Journal of Pharmacy Practice and Community Medicine.2017, 3(4s):S36-S42 • http://dx.doi.org/10.5530/jppcm.2017.4s.46 e-ISSN: 2455-3255

RESEARCH ARTICLE

OPEN ACCESS

National Survey of Hospital Medication Safety Practice during Mass Gathering (Hajj-2016) in Makkah, Saudi Arabia: Medication Preparation and Dispensing

Yousef Ahmed Alomi[1]*, Nezar Adnan Yahya Khayat[2], Mustafa Jamil Baljoon[2], Yasir Abdulraheem Bamagaus[3], Hani Mohammed Ali Jumah[3]

[1]The Past General Manager of General Administration of Pharmaceutical Care and Head, National Clinical pharmacy, pharmacy practice and Pharmacy R & D Administration, Ministry of Health, Riyadh, KSA

[2]General Director, Makkah Health Affairs Region, Makkah, KSA

[3]Pharmaceutical Care Administration, Makkah Medical Affairs Region, Makkah, KSA

Received: 13 August 2017;

Accepted: 28 September2017

***Correspondence to:**

Dr. Yousef Ahmed Alomi,

The Past General Manager of General Administration of Pharmaceutical Care, Head, National Clinical pharmacy, and Pharmacy practice, and Pharmacy R & D Administration, Ministry of Health, Riyadh 11392, Kingdom of SAUDI ARABIA (KSA)

Email: yalomi@gmail.com

Abstract

Objective: To explore the national survey of hospital medication safety practice during mass gathering (Hajj -2016) in Makkah, Saudi Arabia: Medication preparation and dispensing, the finding of ISMP (2011) self-assessment of medication safety at the hospitals. **Methods:** It is 15 days cross-sectional national survey of hospital medication safety at Makkah region. The survey modified from Institution of Safe Medication Practice (ISMP) self-assessment of hospital medication safety. It consisted of a demographic section and ten domains with 270 questions. The ten areas included patient information, drug information, communication of medication orders, drug preparation, medication distribution, medication devices, work environment, staff competency, patient education, quality process with risk management domain. The 5-points Likert response scale system used. The survey distributed to sixteen directors of hospital pharmacy during mass gathering Hajj-2016. The medications safety officer at Makkah region distributed the questionnaire and made follow up on a daily basis used physical visiting and through the telephone call. **Results:** The survey distributed to sixteen hospitals, the response rate, was eleven hospitals (68.75%). The total score of all ISMP-self assessment of medication safety was 3.39 +/-0.51 (67.68 %) with CI (3.2-3.6) P< 0.05. Medication preparation and dispensing included two domains; communication of drug order with scores 3.53 (55%), drug labeling and packaging with scores 3.57 (71.4%). The highest score of two sections the products with look-alike drug names and packaging segregated and not stored alphabetically 4.5 (90%) while the lowest score was a presenting of alerting with computerized physician order entry 2.1 (42%). **Conclusion:** The standardized medication process during preparation and dispensing is acceptable rate with missing the intravenous admixture and repackaging services. Targeting to continue the level of improvement and correction the missing services is the potential goals in the mass gathering pharmaceutical care during Hajj period. In addition to the annual survey of medication safety during medication preparation and dispensing is a crucial requirement of best medical services provided to all pilgrims in Makkah, Saudi Arabia.

Key words: Medication Safety, Hajj, Drug, Preparation, Dispensing, Ministry of Health, Saudi Arabia.

INTRODUCTION

Publishing Partner : EManuscript [www.emanuscript.in]

7General administration of Pharmaceutical Care (GAPC) implemented the pharmacy strategic plan in between 2013-2015. In this period, several policy and procedures of drug preparation launched.[1] The administration distributed six booklets of parenteral dilution manual for adults and pediatric and neonates. In addition to, the parenteral dilution manual for home health care services. That booklet consisted of how to reconstitute the drug, the stability of preparation, how to administer the medication, premixed preparation. The administration distributed them over all hospitals and primary care center pharmacies.[2-8] All the previous publication was essential for medication error prevention and required for accreditation of Saudi Central Board for Accreditation of Health Care Institutions. Several reports in the United States of America (USA) discussed of preparation of medicines and related death specialty total parental nutrition.[9-12] Local studies in Saudi Arabia showed a low percentage of using intravenous admixture services (23-46%), and unit dose system.[13-16] Another study by author and his colleagues found in the total parenteral nutrition services (TPNS) in twenty-four only of Ministry of Health Hospitals (MOH) with TPNS safety existed less than 50% of the hospital.[17-19] The best solution to assess all safety of medication preparation by using practical tools. Institution Safe Medication Practice (ISMP) published self-assessment of hospital medication safety to measure all basic requirements of medication safety including medication preparation. The tools used with studies in 2000 and 2011. The authors found Communication of drug orders and other drug information key element changed from 47% to 57.4%, and drug labeling, packaging, and nomenclature improved from 61% to 74% (20)(21). The authors not familiar with studies in Saudi Arabia or the Middle East used the completed tools of ISMP for self-assessment of hospital practice of medication safety and with emphasis during mass gathering hajj period. The goal of the study to explore the national survey of medicines safety practice at the hospital during mass gathering hajj-2016 in Makkah, Saudi Arabia, the finding of ISMP (2011) self-assessment of medication safety at hospitals.

METHODS

It is a fifteen days cross-sectional national survey of hospital medication safety at Makkah region. The survey modified from Institution of Safe Medication Practice (ISMP) self-assessment of hospital medication safety. It consisted of a demographic section and ten domains with 270 questions. The ten areas included patient information, drug information, communication of drug orders and other drug information, drug Labeling and Packaging and Nomenclature. The drug standardization, storage and distribution, medication devices acquisition, use, and monitoring, environmental factors, workflow, and staffing, staff competency, patient education, quality processes and risk management domain. It contained a twenty core sections included essential patient information, essential drug information, a controlled drug formulary system, methods of communicating drug orders, strategies to minimize the possibility of errors. Readable labels that identify drugs are on all drug containers, standardized of IV solutions, drug concentrations, doses, and administration times. A safety-supportive culture, practitioners are stimulated to detect and report adverse events, errors, hazards, and observed at risk behavior, and redundancies that support a system of independent double check at risk. The practitioners receive sufficient orientation to medication use; the practitioners involved in medication use provided with ongoing education about medication error prevention and the safe use, patients, are included as active partners. Medications provided to patient care units safely and securely, the unit stock, is restricted, hazardous chemicals safely sequestered, the potential for human errors, medications are prescribed, transcribed, prepared, dispensed, and administered within an efficient and safe workflow. The complement of qualified, well-rested practitioners matches the clinical workload without compromising patient safety. The 5-points Likert response scale system used. The scoring key identified as number (1) equal to (A): No activity to implement, (2) equal to (B): Considered, but not implemented, (3) equal to (C): partially implemented in some or all areas. (4) Equal to (D): Fully implemented in some areas, and (5) equal to (E): Fully implemented throughout. The survey conducted at a permanent and temporary hospital located at Makkah and holy places. Most of the hospital had outpatient, and emergency services, some of them had critical care section for adults, pediatrics, and internal medicine. The hospital provided emergency and outpatient pharmacies, inpatient pharmacies. Some of the hospitals had intravenous admixture and total parenteral services and drug information services. Structural Clinical pharmacy services missed at most of the hospitals except critical care pharmacy and stewardship antimicrobial program at permanent hospitals, some essential Clinical pharmacy program; pain management, and anticoagulation program not existed at all hospital. The survey distributed to directors of hospital pharmacy during mass gathering Hajj-2016. The medications safety officer at Makkah

region distributed the questionnaire and made follow up on a daily basis used physical visiting and through the telephone call. The study made as an electronic format, and it analyzed through survey monkey system and Microsoft Excel version ten. The authors suggested some solution to improve the scoring medication safety culture and the finding of ISMP self-assessment, the 5-points Likert scale system with high priority or opportunity to implement (5) and low priority or opportunity to implement (1). Those suggestions based on General Administration of Pharmaceutical strategic goals and Saudi Central Board for Accreditation of Health Care Institutions (CBAHI) standards in Saudi Arabia. The ten domains divided into for several parts for analysis, discussion, and solutions. Part one: patient information, part two: drug information, part three: medication preparation and dispensing (communication of drug orders and other drug information, drug Labeling and Packaging and Nomenclature). The part four: medication administration (drug standardization, storage and distribution, medication devices acquisition, use, and monitoring), part five: environmental factors, workflow, and staffing, staff competency, and part six: patient education, quality processes, and risk management. The study explored part three; it is a finding from ISMP (2011) medication safety at a hospital in Makkah.

RESULTS

The survey distributed to sixteen hospitals, the response rate, was eleven hospitals (68.75%). The number of permanent hospitals was six (54.45%) located at Makkah city while the temporary hospitals were five (45.45%) located at holy places. Of those four (36.4%) hospitals bed size was (100-199) and 3 (27.3%) bed size (200-299). The number of hospitals accredited by Saudi Central Board of Hospitals Accreditation (CIBAHI) was four (36.4%) while three hospitals (27.3%) accredited by USA International Joint Commission and CIBAHI. The total number of prescriptions was (120,598). Of those (72,627) were Ambulatory care prescriptions, while (43,242) were Emergency Prescriptions, and (4,729) were inpatient orders. The total number of the pharmacist was (180) while pharmacy technician (83) and some clinical pharmacists not reported as explored in Table 1. The total score of all ISMP-self assessment of medication safety was 3.39 +/-0.51 (67.68 %) with CI (3.2-3.6) P< 0.05 and range (2.75 – 3.93). The average score of the communication of drug orders and other drug information domain at all hospital were 3.53 +/- 0.65 (55 %) with CI (3.183-3.877), P< 0.05 and range (2.55 – 4.50). The average score drug labeling and packaging and nomenclature domain at all hospital were 3.57+/- 0.68 (71.4 %) with CI (3.332.52-3.808), P< 0.05 and range (2.10 – 4.90) as explored in Table 2. The highest score of the communication of drug orders key element in was pharmacy interventions in response to a potentially harmful medication order immediately communicated to the nurses 4.50 (90%) while the lowest score was verbal or telephone orders never accepted for oral or parenteral chemotherapy 2.55 (51%) as explored in Table 3. The highest score of the drug labeling and packaging and nomenclature key element in core strategies undertaken to minimize the possibility of errors was the products with look-alike drug names and packaging segregated and not stored alphabetically 4.50 (90%). The lowest score was Alerts built into computer order entry system 2.10 (42%) as explored in Table 4. The highest score of the drug labeling and packaging and nomenclature key element with core readable labels that identify drugs was the medications brought into the health facility by a patient or family member not administered to the patient 4.90 (98%). The lowest score was the computer systems that print medication labels produce clear and distinctive labels free of abbreviation 2.55(51%) as explored in Table 4.

DISCUSSION

The Ministry of Health including General Administration of Pharmaceutical Care started the implementation of pharmacy strategic with full supporting of the logistic department. They began to build Intravenous admixture (IV) setting with total parenteral services in 2014.[8] The projects built based on Saudi Board of health care organization accreditation and according to American society of health system pharmacist's specifications, ISMP medication safety preparations.[22-26] The IV expanded from 28 to more 50 hospitals over all Kingdom of Saudi Arabia. Also, a repacking system for unit dose services built over several hospital pharmacies.[16,17] All those of project some of them was in Makkah city to utilize them during mass gathering hajj every year. These renovations let all pharmacist and pharmacy technician appropriately prepare the IV medication with a high standard of pharmacy Infection control.[8] The general administration of pharmaceutical care implemented the pharmacy indicators with several programs including pain management and anticoagulation. Both of them drug therapy management preparation and dispensing should report through ISMP scores medication safety annually.[27-28] This tool used to

Table 1: Type of hospital services and pharmaceutical care section of surveyed hospitals in Makkah.

Core Characteristic								No of OPD Prescriptions		No of Emergency Prescriptions		No of Inpatient Prescriptions	
No and Hospitals	Location	Hospital Type	No of Beds	Accreditations	No of Pharmacy Technician	No of Pharmacist	No of Clinical Pharmacist	Pilgrims	Non-Pilgrims	Pilgrims	Non-Pilgrims	Pilgrims	Non-Pilgrims
1.Mena-1	Mena	Temporary	100-199	Non	9	1	NR	6,180	500	992	67	179	6
2. Mena-2	Mena	Temporary	100-199	Non	18	1	NR	15,203	330	1,661	113	612	17
3. Mena-3	Mena	Temporary	200-299	Non	19	2	NR	12,286	1,016	1,281	99	350	22
4. Arafat-1	Arafat	Temporary	200-299	Non	10	1	NR	527	73	272	22	129	6
5. Arafat-2	Arafat	Temporary	100-199	Non	8	1	NR	4,073	155	328	13	192	6
6. M-1	Makkah	Permanent	300-399	CIBAHI	12	9	NR	22	650	244	6,135	31	664
7. M-2	Makkah	Permanent	200-299	CIBAHI - JCI	23	10	NR	34	3,208	185	9,408	46	728
8. M-3	Makkah	Permanent	400-599	CIBAHI - JCI	60	24	NR	6,706	15,222	4,033	4,026	428	490
9. M-4	Makkah	Permanent	50-99	JCI	7	2	NR	0	0	1,754	1,159	55	11
10. M-5	Makkah	Permanent	100-199	CIBAHI	4	2	NR	1,037	NR	3,353	NR	29	NR
11. M-6	Makkah	Permanent	300-399	CIBAHI	10	30	NR	2,640	2,765	2,988	5,109	411	317
Total					180	83		48,708	23,919	17,091	26,151	2,462	2,267
Total no of prescriptions 120,598													

No.: Number, NR: Not reported

Table 2: The scores key elements of ISMP medication safety hospitals in Makkah.

Core #	Core Characteristic	Mean score	SD	Range	Percent	SD %	Range %	USA, 2000 Scores %	USA, 2011 Scores %
III	Communication of drug orders and other drug information	3.53	0.65	2.55 – 4.50	70.60	11.46	51– 90	47.00	74.00
4	Streamlined, standardized, and increase automated methods of communicating	3.53	0.65	2.55 – 4.50	70.60	13.00	51-90	61.00	74.00
IV	Drug Labeling and Packaging and Nomenclature	3.57	0.68	2.10 – 4.90	71.4	13.60	42 – 98	61.00	74.00
5	Strategies are undertaken to minimize the possibility of errors	3.73	0.80	2.10 – 4.50	74.60	16.00	42 – 90	48.00	71.00
6	Readable labels that clearly identify drugs are on all drug containers	3.58	0.569	2.55 – 4.90	71.60	11.38	51 – 98	74.00	79.00

Table 3: The highest and lowest scores items of domain Communication of drug orders and other drug information

III: Communication of drug orders and other drug information

ISMP No	Key elements Streamlined, standardized, and increase automated methods of communicating	E 1	D 2	C 3	B 4	A 5	Rating Average	Percent	Response Count
	The highest scores items								
34	Pharmacy interventions in response to a potentially harmful medication order immediately communicated to the nurses	0	0	2	1	7	4.50	90.00	10
35	Upon admission to the hospital or transfer to a different level of care within the hospital, complete orders for all drug therapy provided.	1	0	2	0	8	4.27	85.40	11
49	Verbal (face-to-face) orders from prescribers who are onsite in the hospital are never accepted, except in emergencies or during sterile procedures	0	1	3	0	7	4.18	83.60	11
	The lowest scores items								
60	Electronic MARs that share a common database with the pharmacy system are used to guide and document medication administration.	5	2	0	0	4	2.64	52.80	11
51	Computer-generated MARs that share usually database with the pharmacy system are used to guide and document medication administration.	5	2	0	0	4	2.64	52.80	11
52	Verbal or telephone orders never accepted for oral or parenteral chemotherapy, including chemotherapeutic agents used for non-oncologic indications	6	1	0	0	4	2.55	51.00	11
	answered question 11 and skipped question 0								

Table 4: The highest and lowest scores items of domain Drug Labeling and Packaging and Nomenclature

IV: Drug Labeling and Packaging and Nomenclature									
ISMP No	Key elements	A 1	B 2	C 3	D 4	E 5	Rating Average	Percent	Response Count
	Core # 5: Strategies are undertaken to minimize the possibility of errors								
	The highest scores items								
80	Products with look-alike drug names and packaging segregated and not stored alphabetically	0	1	0	2	7	4.50	90	10
83	Auxiliary warnings or other label enhancements (e.g., TALL MAN LETTERS) used on packages and storage bins.	1	0	0	2	7	4.40	88	10
85	All clinical staff involved in medication use made aware of the organization's list of look- and/or sound-alike products	0	2	1	1	6	4.10	82	10
	The lowest scores items								
79	The package and label of new drugs that considered for formulary addition or temporary use compared to other formulary products to identify any potential for confusion.	2	1	0	1	6	3.80	76	10
81	Look-alike drug names do not appear on the same computer screen when selecting a drug during order entry.	4	2	0	1	3	2.70	54	10
84	Alerts are built into COMPUTER ORDER ENTRY SYSTEMS to remind practitioners about problematic drug names	4	4	0	1	1	2.10	42	10
	Core # 6: Readable labels that identify drugs are all drug containers								
	The highest scores items								
92	Medications brought into the health facility by a patient or family member not administered to the patient until an authorized prescriber has approved their use	0	0	0	1	9	4.90	98	10
93	Syringes of medications prepared for use during anesthesia labeled with the drug name, strength/concentration, and date of expiration	2	0	1	1	7	4.00	80	11
88	At a minimum, all medication containers taken to the bedside or interventional areas labeled with at least the drug name and strength/concentration.	1	2	0	2	5	3.80	76	10
	The lowest scores items								
94	Doses that require less than a full tablet repackaged by the pharmacy into UNIT-DOSE packages.	5	0	0	0	6	3.18	63.6	11
89	There is a standard process to identify which compounded IV solutions	5	0	0	1	5	3.09	61.8	11
87	All computer systems that print medication labels produce clear and distinctive labels free of ERROR-PRONE ABBREVIATIONS and nonessential information	5	2	0	1	3	2.55	51	11
answered question 11 and skipped question 0									

assess medication safety preparation and to dispense key elements overall the hospital's departments. The authors conducted the ISMP self-assessment of medication safety at hospitals at holy places and Makkah city during mass gathering hajj period. The general results are more than old study in USA and less than the updated new study in 2011. This finding was normal due to the new development of pharmaceutical care services over several years. The key elements of Communication of drug orders, other drug information, drug labeling, packaging, and nomenclature more than results study by Vaida AJ *et al*. in 2000 and almost near results Vaida AJ *et al*. in 2011.[20] The results are normal finding with previous comprehensive and renovation work of intravenous admixtures at MOH hospitals, and the pharmacy strategic plan implementation not completed yet to cover all hospitals including during mass gathering hajj period. The authors revised all core elements and suggested some solution to improve the medication safety culture during medication preparation based on pharmacy strategic planning and CBAHI standard. For instance; Look-alike drug sound a like system alerting system with computerized physician order entry, Use premixed fixed centration Intravenous medication, Implement medication preparation indicators as explored in Table 5.

CONCLUSION

The medication preparation required with emphasis on IV admixture services and repacking system hard working to improve the pharmaceutical care provided to the patient. ISMP self-assessment of medication safety at hospitals is useful tools for evaluating medication safety during medication preparation stage, and the authors recommended doing annually during mass gathering hajj period.

ACKNOWLEDGEMENT

Table 5: The recommendations to improve the items of domains Communication of drug orders and drug labeling and packaging during mass gathering Hajj period.

No.	Strategic Goals	C B A H I standards	Suggestion for improvement during mass gathering Hajj	Propriety scores	Opportunity scores
1	Pharmacy computerization				
1.1	Strategic Goal 3	MM.6 MM.20 MM.36	Implement full electronic medication administration records for inpatient and outpatient pilgrim	5	4
1.2			Look-alike drug sound alike system alerting system with computerized physician order entry	5	3
1.3			Use full drug computerized names without abbreviation	5	4
2	Pharmacy automation				
2.1	Strategic Goal 3	MM.14 MM.25 MM.28	Use Intravenous chemotherapy robotic system	4	3
3	Pharmacy human resources				
3.1	Strategic Goal 2	MM.2 MM.3	Implantation of Basic medication safety education session for all health care providers	5	5
4	Pharmacy innovation and empowering culture				
4.1	Strategic Goal 4	MM.14 MM.21 MM.26 MM.28 MM.31	Use of ready-made unit dose medication	5	4
4.2			Use premixed fixed centration Intravenous medication	5	5
4.3			Implement of Intravenous admixture for all hospital pharmacies	5	4
4.4			Implement repacking machines	4	4
5	Guidelines and protocols				
5.1	Strategic Goal 1	MM.14 MM.26 MM.28	Look-alike drug sound alike system implementation at hospital departments	5	4
5.2			Use Standardized centration Intravenous medication	5	4
5.3			Use Standardized of oral syrup and suspension medication	5	4
6	Pharmacy risk management				
6.1	Strategic goal 1	MM.26 MM.31	Implement medication preparation indicators	5	4
6.2			Implement medication dispensing indicators	5	5
7	Pharmacy clinical audit				
7.1	Strategic Goal 5	MM.31 MM.40 MM.41	Annual survey of ISMP self-assessment of medication safety for all mass gathering hajj hospitals	5	5
7.2			Regular reports of medication preparation indicators	4	5
7.3			Regular reports of medication dispensing indicators	4	5

I want to thank all directors of pharmacies at all hospitals in Makkah region for their cooperation and filled the survey.

CONFLICT OF INTEREST

None

ABBREVIATION USED

GAPC: General administration of Pharmaceutical Care, CBAHI: Saudi Central Board of Accreditation for Health Care Institutions, MOH: Ministry of Health, USA: United States of America, ISMP: Institution Safe Medication Practice.

REFERENCES

1. Alomi YA, Zahran R. Self-Assessment of mass gathering (Hajj) pharmaceutical care program in Saudi Arabia. J Pharm Pract Community Med. 2016;2(4):137-43.
2. Adult Parenteral Dilution Manual. 1st Editio. General Administration of Pharmaceutical care, MOH, Saudi Arabia; 2015. Available from: https://www.researchgate.net/publication/281710454_Adults_Parenteral_Dilution_Manual
3. Pediatrics Parenteral Dilution Manual. 1st Ed. General Administration of Pharmaceutical care, MOH, Saudi Arabia; 2015. Available from: https://www.researchgate.net/publication/281710402_Pediatrics_Parenteral_Dilution_Manual
4. Neonates Parenteral Dilution Manual. 1st Editio. General Administration of Pharmaceutical care, MOH, Saudi Arabia; 2015. Available from: https://www.researchgate.net/publication/281710411_Neonates_Parenteral_Dilution_Manual
5. Adults Home Care Parenteral Dilution Manual. 1st Editio. General Administration of Pharmaceutical care, MOH, Saudi Arabia; 2015. Available from: https://www.researchgate.net/publication/281710523_Adults_Home_Care_Parenteral_Dilution_Manual
6. Pediatric Home Care Parenteral Dilution Manual. 1st Editio. General Administration of Pharmaceutical care, MOH, Saudi Arabia; 2015. Available from: https://www.researchgate.net/publication/281710299_Pediatrics_Home_Care_Parenteral_Dilution_Manual
7. Neonates Home Care Parenteral Dilution Manual. 1st Ed. General Administration of Pharmaceutical care, MOH, Saudi Arabia; 2015. Available from: https://www.researchgate.net/publication/281710618_Neonates_Home_Care_Parenteral_Dilution_Manual

8. Alomi YA. National Intravenous (IV) Therapy Program at MOH in Saudi Arabia. EC Pharm Sci. 2016;2(3):307–11.
9. ISMP. TPN-related deaths call for FDA guidance and pharmacy board oversight of USP Chapter <797>. ISMP Medicat Saf Alert! 2011;16(7):1–3.
10. ISMP. Fatal 1,000-fold overdoses can occur, particularly to neonates, by transposing mcg and mg. ISMP Medicat Saf Alert! 2007;12(18):1–4.
11. Boullata J. Clinical Guidelines: Parenteral Nutrition Ordering, Order Review, Compounding, Labeling, and Dispensing. J Parenter Enter Nutr. 2014;38(3):334–77.
12. Canada T. Safe Practices for Parenteral Nutrition. J Parenter Enter Nutr. 2004;28(6):S39–70.
13. Alsultan M, Khurshid F, Mayet A. Hospital pharmacy practice in Saudi Arabia: Dispensing and administration in the Riyadh region. Saudi Pharm. 2012;20(4):307-15
14. Alsultan M, Khurshid F, Salamah H, Mayet A. Hospital pharmacy practice in Saudi Arabia: Prescribing and transcribing in the Riyadh region. Saudi Pharm. 2012;20(3):203-210.
15. Alomi YA, Alghamdi SJ, Alattyh RA E a. National survey of pharmacy practice at MOH hospitals 2016: pharmacy management and resources. Value Heal. 2017;20(5): A1–A383.
16. Alomi YA, Alghamdi SJ, Alattyh RA E a. National survey of pharmacy practice at MOH hospitals 2016: Preparation of medication and dispensing. Value Heal. 2017;20(5): A1–A383.
17. Alomi YA, Ajudaibi SM and A. National Survey of Total Parenteral Nutrition practice in Saudi Arabia: Prescribing and transcribing at MOH Hospitals. EC Nutr. 2016;4(1):795–803.
18. Alomi YA AS. National Survey of Total Parenteral Nutrition practice in Saudi Arabia: Dispensing and administration at MOH Hospitals. EC Nutr. 2016;3(6):748–56.
19. Alomi YA, Aljudaibi SM. National Survey of Total Parenteral Nutrition Practice in Saudi Arabia: Drug Monitoring and Patient Education at MOH Hospitals. EC Nutr. 2016;4:784–92.
20. Vaida AJ, Smetzer JL, Lamis RL, Cohen MR, Kenward K. Assessing the state of safe medication practices using the ISMP medication safety self-assessment® for hospitals: 2000 and 2011. Jt Comm J Qual Patient Saf. 2014;40(2):51-67.
21. Smetzer JL, Vaida AJ, Cohen MR, Tranum D, Pittman MA, Armstrong CW. Findings from the ISMP Medication Safety Self-Assessment® for Hospitals. Jt Comm J Qual Saf. 2003;29(11):586–97.
22. Medication Management (MM). In: National Hospital Standards. 2nd Ed. Saudi Central Board for Accreditation of Healthcare Institutions. 2015. p. 194–211.
23. ASHP guidelines on quality assurance for pharmacy-prepared sterile products. Am J Hosp Pharm. 1992;49(2):407–17.
24. Young D. Compounding sterile preparations raises informed-consent issues. Am J Heal Pharm. 2003;60(12):1209–10.
25. Chapter S. The ASHP Discussion Guide on USP CHAPTER <797> for compounding sterile preparations.
26. ISMP Guidelines for Safe Preparation of Compounded Sterile Preparations. 2016; Available from https://www.ismp.org/Tools/guidelines/IVSummit/IVCGuidelines.pdf
27. Alomi YA. National Pharmacy Pain Management Program at Ministry of Health in Saudi Arabia. J Pharmacol Clin Res. 2017;3(2).
28. Alomi YA. National pharmacy anticoagulation program at Ministry of Health in Saudi Arabia. BAOJ Pharm Sci. 2017;3:39.

Cite this article as: Alomi YA, Khayat NAY, Baljoon MJ, Bamagaus YA, Jumah HMA. National Survey of Hospital Medication Safety Practice during Mass Gathering (Hajj-2016) In Makkah, Saudi Arabia: Medication Preparation and Dispensing. J Pharm Pract Community Med. 2017;3(4s):S36-S42.