Pharmacy Workload and Workforce Requirements at MOH Hospitals during Ten years Mass Gathering Hajj (2006-2015) in Makkah Region, Saudi Arabia

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Abstract

Purpose: To explore the pharmaceutical care services workload analysis and human resources requirements at Ministry of Health Hospitals during mass gathering Hajj ten years (2006-2015), Saudi Arabia. **Methods:** It is a retrospective of ten years (2006-2015) of hospital pharmacies workload during mass gathering Hajj period. The duration of workload collection was 15 days. The pharmacists provide pharmaceutical to all patients either Pilgrim or not Pilgrim at Makkah region. It included Mona holy places hospitals; Arafa holy places hospitals, and Makkah city. The workforce requirements calculated based on MOH workforce standards per bed and the workload drives as central pharmacy services, patient specific pharmacy activities, and general administration specific pharmacy activities. **Results:** The total number of Pilgrims (1,952,817-3,161,573) with average of (2,445,208). The total number of prescriptions (99,886-257,545) with average (180,120), it represented (5.11-12.07%) with average (7.86%) of all pilgrims. The average number of pharmacist needed (9.49 FTE) for inpatient services per hospital, (48.85 FTE) for Emergency services per hospital, and (21.85 FTE) for Ambulatory care services per hospital. The average number of pharmacist based on Ministry of Health standards calculation per hospital was (37.1 FTE), while the mean number pharmacist needed to base on workload for all services was (80.19 FTE) per hospital. It is (2.16 fold) more incremental than MOH pharmacist workforce standards per bed. There were not any central pharmacy activities, and clinical pharmacy services or administrative pharmacy activities. **Conclusion:** The Workload analysis of pharmaceutical care services as a part of TQM indicators during mass gathering Hajj. Clinical pharmacy activities missed with emphasis on patient-specific clinical pharmacy. There is a high demand for pharmacists' workforce during mass gathering Hajj period in Makkah Region, Saudi Arabia. **Key word:** Pharmacy, Workload, Workforces, Mass Gathering, Hajj, Makkah, Ministry of Health, Saudi Arabia.

INTRODUCTION

The mass gathering is defined as the presence of more than 1000 people together at the same period.^[1] It may give rise to many diseases that need health care interventions

and pharmaceutical care.^[2] One of the most significant mass gathering events is Hajj, the Islamic pilgrimage, which every year attracts millions of people to Makkah in Saudi Arabia. Thus, a huge gathering may rise of many communicable (infectious) diseases, and non-communicable hazards such as; heat exhaustion, dehydration, and trauma.^[3] Furthermore, a significant number of pilgrims have chronic conditions, which sometimes need to manage. Either as an outpatient or they need to hospitalized, as it noted in two studies at a tertiary specialist hospital in Makkah in 2003, 2006 respectively.^[4,5] All of these patients, despite their clinical conditions, usually need medications during Hajj period. According to one study conducted at Al-Noor Specialist Hospital in Makkah, the most common drugs that were dispensed Antibiotics (43.3%), followed by analgesics and antipyretics (25.2%), and then medications for different chronic conditions.^[5]

So, Health care authorities in Saudi Arabia experience a significant challenge to provide sufficient health care services that ensure no more than the minimum health hazards occur during hajj period including a workforce of health care providers during mass gathering hajj period. Because of that, several studies conducted to assess and improve health care services during Hajj. They have studied the importance of mass gathering medicine during hajj, patterns of diseases present, the vaccines and their effects, etc.^[4-6-7] However, still, limited studies were about health care professional workforces during mass gathering Hajj. After very extensive literature review an only small number of studies discussed utilized physician and nurses during mass gathering events but not pharmacists.^[8-10] There insufficient studies of pharmaceutical care during mass gathering events or meeting. In 2016, mass gathering pharmaceutical care established to ensure the proper and safe use of medications promptly (which is a need to service such events). Followed by a study that assesses pharmaceutical care services during Hajj.^[11-12] 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 and worldwide countries. In this study, the authors explored the pharmaceutical care services workload and human resources during hajj in ten years period (2006-2015).

METHODS

It is a retrospective study of ten years (2006-2015) of hospital pharmacies workload during mass gathering Hajj period. The duration of workload collection was 15 days.

The pharmacists provide pharmaceuticals to all patients either Pilgrim or not Pilgrim at Makkah region. It included Mina holy places hospitals; Arafat holy places hospitals, and Makkah city. All the data derived from Ministry of Health. Health Statistical Year Books.^[13-22] Also, there was extensive literature review search at open date periods with fifty databases. 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'aba). It receives emergency cases and patients that need Intensive care Unit, with 20 beds. 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 considered a standard for emergency units in Makkah. Ibn Sina Hospital; since 1960 (1379 H), 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 Abdulaziz 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 H), 110 km from Makkah, provided with 66 beds. Alkamel Hospital; since 2003 (1424 H), it is 160 km from Makkah, and has 40 beds. Maternity and Children Hospital; since 1433, provided with 287 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. Also, *Hospitals in Holy places included* for instant Jabal Rahma (Rahma Mountain Arafat Mecca); It is one of the most famous hospitals due to its location near Mercy mountain. It serves 140 beds. Mina General Hospital, Mina Alwadi Hospital, Mina Al-Jisr Hospital; Arafat Hospital; It has about 300 beds. They all have Intensive Care Unit

department, Emergency Room department, Surgery unit, Internal Medicine unit.^[23-29] The workforce requirements calculated based on MOH workforce standards per bed and the workload dispensing prescriptions, and from as central pharmacy services, patient specific pharmacy activities, and general administration specific pharmacy activities based on American college of clinical pharmacy society literature.^[30-33] The updated hospital's demographic information and the workload calculation based on pharmacy administration database in Makkah region with considered that is an average time of pharmacist dispensing inpatient order was 6 minutes; while Ambulatory care and emergency 4 minutes. The pharmacy technician workforce excluded in the calculations. All calculation done used Microsoft Excel version ten.

RESULTS

There were fifteen hospitals in Makkah city and holy places. The majority of them provided emergency and internal medicine services 15 (100%) followed by surgery services 13 (86.6%) and adults intensive care units 11 (73.3%). Some hospitals got accreditations from local organization CBAHI 6 (40%) while only a few hospitals had accreditation from international institution Joint commission 2 (13 %). Most of the hospital outpatient pharmacy, inpatient pharmacy and emergency followed by medication safety officer and pharmacy total quality management 15 (100%) while missed clinical pharmacy services and medication reconciliation 0 (0%) as explored in Table 1. The total number of Pilgrims over the ten years was (1,952,817 - 3,161,573) with an average of (2,445,208). The total number of the bed was (2,350 - 3,609) with a mean (2,868.60) as explored in Table 2. The total number of prescriptions (99,886 - 287,138) with average (190,822), this percentage represented (5.111 - 12.08 %) with average (7.86%) of all pilgrims. From these prescriptions, an average of (101,328.80) prescriptions in Makkah, which represented (4.14 %) of all pilgrims, and an average of (89,493.40) prescriptions were in holy places, which represented (3.72 %) of all pilgrims. The average number of Ambulatory care prescriptions was (69,517) while (22,959) was the average of emergency prescription, and (2,935) for inpatient prescriptions. The average number of Ambulatory prescriptions per day (4,517) contained (13,551) medications, the emergency orders were (1,492) per day contained (4,476) drugs, and Inpatient prescriptions were (185) per day included (555) medications as exploring in Table 3-4. For inpatient services, the average number of pharmacists needed was 9.49 FTE (full-time employee) per hospital, while for Emergency service 48.85 FTE per hospital, and 21.85 FTE per hospital for Ambulatory care.

The average number of pharmacists calculated per hospital was (37.1 FTE), while the mean number pharmacist needed based on workload for all services was (80.19 FTE) per hospital. It is (2.16 fold) more incremental than MOH pharmacist workforce standards per bed with the new suggestion of workforces as the number of pharmacists per bed during mass gathering Hajj period was 0.6 as explored in Table 5-7. There were not any central pharmacy activities, clinical pharmacy services or administrative pharmacy activities.

DISCUSSION

The Ministry of Health (MOH) in Saudi Arabia stated new health care strategic plan in 2010. The plan included primary health care, medical care chronic diseases, patient safety. Mass gathering Hajj plan was a part of the healthcare plan.^[34] The MOH reported the expanding of health services overall the KSA including Makkah region from 2006 to 2015. The number of hospitals and primary care centers increases 2-3 time fold.^[22] The General Administration of Pharmaceutical Care (GAPC) started the new pharmacy plan in 2012 with various pharmacy practice and clinical pharmacy services with a pharmacy administration supportive program including hospital pharmacy workforce.^[35-37] King of Saudi Arabia, the first unique country in the world, started mass gathering medicine and mass gathering pharmaceutical care.^[11,38] The program consisted of mass gathering pharmacy practice, mass gathering clinical pharmacy, mass gathering pharmacy Infection control and mass gathering pharmacy workforces. The newly updated hospital pharmacy workforces during regular days started in 2014.^[39] However, pharmacy workforces during mass gathering Hajj not established yet. The authors did the study to apply the new stranded at mass gathering Hajj period and compare with real workload analysis dispensing outpatient, emergency, and inpatient prescriptions. The dispensing of medication is part of mass gathering pharmaceutical care but not all the performances of a pharmacist. The authors focusing only on dispensing medication due very high numbers of pilgrims visited the hospital pharmacy to calculate the workload. The number of pharmacists needed when we use MOH standards relatively low compared with the huge number of prescriptions. These figures are normal if compared with another study that done in 2014 by Alomi, in which there were 0.04 pharmacist per bed in 2004 and 0.2 pharmacists per bed in 2014.^[39] It is because that study was about normal hospitals need, not during mass gathering events, and these numbers are not enough during hajj. The calculation of full-time employee required based on workload analysis was more than the

Table 1: Type of hospital services and pharmaceutical care services in Makkah region											
		NR	0-50	51-100	101-200	201-300	301-400	401-500	501-600	> 600	Total existed
	Hospital services										
1	Adults intensive care units		0	0	5	4	0	2	0	0	11(73.3%)
2	Neonatal intensive-care units		0	0	0	1	0	2	0	0	3 (20%)
3	Emergency services		2	1	6	4	0	2	0	0	15 (100%)
4	Ambulatory care services		1	1	1	3	0	2	0	0	8 (53.3%)
5	Internal medicine		2	1	6	4	0	2	0	0	15 (100%)
6	Surgery services		0	1	6	4	0	2	0	0	13 (86.6%)
7	Maternity, Obstetrics, and Gynecology		0	0	0	3	0	2	0	0	5 (33.3%)
8	General Pediatrics		0	0	0	3	0	2	0	0	5 (33.3%)
9	CIBAHl	6	1	0	1	3	1	0	0	0	6 (40%)
10	JCI		0	0	0	1	1	0	0	0	2 (13.3%)
	Pharmacy services										
1	OPD Pharmacy	0	2	1	6	4	0	2	0	0	15(100%)
2	Inpatient Pharmacy	0	2	1	6	4	0	2	0	0	15(100%)
3	ER Pharmacy	0	2	1	6	4	0	2	0	0	15(100%)
4	Intravenous Admixture	0	0	0	0	1	0	2	0	0	3 (20%)
5	TPN services	0	0	0	0	1	0	2	0	0	3 (20%)
6	Satellite Pharmacy	0	0	0	0	0	0	0	0	0	0 (0%)
7	Medication Safety officer	0	2	1	6	4	0	2	0	0	15(100%)
8	Pharmacy Total Quality management	0	2	1	6	4	0	2	0	0	15(100%)
9	Drug Information Center	0	1	1	6	3	0	2	0	0	14(93.3%)
10	Clinical Pharmacy Services	0	0	0	0	0	0	0	0	0	0 (0%)
11	Patient Counseling	0	0	0	0	0	0	0	0	0	0 (0%)
12	Medication Reconciliation	0	0	0	0	0	0	0	0	0	0 (0%)

Table 2: Number of Pilgrims, hospital, Beds at Makkah city and Holy places over ten years in Makkah region								
Year	Makkah City		Holy Places		Total hospitals	Total no of Beds	No of Pilgrims / Hospital	No of Pilgrims / Bed
	Pilgrims number	No of Hospitals	No of beds	No of Hospitals				
2006	2,378,636	8	1,528	7	15	2,350	158,575.73	1,012.19
2007	2,454,325	8	1,574	7	15	2,579	163,621.67	951.66
2008	2,408,849	7	1,537	7	14	2,613	172,060.64	921.87
2009	2,313,278	9	1,485	7	16	2,545	144,579.88	908.95
2010	2,789,399	9	1,457	7	16	2,537	174,337.44	1,099.49
2011	2,927,717	7	1,457	7	14	2,537	209,122.64	1,154.01
2012	3,161,573	8	2,068	8	16	3,515	197,598.31	899.45
2013	1,980,249	8	2,068	8	16	3,515	123,765.56	563.37
2014	2,085,238	8	1,570	8	16	2,886	130,327.38	722.54
2015	1,952,817	8	2,507	8	16	3,609	122,051.06	541.10
Average	2,445,208.10	8.00	1,725.10	7.40	15.40	2,868.60	159,604.03	877.46

Table 3: Number of Inpatient, Emergency (ER), and Ambulatory care prescriptions at Makkah city over ten years in Makkah region										
Makkah city										
Y (H)	Y (G)	Pilgrims number	No of Inpatient Prescriptions	Percentage from Pilgrims (%)	No of ER Prescriptions	Percentage from Pilgrims (%)	No of Ambulatory care Prescriptions	Percentage from Pilgrims (%)	Total no of Prescription	Percentage from Pilgrims (%)
1427	2006	2,378,636	4,528	0.19	41,083	1.73	133,862	5.63	179,473.00	7.55
1428	2007	2,454,325	4,800	0.20	40,343	1.64	125,224	5.10	170,367.00	6.94
1429	2008	2,408,849	4,830	0.20	43,147	1.79	113,042	4.69	161,019.00	6.68
1430	2009	2,313,278	4,402	0.19	35,124	1.52	44,918	1.94	84,444.00	3.65
1431	2010	2,789,399	4,588	0.16	39,092	1.40	54,108	1.94	97,788.00	3.51
1432	2011	2,927,717	4,610	0.16	35,016	1.20	49,547	1.69	89,173.00	3.05
1433	2012	3,161,573	3,789	0.12	33,645	1.06	45,891	1.45	83,325.00	2.64
1434	2013	1,980,249	1,368	0.07	16,624	0.84	42,151	2.13	60,143.00	3.04
1435	2014	2,085,238	1,301	0.06	9,317	0.45	36,461	1.75	47,079.00	2.26
1436	2015	1,952,817	2,908	0.15	14,233	0.73	23,336	1.19	40,477.00	2.07
Average		2,445,208.10	3,712.40	0.15	30,762.40	1.24	66,854.00	2.75	101,328.80	4.14

Table 4: Number of Inpatient, Emergency (ER), and Ambulatory care prescriptions at Holy places over ten years in Makkah region										
Holy places										
Y (H)	Y (G)	Pilgrims number	No of Inpatient Prescriptions	Percentage from Pilgrims (%)	No of ER Prescriptions	Percentage from Pilgrims (%)	No of Ambulatory care Prescriptions	Percentage from Pilgrims (%)	Total no of Prescription	Percentage from Pilgrims (%)
1427	2006	2,378,636	1,770	0.07	7,942	0.33	97,953	4.12	107,665.00	4.53
1428	2007	2,454,325	1,740	0.07	6,676	0.27	78,762	3.21	87,178.00	3.55
1429	2008	2,408,849	1,754	0.07	7,416	0.31	73,458	3.05	82,628.00	3.43
1430	2009	2,313,278	1,561	0.07	5,860	0.25	72,172	3.12	79,593.00	3.44
1431	2010	2,789,399	2,629	0.09	7,836	0.28	82,810	2.97	93,275.00	3.34
1432	2011	2,927,717	2,154	0.07	6,893	0.24	86,805	2.96	95,852.00	3.27
1433	2012	3,161,573	2,805	0.09	79,888	2.53	9,256	0.29	91,949.00	2.91
1434	2013	1,980,249	1,722	0.09	8,556	0.43	81,536	4.12	91,814.00	4.64
1435	2014	2,085,238	2,141	0.10	11,341	0.54	92,089	4.42	105,571.00	5.06
1436	2015	1,952,817	3,297	0.17	9,153	0.47	46,959	2.40	59,409.00	3.04
Average		2,445,208.10	2,157.30	0.09	15,156.10	0.57	72,180.00	3.07	89,493.40	3.72

Table 5: Number of calculated Full-Time Employee based on workload of Inpatient, Emergency (ER), and Ambulatory care services prescriptions at Makkah city over ten years in Makkah region

Makkah city									
Y (H)	Y (G)	Pilgrims number	No of Inpatient Prescriptions	FTE	No of ER Prescriptions	FTE	No of Ambulatory care Prescriptions	FTE	Total FTE
1427	2006	2,378,636	4,528	7.08	41,083	42.79	133,862	139.44	189.31
1428	2007	2,454,325	4,800	7.50	40,343	42.02	125,224	130.44	179.97
1429	2008	2,408,849	4,830	8.63	43,147	51.37	113,042	134.57	194.56
1430	2009	2,313,278	4,402	6.11	35,124	32.52	44,918	41.59	80.23
1431	2010	2,789,399	4,588	6.37	39,092	36.20	54,108	50.10	92.67
1432	2011	2,927,717	4,610	8.23	35,016	41.69	49,547	58.98	108.90
1433	2012	3,161,573	3,789	5.92	33,645	35.05	45,891	47.80	88.77
1434	2013	1,980,249	1,368	2.14	16,624	17.32	42,151	43.91	63.36
1435	2014	2,085,238	1,301	2.03	9,317	9.71	36,461	37.98	49.72
1436	2015	1,952,817	2,908	4.54	14,233	14.83	23,336	24.31	43.68
Average		2,445,208.10	3,712.40	5.86	30,762.40	32.35	66,854.00	70.91	109.12

Holy places									
Y (H)	Y (G)	Pilgrims number	No of Inpatient Prescriptions	FTE	No of ER Prescriptions	FTE	No of Ambulatory care Prescriptions	FTE	Total FTE
1427	2006	2,378,636	1,770	3.16	7,942	9.45	97,953	116.61	129.23
1428	2007	2,454,325	1,740	3.11	6,676	7.95	78,762	93.76	104.82
1429	2008	2,408,849	1,754	3.13	7,416	8.83	73,458	87.45	99.41
1430	2009	2,313,278	1,561	2.79	5,860	6.98	72,172	85.92	95.68
1431	2010	2,789,399	2,629	4.69	7,836	9.33	82,810	98.58	112.61
1432	2011	2,927,717	2,154	3.85	6,893	8.21	86,805	103.34	115.39
1433	2012	3,161,573	2,805	4.38	79,888	83.22	9,256	9.64	97.24
1434	2013	1,980,249	1,722	2.69	8,556	8.91	81,536	84.93	96.54
1435	2014	2,085,238	2,141	3.35	11,341	11.81	92,089	95.93	111.08
1436	2015	1,952,817	3,297	5.15	9,153	9.53	46,959	48.92	63.60
Average		2,445,208.10	2,157.30	3.63	15,156.10	16.42	72,180.00	82.51	102.56

Year	Makkah City				Holy Places				Total Makkah Region				New guidelines of pharmacist per bed
	No of Hospitals	No of beds	No of pharmacist (MOH Standards)	No of pharmacist (Workload)	No of Hospitals	No of beds	No of pharmacist (MOH Standards)	No of pharmacist (Workload)	Total no of Beds	Total No of pharmacist (MOH Standards)	Total No of pharmacist (Workload)	No of fold times	
2006	8	1,528	305.6	1,514.48	7	822	164.4	904.61	2,350	470	2,419.09	5.15	1.03
2007	8	1,574	314.8	1,439.76	7	1,005	201	733.74	2,579	515.8	2,173.50	4.21	0.842
2008	7	1,537	307.4	1,361.92	7	1,076	215.2	695.87	2,613	522.6	2,057.79	3.94	0.788
2009	9	1,485	297	722.07	7	1,060	212	669.76	2,545	509	1,391.83	2.73	0.546
2010	9	1,457	291.4	834.03	7	1,080	216	788.27	2,537	507.4	1,622.30	3.20	0.64
2011	7	1,457	291.4	762.30	7	1,080	216	807.73	2,537	507.4	1,570.03	3.09	0.618
2012	8	2,068	413.6	710.16	8	1,447	289.4	777.92	3,515	703	1,488.08	2.12	0.424
2013	8	2,068	413.6	506.88	8	1,447	289.4	772.32	3,515	703	1,279.20	1.82	0.364
2014	8	1,570	314	397.76	8	1,316	263.2	888.64	2,886	577.2	1,286.40	2.23	0.446
2015	8	2,507	501.4	349.44	8	1,102	220.4	508.80	3,609	721.8	858.24	1.19	0.238
Average	8.00	1,725.10	345.02	859.88	7.40	1,143.50	228.70	754.77	2,868.60	573.72	1,614.65	2.97	0.594

new standard because of a vast number of prescriptions. There is no study the world to compare with these results with the seldom publication of human medical resources of mass gathering event. Thus the first study in the world to discuss the pharmacy workforces with mass gathering conference like Hajj event. During the Hajj or any other mass gathering events, it is not applicable to calculate the number of pharmacists needed according to the number of bed only, but we also have to consider carefully the number of prescriptions in that period and the workload. The number of a pharmacist during mass gathering hajj period should increase to meet pharmaceutical care key elements requirements at all Makkah city hospitals and holy places hospitals.^[40-41] The author suggested the new guidelines with 0.6 pharmacists per bed during mass gathering Hajj period. Also, it maybe another suggestion to solve the demand of the pharmacist and it is to implement the new system if pharmacy practice Saudi managed care pharmacy the new initiative project recently published.^[42-43] The author did not calculate the workforce of pharmacy technician or clinical pharmacist it a further study in the future.

Limitation: There several limitations with the study and it some time out of author control. It included as follows; the first investigations in the world, there is no official complete publication workforces of pharmacists by MOH during hajj period over entire study years, no official documentation of dispensed medication by general administration of Pharmaceutical Care, and the missed documented of all workload during mass Gathering in reality

CONCLUSION

The Workload analysis of pharmaceutical care services reflects a high demand for pharmacists' workforce during mass gathering Hajj period in Makkah Region, Saudi Arabia. The MOH standards during regulars' days should change with three times during mass gathering Hajj period. All pharmacy activities including clinical performances should document during Hajj period to recalculate the pharmacist demand during mass gathering Hajj period in the future studies in Makkah region, Saudi Arabia

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CONFLICT OF INTEREST

None

ABBREVIATION USED

KSA: Kingdom of Saudi Arabia, MOH: Ministry of Health, GAPC: General Administration of Pharmaceutical Care

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