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National Survey of Pharmacy Practice at MOH Hospitals in SAUDI Arabia 2016-2017: Pharmacy Computerized and Technology

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Abstract

Objective: To explore National Survey of Pharmacy Practice at MOH hospitals in Saudi Arabia 2016-2017: Pharmacy Computerized and Technology. **Methods:** It is a 4-months cross-sectional National Survey of Pharmacy Practice at MOH hospitals in Saudi Arabia. The study consisted of two parts; the demographic information and the second part contained eighty-five questions divided into nine domains drove from American Society of Health-System Pharmacists (ASHP), Saudi Pharmaceutical Society (SPS) survey, and the international standard of Joint Commission of Hospital Accreditation. The parts were pharmacy management and resources, prescribing and medication control, preparation of medications and dispensing, Computerized and pharmacy technology, clinical pharmacy services, drug monitoring and patient's education, Pharmacy inventory control and stock management, Pharmacy education and training. The 5-point Likert response scale system was used with closed and ended questions. An electronic questionnaire was distributed to the one hundred eighty-five directors of pharmacies at MOH hospitals. The study discussed and analyzed National Survey of Pharmacy Practice at MOH hospitals in Saudi Arabia: Pharmacy Computerized and Technology. **Results:** The survey questionnaire was distributed to 185 of hospitals, the rate of reply was 105 (56.75%) hospitals. The majority of hospital pharmacies are not computerized and have no immediate plans to computerize 58 (55.2%) or Electronic Medical Record (EMR) 59 (56.2%). However, they had one or more component of the medical record (e.g., Medication administration record, CPOE, laboratory, radiology 42 (40.0%). The majority of hospital pharmacies had not Computerized Physician Order Entry (CPOE) at all, pharmacy services with average scores found 1.51 (30%) or Drug Alerting System through Computerized Physician Order Entry (CPOE) 1.35 (27%) only. Pharmacy technology in drug distribution network found in 17 (16.2%) hospitals only, and they used Automated transportation system 8 (7.6%) or centralized units dose (Cart filling machines, robotic arms) 5 (4.8%). Most of the hospital pharmacies did not have a plan for pharmacy automation or technology with average scores 1.66 (33.2%). **Conclusion:** Pharmacy computerization and technology seldom implemented at Ministry of Health hospitals. Targeting of strategic pharmacy informatics vision is required to prevent drug-related problems and avoid the unnecessary additional economic burden on healthcare system at Ministry of Health hospitals in Kingdom of Saudi Arabia.

Key word: Pharmacy practice, Informatics, Automation, Technology, Ministry of health, Saudi arabia.

INTRODUCTION

The computerization and technology are one the cornerstone tools used in the pharmacy practice. The new specialty of pharmacy informatics described by American Society of Health-System Pharmacist (ASHP).[1] In addition to the standardization of one of the significant part of informatics used new pharmacy technology and computerized physician order entry.[2] The new system is approved for preventing drug-related problems, decrease the pharmacy workload on pharmacist, and avoid the economic burden of pharmacy system.[2] Several studies published overall the world showed the implementation of pharmacy computerized and automation at hospital pharmacies among pharmacy practice through either international or local studies.[3-8] Some studies focused on clinical pharmacy services and acute care section.[9-10] Other investigation emphasized on pharmacy automation and technology or pharmacy informatics.[11-14] However, the most of the local investigation not included the ministry of health hospitals. It is seldom to find in Kingdom of Saudi Arabia or Gulf and Middle East counties studies about pharmacy informatics system in-depth detail manner. The objective of the study is to explore the national survey of pharmacy practice with emphasis on computerized and technology at MOH hospitals.

METHODS

It is a 4-months cross-sectional National Survey of Pharmacy Practice at MOH hospitals in Saudi Arabia. The study consisted of two parts; the demographic information and the second part contained eighty-five questions divided into eight domains drove from 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.[3,4,6,7,8,15,16] The parts were pharmacy management and resources, prescribing and medication control, preparation of medications and dispensing, Computerized and pharmacy technology, clinical pharmacy services, drug monitoring and patient's education, Pharmacy inventory control and stock management, Pharmacy education and training. The 5-point Likert response scale system was used with closed and ended

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questions. An electronic questionnaire was distributed to the one hundred eighty-five directors of pharmacies at MOH hospitals. The follow-up was taken through the email and telephone at every one-two week. All primary care centers, pharmacy administration at MOH or regions excluded from the study. The study discussed and analyzed National Survey of Pharmacy Practice at MOH hospitals in Saudi Arabia: the Pharmacy Computerized and Technology. All analysis is done through survey monkey system.

RESULTS

The survey questionnaire distributed to 185 of hospitals, the rate of reply, was 105 (56.75%) hospitals. Of that 30.5% of (< 50 beds) hospitals, 50-99), 20.0% of (50-99 beds) hospitals, 15.2% of (100-199 beds) hospitals, 18.1% of (200-299 beds) hospitals, 16.5% of (= or > 300 beds) hospitals. OF those, fifty-one (48.57%) hospitals accredited by CIBAHI, 30 (28.57%) hospitals accredited by Saudi Commission of Health Specialties, and ten (9.52%) hospitals only accredited by Joint Commission. While twenty-two (20.95%) hospitals were not accredited by any organizations; and 67 (63.8%) patients were not covered by any health insurance. The majority age of responders was (18-40) years 99 (94.29%) while the nationalities were Saudi 101(96.2%) and Non-Saudi 4 (3.8%). Most of the responders had BSc Pharm 59 (56.19%) and diploma of pharmacy 28 (26.67%) while 95 (96.9%) none certified of Board of Pharmaceutical Specialties. Most of the responders had pharmacy experiences 4-6 years (72.34%), while (40.00%) of responders had 1-3 years pharmacy administration experience, and (73.33%) had no experiences in clinical pharmacy as explored in Table 1, and Table 2. The majority of hospital pharmacies are not computerized and have no immediate plans to computerize 58 (55.2%) or Electronic Medical Record (EMR) 59 (56.2%). However, they had one or more component of the medical record (e.g., Medication administration record, CPOE, laboratory, radiology 42 (40.0%). The most personal computer and software of pharmacy practice were word processing 45 (42.9%) and drug information electronic references 27 (25.7%). The most Software used to document Drug Information Inquires was Microsoft Excel 40 (38.1%) and Microsoft Access 28 (26.7%). Most of hospital pharmacies had not Computerized Physician Order Entry (CPOE) at all pharmacy services with average scores found 1.51 (30%) or Drug Alerting System through Computerized Physician Order Entry (CPOE) 1.35 (27%) only as explored in Table 5 and Table 6. Pharmacy technology in drug distribution network found in 17 (16.2%) hospitals only, and they used Automated transportation system 8 (7.6%) or centralized units dose (Cart filling machines, robotic arms) five (4.8%). Most of the hospital

Table 1: Demographic responder qualifications information.

Nationality	Response N	Response %	No. of hospital Licensed Beds	Response N	Response %
Saudi	101	96.2%	< 50	32	30.5%
Non-Saudi	4	3.8%	50-99	21	20.0%
Answered question	105		100-199	16	15.2%
Skipped question	0		200-299	19	18.1%
Age	**Response N**	**Response %**	300-399	10	9.5%
18 - 40	99	94.29%	400-499	6	5.7%
40 - 56	5	4.76%	= or > 600	1	1.0%
65+	1	0.95%	Medical City	0	0.0%
Answered question	105		Answered question	105	
Skipped question	0		Skipped question	0	
Academic qualifications	**Response N**	**Response %**	**Board of Pharmaceutical Specialty**	**Response N**	**Response %**
Diploma Pharmacy	28	26.67%	Board Certified Ambulatory Care Pharmacist (BCACP)	1	1.0%
Bsc. Pharm	59	56.19%	Board Certified Critical Care Pharmacist (BCCCP)	1	1.0%
M.S	10	9.52%	Board Certified Nuclear Pharmacist (BCNP)	0	0.0%
Msc. Clinical Pharmacy	0	0.00%	Board Certified Nutrition Support Pharmacist (BCNSP)	0	0.0%
Pharm.D.	10	9.52%	Board Certified Oncology Pharmacist (BCOP)	0	0.0%
Ph.D	2	1.90%	Board Certified Pediatric Pharmacy Specialist (BCPPS)	0	0.0%
MBA	1	0.95%	Board Certified Pharmacotherapy Specialists (BCPS)	1	1.0%
Pharmacy Residency Two years (R1)	2	1.90%	Board Certified Psychiatric Pharmacist (BCPP)	0	0.0%
Pharmacy Residency one year (R2)	0	0.00%	Non	95	96.9%
Fellowship	1	0.95%	Answered question	98	
Other (please specify)	2	1.90%	Skipped question	7	
Answered question	105		Total number of patients covered by health insurance	Response N	Response %
Skipped question	0		Non	67	63.8%
The hospital accreditation	Response N	Response %	< 25%	23	21.9%
CIBAHI	51	48.57%	25-49%	9	8.6%
Joint Commotion USA	10	9.52%	50-74%	1	1.0%
Canada	1	0.95%	75-100% of our patients.	5	4.8%
Saudi Council	30	28.57%	Answered question	105	
None	22	20.95%	Skipped question	0	
Answered question	105				
Skipped question	0				

Table 2: Pharmacy Computerization and Technology.

	Hospital bed size									
Answer Options	**< 50**	**50-99**	**100-199**	**200-299**	**300-399**	**400-499**	**= or > 600**	**Medical City**	**Response Count**	**Response Percent**
No-we are not computerized and have no immediate plans to computerize.	21	14	12	7	4	0	0	0	58	55.2%
No-we are not computerized but have approval to obtain a computer system within the next 12 months.	6	7	2	5	1	3	1	0	25	23.8%
Yes-we are part of the hospital's mainframe computer system.	4	0	2	6	4	3	0	0	19	18.1%
Yes- we have a stand-alone computer system	1	0	0	1	1	0	0	0	3	2.9%
Electronic Medical Record (EMR)										
We have one or more component of the medical record	10	6	7	11	5	3	0	0	42	40.0%
We have complete EMRs System and we do not use paper-based charts	0	1	1	1	0	0	1	0	4	3.8%
We do not have EMRs system	22	14	8	7	5	3	0	0	59	56.2%
The personal computer and software of pharmacy practice										
Spread sheet	2	3	1	5	1	2	0	0	14	13.3%
Word processing	14	6	9	9	4	3	0	0	45	42.9%
Statistical analysis	4	1	1	8	1	1	0	0	16	15.2%
Drug dispensing (Outpatient pharmacy, and unit dose system)	5	3	0	7	3	4	0	0	22	21.0%
Data Kinetics (Pharmacokinetics)	0	2	0	1	0	0	0	0	3	2.9%
Pharmacy Microsystems I.V. (I.V. admixture, and TPN)	0	1	0	6	0	0	0	0	7	6.7%
Electronic drug references (Drug information)	8	5	4	6	1	3	0	0	27	25.7%
Home health disk, and or Family medical advisor (Telecommunications)	0	0	0	0	0	0	0	0	0	0.0%
We do not have it	15	10	6	4	3	1	1	0	40	38.1%
answered question:105 and skipped question:0										

Table 3: The responder experiences information.

Years of experience	Pharmacy Practice	Percent	Clinical Pharmacy	Percent	Pharmacy Administration	Percent	Response N
0	2	13.33%	11	73.33%	2	13.33%	15
< 1 year	12	38.71%	8	25.81%	11	35.48%	31
1-3	23	57.50%	1	2.50%	16	40.00%	40
4-6	34	72.34%	1	2.13%	12	25.53%	47
> 6 years	43	84.31%	0	0.00%	8	15.69%	51
Answered question: 105 and skipped question:0							

Table 4: Software used to document Drug Information Inquires

	Hospital bed size									
Answer Options	< 50	50-99	100-199	200-299	300-399	400-499	= or > 600	Medical City	Response N	Response %
Professional File Database	8	3	3	8	3	0	0	0	25	23.8%
Toxicol	0	0	0	1	0	0	0	0	1	1.0%
Clinitrend	0	0	0	0	0	0	0	0	0	0.0%
Mi-DataBank	1	0	2	0	0	1	0	0	4	3.8%
Microsoft Access	7	10	4	5	1	0	1	0	28	26.7%
Microsoft Excel	17	5	4	6	3	4	1	0	40	38.1%
Microsoft Foxpro	1	1	0	1	1	0	0	0	4	3.8%
Microsoft Word	0	0	2	0	0	0	0	0	2	1.9%
Manual drug information book	1	0	1	0	0	1	0	0	3	2.85%
No documentation	3	2	1	2	2	1	0	0	11	10/5%
answered question:105 and skipped question:0										

Table 5: Type of pharmacy services had Computerized Physician Order Entry (CPOE)

Answer Options	No activity to implement	Discussed for possible implementation in the pharmacy but is not implemented at this time	Partially implemented for some or all patients, prescriptions, drugs, or hospital department	Fully implemented for some patients, prescriptions, drugs, or hospital departments	Fully implemented for ALL patients, prescriptions, drugs, or hospital departments	Rating Average	Percent Average	Response N
Inpatient pharmacy	65	19	4	2	12	1.79	35.8	102
IV admixture Pharmacy	76	9	5	0	2	1.29	25.8	92
Outpatient pharmacy	60	19	5	6	12	1.93	38.6	102
Satellite pharmacy	82	5	1	1	1	1.16	23.2	90
Emergency pharmacy	65	14	6	3	11	1.80	36	99
Drug information	71	11	6	2	3	1.44	28.8	93
Clinical Pharmacy	82	6	3	0	2	1.22	24.4	93
Preparation area	75	10	3	0	5	1.39	27.8	93
Prepackaging area	80	8	1	1	3	1.27	25.4	93
Pharmacy Store	59	16	6	4	9	1.81	36.2	94
answered question:105 and skipped question:0								

Table 6: Type of pharmacy services had Drug Alerting System through Computerized Physician Order Entry (CPOE).								
Answer Options	**No activity to implement**	**Discussed for possible implementation in the pharmacy but is not implemented at this time**	**Partially implemented for some or all patients, prescriptions, drugs, or hospital department**	**Fully implemented for some patients, prescriptions, drugs, or hospital departments**	**Fully implemented for ALL patients, prescriptions, drugs, or hospital departments**	**Rating Average**	**Percent Average**	**Response N**
Inpatient pharmacy	71	17	6	3	4	1.53	30.6	101
IV admixture Pharmacy	75	10	5	2	1	1.32	26.4	93
Outpatient pharmacy	67	21	4	3	4	1.55	31	99
Satellite pharmacy	85	5	1	0	1	1.12	22.4	92
Emergency pharmacy	69	17	6	2	3	1.48	29.6	97
Drug information	72	12	6	2	2	1.40	28	94
Clinical Pharmacy	78	6	3	2	1	1.24	24.8	90
Preparation area	79	8	2	2	2	1.28	25.6	93
Prepackaging area	81	8	2	2	0	1.19	23.8	93
Pharmacy Store	71	16	3	4	1	1.40	28	95
answered question:105 and skipped question:0								

Table 7: Type of New Technology used for drug distribution and Patient Care.		
Answer Options	**Response N**	**Response %**
Robot for IV preparation	4	3.8%
Bar-Coding Inventory system	5	4.8%
Point of Care Bar-Coding (BCMA)	0	0.0%
Point of Care devices (e.g., Smart Pump).	4	3.8%
Automated Dispensing Cabinets	4	3.8%
PDA (Pocket PC- Palm)	1	1.0%
None	88	83.8%
The type of automation is currently used in any area of the hospital to support inpatient drug distribution services		
Answer Options	**Response N**	**Response %**
We have Automated transportation system (pneumatic tubes, Trackless robots, automated track vehicles)	8	7.6%
We have centralized units dose (Cart filling machines, robotic arms)	5	4.8%
We have decentralized drug dispensing units (automated vendor machine)	1	1.0%
We have IV production system (Robotic IV compounders, TPN solution compounder)	3	2.9%
We planned to do the following: Automated transportation system (pneumatic tubes, Trackless robots, automated track vehicles)	20	19.0%
Centralized units dose (Cart filling machines, robotic arms)	8	7.6%
Decentralized drug dispensing units (automated vendor machine)	3	2.9%
We are not planning to do	62	59.0%
Answered question	105	0%

Table 8: hospital pharmacy plan to do the following project

Answer Options	Hospital bed size							Medical City	Rating Average	Percent Average	Response N
	< 50	50-99	100-199	200-299	300-399	400-499	= or > 600				
Automated Dispensing Cabinets	1.97	2.00	2.25	1.53	1.60	1.00	1.00	0.00	1.83	36.6	102
Bar-Code Medication Administration	1.87	1.86	2.19	1.50	1.60	1.00	1.00	0.00	1.77	35.4	103
Electronic Medication Administration Recorded	1.83	1.71	2.00	1.18	1.50	1.00	1.00	0.00	1.63	32.6	100
Pharmacy Information System	1.68	1.95	1.60	1.17	1.50	1.33	1.00	0.00	1.59	31.8	102
Computerized Physician Order Entry	1.71	1.90	1.56	1.17	1.10	1.00	1.00	0.00	1.52	30.4	102
Pharmacoeconomics Center	2.28	2.14	2.00	1.83	2.00	2.17	2.00	0.00	2.09	41.8	101
General Facility Improvement/Renovation	2.14	1.75	1.88	1.65	2.10	1.17	1.00	0.00	1.86	37.2	99

pharmacies did not have a plan for pharmacy automation or technology with average scores 1.66 (33.2%) as explored in Table 7 and Table 8.

DISCUSSION

The strategic planning of pharmaceutical care started in 2012 with six general goals and more than eighty projects. The third general goal stated about pharmacy computerization and new technology implementation.[17] The pharmacy administration formulated a central committee of pharmacy automation. It consisted of representing twenty regions with pharmacist or pharmacy technician specialized in pharmacy informatics or had experience in this field. The committee divided the hospital beds size into three categorized into three sections included the less than 150 beds and poisonous used essential computerized physician order entry. The hospital-bed sized 150-350 beds intermediate level computerized physician order enters. Moreover, more than 350 beds used advance computerized physician order entry. The committee recommended using the ASHP CPOE standard, and the pharmacy administration sends a memo to all hospitals pharmacy for implementation. In addition to applying the role of the pharmacist in pharmacy informatics field. The committee organized several courses about pharmacy computerized and automation for pharmacist staff and pharmacy technician. The pharmacy administration arranged to release electronic prescription of Narcotic and controlled medication as by pharmacy law and cooperate with Saudi Food and Drug Authority (SFDA). The authors tried investigated the level of pharmacy electronic and new technologies at MOH hospital pharmacy. The results of pharmacy computerized is lower than what report by Fox, B et al., because the most of the hospital pharmacy used everything manually and just recently started the computer system at their pharmacy.[12] Also, the one-third of hospital pharmacy utilized necessary computer software Microsoft office only while seldom-used clinical professional software. That is give the negative background of computer skills for pharmacist and inadequate knowledge of computerized pharmacy documentation system and pharmacy informatics. The results of finding of Electronic Medical Record (EMR) or Computerized Physician Order Entry (CPOE) at all pharmacy services are same what reported by AlSultam et al. while the Drug Alerting System through Computerized Physician Order Entry (CPOE) have little lower than what reported by Alasultan et.al. The components of the medical record (e.g., Medication administration record, CPOE, laboratory, radiology) little than what report by Alsultan et al. Ther results are accep*et al* because not all the hospital pharmacies had an electronic prescription and CPOE and related issues.[6] Also, EMR or CPOE or clinical decision support system was lower that what report by Pedersen, C et al. and Fox, B et al., because the system just recently started at MOH hospital with week experiences while in the USA since a long time with vibrant experiences.[3,12] The results of Pharmacy technology in drug distribution network included Automated transportation system lower that results in report by Alsultam et al. and Pedersen, C et al. and Fox, B et al. while the finding of centralized units dose (Cart filling machines, robotic arms) better than Alsultan report but lower than Pederson c et al and Fox, B et al, result.[4,7,12] The MOH hospital recently started with the automated distribution system, and there some improvement of utilization new pharmacy technology with one-third of hospital pharmacies had planning project for that but still far away from developing countries.

CONCLUSION

The pharmacy computerized and automation services at MOH hospitals is poor. The electronic prescription does not implement with more than fifty percent of the hospital while pharmacy automation not existed at more than ninety percent of them. The very comprehensives pharmacy informatics with close monitoring of the implementation is highly recommended. The new pharmacy technology improves patient satisfaction and decreases economic burden on health care system at MOH hospital in Kingdom of Saudi Arabia.

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CONFLICT OF INTEREST

None

SOURCE OF SUPPORT

None

ABBREVIATION USED

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

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