at first, but also with a general decrease in the last three years. The Decrease in the number of prescriptions and their percentage of pilgrims may be due to the focus on health awareness and vaccination in the last years. The required number of clinical pharmacists when we calculated it based on MOH standards depending on the number of beds was low if compared with the high number of prescriptions and medications. If we compared these numbers with another study which done in 2014 by Alomi and study the required number of pharmacists per hospital, they would look normal.[36] The difference is that this study done for normal hospitals, which receive a normal number of patients, not in Mass gathering events. The clinical pharmacist workload in Makkah high compared with Al-Madina, This expected because not all pilgrims visit Al-Madina during Hajj, especially pilgrims who came from Saudi Arabia because they can visit Al-Madina anytime during the year. Therefore, calculating the number of required clinical pharmacists during Hajj or any other mass gathering events should not only based on the number of beds available but also on the number of prescription, medications, the number of diseases, type of clinical pharmacy activities and always consider reasonable clinical pharmacist workload. The results of the study cannot compare it with the study because limited investigations and it was the first study done in Saudi Arabia, Middle East countries and rest of the world. The study shows the demand, role of the clinical pharmacist, and a workforce of clinical pharmacy services during mass gathering events with an emphasis on a huge event like the Hajj. Moreover, the importance of clinical pharmacists especially during mass gathering due to the increasing demand for healthcare services.

Limitation

The study came up with essential and significant results. However, it consisted several limitations. It was not the author's control including the missing of official documentation of clinical pharmacy services as a pharmacist in intervention, answering of drug information inquiries, and medication errors prevented and avoidance, a cost avoidance of some clinical pharmacy activities at both holy cities Makka and Al-Madina.

CONCLUSION

The diseases occurred during mass gathering Hajj time complicated to morbidity and mortality. Most of the hospitals provided medical services miss the potential clinical pharmacy services in Makkah or Al-Madina region. There are high demands of clinical pharmacists at all hospital during mass gathering Hajj period. Those clinical pharmacy services may decrease morbidity and mortality, and improve patient quality of life. Also, economic avoidance burden on the healthcare system.

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CONFLICT OF INTEREST

None

ABBREVIATION USED

KSA: Kingdom of Saudi Arabia, MOH: Ministry of Health

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