Forecasting (2018-2030) and the Demand of Hospital Pharmacy Technician Workforce at Over Twelve Years (2006-2017) in Saudi Arabia

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ABSTRACT

Objectives: The workforce of hospital pharmacy technician is one the elements of pharmacy strategic plan in Saudi Arabia.: The purpose of this study is to explore the demand workforce of pharmacy technician at MOH hospitals over the past twelve years (2006-2017) and forecasting during (2018-2030) in the kingdom of Saudi Arabia. **Methods:** It is a retrospective analysis of twelve years (2006-2017) of Ministry of Health pharmacy technician workforce demand and forecasting in the future (2018-2030) at MOH organization practice. All data were derived from the Ministry of Health Statistical Year Books and any missing appropriate information about pharmacy technician workforce that will be estimated through allied healthcare professional's data in each region including gender or nationality. It included pharmacy technician and exclude all types of pharmacists or clinical pharmacist's workforce at MOH hospital setting. All calculations were based on MOH workforce standards of hospital with update literatures. All calculation was done used Microsoft Excel version ten. **Results:** The number of pharmacy technician demand based on optimum pharmacy and pharmacist. The pharmacy technician ratio (1:4) demand was (21,212.6-26,091) with an average (22,934.68). While with a ratio of (1:2) the number of pharmacy technician demand was (7,410-8,859) with an average (8,320.55). The number of pharmacy technician forecasting of a ratio (1:3) was (14,300-17,475) with an average (15,627.62). The forecasting number of pharmacy technician in the future within years (2018-2030) over thirteen years based on optimum pharmacy and pharmacist. The pharmacy technician ratio (1:4) forecast was (33,898.6-45,803) with an average (39,577.00). While with a ratio of (1:2) the number of the forecasting pharmacy technician was (16,303-22,028) with an average (19,034.31). The number of pharmacy technician forecasting of ratio (1:3) was (25,100 - 33,916) with an average (29,305.54). **Conclusion:** The demand of pharmacy technicians and forecasting in the future were determined. The ratio of pharmacist to pharmacy technician in the hospital practice should be standardized. An annual study on hospital pharmacy technician workforce is recommended in Saudi Arabia.

Keywords: Demand, Forecasting, Hospital, Pharmacy technician, Workforces, Ministry of Health, Saudi Arabia

INTRODUCTION

There are two types of pharmacy staff. The pharmacist included clinical pharmacist and advanced specialized clinical pharmacist. The other type calls supportive personal of pharmacy or pharmacy technician. Each type had specific functions and roles in the healthcare system.[1-3] The workforce standard of each type should be with the balance to provide very cost-effective services to patients. Several State boards of pharmacy in America released different ratio of pharmacist to pharmacy technician starting from 1:2 to 1:4 or more.[4] The ratio was established based on the workload and the services provided to the patients.[1] The Ministry of Health released the pharmacist workforce required for hospitals.[5,6] Local investigation discussed the demand of hospital pharmacist based on MOH standards.[7,8] However, the pharmacy technician requirement standard for hospital has not existed yet. Also, the ratio of pharmacist to pharmacy technician workforce and demand of the pharmacy technician and forecasting is not ready in Saudi Arabia or Gulf and Middle East countries. The aim of the study was to explore the analysis of pharmacy technician demand over the past twelve years and forecasting in the future within the years 2030.

METHODS

It is a retrospective analysis of twelve years (2006-2017) of Ministry of Health pharmacy technician workforce demand and forecasting in the future (2018-2030) at MOH organization practice. All data were derived from the Ministry of Health Statistical Year Books and any missing appropriate information about pharmacy technician workforce, that will be estimated through allied healthcare professionals data at each region including gender or nationality.[9-20] It included pharmacy technician and exclude all types of pharmacists or clinical pharmacist's workforce at MOH hospital setting. All types of hospitals or primary health care center levels services

included in the studies with general, public, pediatrics, maternity, psychiatric hospitals. All specialized centers, cardiac, oncology and dental centers included in the study. All pharmacy technicians expected to provide pharmaceutical according to ASHP definition and requirements. All types of pharmacy services based on the Saudi Central Board of hospital accreditation, Joint Commission on Hospital Accreditation, ASHP best practice standards and general administration of the pharmaceutical care strategic plan.[21-25] All pharmacy technician works at MOH primary healthcare centers or administration or non-MOH government hospitals and primary care centers excluded from the studies. All private hospital or community pharmacist was excluded from the study. All calculations were based on MOH workforce standards of hospital with update literatures.[4,8,26] All calculation was done using Microsoft Excel version ten.

RESULTS

Over 12 past years (2006-2017), the total population of the kingdom of Saudi Arabia was (23,678,849 - 32,552,336) with an average (28,283,424.58). The Ministry of Health services sixty percent of the pollution and accounted (14,207,309 - 19,531,402) with an average (16,970,054.78). The number of pharmacists increased (1,023 - 3,853) with an average 2,267.08, with (3.76) fold over twelve years and (0.313) increments annually. The number of pharmacy technicians increased (4,289 - 8,373) with an average (6,293.58) with (1.9) fold over twelve years and (0.162) increments annually. The number of pharmacy technician demand based on actual pharmacy and pharmacist. The pharmacy technician ratio (1:4) demand was (197-7,039) with an average (2,774.75) annually. While with a ratio of (1:2) the number of pharmacy technician demand was (667-2,576) with an average (1,648.25) annually. The number of pharmacy technician ratio (1:3) demand was (98-3,186) with an average (507.67) annually (Table 1).

The number of pharmacy technician demand based on optimum pharmacy and pharmacist: The pharmacy technician ratio (1:4) demand was (21,212.6-26,091) with an average (22,934.68) annually. While with a ratio of (1:2) the number of demand pharmacy technician was (7,410-8,859) with an average (8,320.55) annually. The number of pharmacy technician forecasting of ratio (1:3) was (14,300-17,475) with an average (15,627.62) annually (Table 2).

The forecasting number of pharmacy technician in the future within years (2018-2030) over thirteen years based on optimum pharmacy and pharmacist. The pharmacy technician ratio (1:4) forecasting was (33,898.6-45,803) with an average (-39,577.00) annually. While with a ratio of (1:2) the number of the forecasting pharmacy technician was (16,303-22,028) with an average (19,034.31) annually. The number of pharmacy technician forecasting of ratio (1:3) was (25,100-33,916) with an average (29,305.54) annually (Table 3).

DISCUSSION

The general direction of pharmaceutical care underway pharmacy strategic plan in the mid-2000s and restructured plan released in early 2010. The plan contained of development all pharmacy practice services and clinical pharmacy programs with required of pharmacy workforces.[25] There was more one type to calculate the demand for hospital pharmacist. One based on workload analysis with the number of prescriptions. That is each pharmacist can handle 80-120 prescription per duty with a maximum 150 prescription per day.[27-29] Another method of pharmacist workforce demand at hospitals with the number of pharmacist per bed.[5, 8,30] The Ministry of Health in the Saudi Arabia stated with 0.2 pharmacists per bed; with 60% as distributive pharmacists and 40% clinical pharmacist.[5,30] However, the pharmacy technician workforce demand at hospitals not standardized yet in the healthcare system in the kingdom of Saudi Arabia. The authors calculated the demand through two ways based of the actual number of pharmacist and the optimum number of pharmacist with three ratios of pharmacist to pharmacy technician (1:2), (1:4) and the (1:3) as the average of two previous methods similar to the previous studies.[4,26] The findings showed that is of pharmacy technician demand at the year 2017 reach to almost equal to the present number of a pharmacy technician with the high pharmacist to pharmacy technician ration while reach to 33% of a presented number. Besides, with using

Table 1: Hospital Pharmacy technician demand based on actual hospital pharmacist (2006-2017)

years	Total Population	MOH serving populations	total of actual pharmacist	total of pharmacy technician	actual pharmacy Technical(1:4)	no demand actual pharmacy Technical	actual pharmacy Technical(1:2)	no demand actual pharmacy Technical	actual pharmacy Technical(average)	no demand actual pharmacy Technical
2006	23,678,849.00	14,207,309.40	636	2,544	1,745	1,272	-3,017	1,908	2,381	636
2007	24,242,578.00	14,545,546.80	804	3,216	785	1,608	-2,393	2,412	1,589	804
2008	24,807,273.00	14,884,363.80	1,065	4,260	-291	2,130	-1,839	3,195	774	1,065
2009	25,373,512.00	15,224,107.20	1,364	5,456	-1,143	2,728	-1,585	4,092	221	1,364
2010	27,136,977.00	16,282,186.20	1,601	6,404	-704	3,202	-2,498	4,803	897	1,601
2011	28,376,355.00	17,025,813.00	1,487	5,948	422	2,974	-3,396	4,461	1,909	1,487
2012	29,204,842.00	17,522,905.20	1,661	6,644	-25	3,322	-3,297	4,983	1,636	1,661
2013	29,994,272.00	17,996,563.20	1,820	7,280	-662	3,640	-2,978	5,460	1,158	1,820
2014	30,770,375.00	18,462,225.00	2,206	8,824	-476	4,412	-3,936	6,618	1,730	2,206
2015	31,521,418.00	18,912,850.80	2,389	9,556	-1,085	4,778	-3,693	7,167	1,304	2,389
2016	31,742,308.00	19,045,384.80	2,760	11,040	-2,588	5,520	-2,932	8,280	172	2,760
2017	32,552,336.00	19,531,402.00	3,248	12,992	-4,619	6,496	-1,877	9,744	-1,371	3,248
Average	28,283,424.58	16,970,054.78	1,753.42	7,013.67	-720.08	3,506.83	-2,786.75	5,260.25	1,033.33	1,753.42

Table 2: Hospital Pharmacy technician demand or required based on hospital optimum pharmacist (2006-2017)

years	no hospital bed	optimum hospital pharmacist	optimum hospital pharmacy Technical(1:4)	no demand optimum hospital pharmacy Technical	optimum hospital pharmacy Technical(1:2)	no demand optimum hospital pharmacy Technical	optimum hospital pharmacy Technical(average)	no demand optimum hospital pharmacy Technical
2006	31,877	6,375	25,502	-21,213	12,751	-8,462	19,126	-14,837
2007	31,420	6,284	25,136	-21,135	12,568	-8,567	18,852	-14,851
2008	31,720	6,344	25,376	-21,407	12,688	-8,719	19,032	-15,063
2009	33,277	6,655	26,622	-22,309	13,311	-8,998	19,966	-15,653
2010	34,370	6,874	27,496	-21,796	13,748	-8,048	20,622	-14,922
2011	34,450	6,890	27,560	-21,190	13,780	-7,410	20,670	-14,300
2012	35,828	7,166	28,662	-22,043	14,331	-7,712	21,497	-14,878
2013	38,970	7,794	31,176	-24,558	15,588	-8,970	23,382	-16,764
2014	40,300	8,060	32,240	-23,892	16,120	-7,772	24,180	-15,832
2015	41,297	8,259	33,038	-24,567	16,519	-8,048	24,778	-16,307
2016	41,835	8,367	33,468	-25,016	16,734	-8,282	25,101	-16,649
2017	43,080	8,616	34,464	-26,091	17,232	-8,859	25,848	-17,475
Average	36,535.33	7,307.00	29,228.33	-22,934.75	14,614.17	-8,320.58	21,921.17	-15,627.58

Table 3: Hospital Pharmacy technician forecasting based on hospital optimum pharmacist (2018-2030)

years	optimum hospital pharmacist	optimum hospital pharmacy Technical(1:4)	no demand optimum hospital pharmacy Technical	optimum hospital pharmacy Technical(1:2)	no demand optimum hospital pharmacy Technical	optimum hospital pharmacy Technical(average)	no demand optimum hospital pharmacy Technical
2018	8,797.44	35,190	-33,898	17595	-16,303	26,392	-25,100
2019	9,020.90	36,084	-34,759	18042	-16,717	27,063	-25,738
2020	9,250.03	37,000	-35,642	18500	-17,142	27,750	-26,392
2021	9,484.98	37,940	-36,547	18970	-17,577	28,455	-27,062
2022	9,725.90	38,904	-37,475	19452	-18,023	29,178	-27,749
2023	9,972.93	39,892	-38,427	19946	-18,481	29,919	-28,454
2024	10,226.25	40,905	-39,403	20453	-18,951	30,679	-29,177
2025	10,485.99	41,944	-40,404	20972	-19,432	31,458	-29,918
2026	10,752.34	43,009	-41,430	21505	-19,926	32,257	-30,678
2027	11,025.45	44,102	-42,483	22051	-20,432	33,076	-31,457
2028	11,305.49	45,222	-43,562	22611	-20,951	33,916	-32,256
2029	11,592.65	46,371	-44,668	23185	-21,483	34,778	-33,075
2030	11,887.11	47,548	-45,803	23774	-22,028	35,661	-33,916
Average	10,271.34	41,085.46	-39,577.00	20,542.77	-19,034.31	30,814.00	-29,305.54

a medium ratio of pharmacy technician ratio, the number of demanded was 38 % of the number of current pharmacy technician numbers. The findings showed the demand of pharmacy technician based on optimum pharmacists was also threefold increments, one-fold increments and two-fold increments with the pharmacist to pharmacy technician ration (1:4), (1:2) and (1:3) respectively. The forecasting demand of pharmacy technician from based on optimum pharmacist 2018 to the 2030 year was almost (4-5) fold increments, (2-2.75) fold increments and (3-2.75) fold increments with the pharmacist to pharmacy ratio (1:4), (1:2) and (1:3) respectively. With the implementation of updated pharmacy strategic plan with new vision 2030 and Saudi managed care pharmacy; most of the pharmacy technician may be converted to community pharmacies after determining the number of the pharmacist at ambulatory care services at hospital sectors. The author suggested the ratio of pharmacy technician (1:1) should convey to the number of a clinical pharmacy technician to help the clinical pharmacist with their daily duties at either hospitals or community pharmacies. The pharmacy technician workforce should report by Ministry of health human resources sectors in such details of nationality, gender, working site and position on an annual basis. The study is first instances in the kingdom of Saudi Arabia and Gulf or Middle East countries and should be repeated with actual data and including all government and private organizations every 2-4 years in the kingdom of Saudi Arabia.

CONCLUSION

The study of demand and forecasting of pharmacy technician workforce is unique locally and Gulf and Middle East countries. The standardized ratio of pharmacist to pharmacy technician at hospital practice should be determined. The periodically pharmacy technician workforce's demand and forecasting at all healthcare organization is recommended in the Kingdom of Saudi Arabia.

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ABBREVIATIONS

KSA: Kingdom of Saudi Arabia; **MOH:** Ministry of Health; **ASHP:** American Society of Health-System Pharmacist; **PHCs:** Primary Healthcare Centers.

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