Forecasting the Demand of Clinical Pharmacist Workforce in Future Fifteen Years (2016-2030) at all Healthcare institutions in Saudi Arabia

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Abstract

Objectives: The workforce of clinical pharmacist is one the elements of pharmacy strategic plan in Saudi Arabia. The purpose of this study is to explore the demand for clinical pharmacist's workforce in fifteen years (2016-2030) at Ministry of Health hospitals and primary care centers, and all Non-Ministry of Health hospitals in Saudi Arabia. **Methods:** It is a prospective analysis of fifteen years (2016-2030) of health care provider hospital and MOH primary care centers projecting demand of clinical pharmacists in the future. All data were derived from Ministry of health statistical Year Books. It included current and future demand for clinical pharmacist workforces at hospitals in Kingdom of Saudi Arabia. The type of hospital included having bed capacity of 50-1500 beds with Adults public hospitals, pediatrics and maternity hospitals, Psychiatric hospitals, Diabetic centers, Cardiology centers, Oncology Centers, Renal Dialysis Centers, and Medical cities. All calculations were based on MOH clinical pharmacist workforce standards of hospitals. The calculations were per each region for a total of twenty-one regions for MOH hospital and primary care centers, the expected number of clinical pharmacist requirement in the coming years 2016-2030 were estimated per each sector across Saudi Arabia. **Result:** The total numbers of hospitals were 466 in the kingdom of Saudi Arabia, 274 (58.8%) Ministry of Health hospitals, 152 (32.6%) private hospitals, and 40 (8.6%) non-MOH governmental hospitals. Over the eleven years, the average number of hospitals were (423.45) with a range number of (384-467), and the total number was (467). The total average demand of clinical pharmacists at MOH hospitals by the year 2030 will be (6,018.96) with range (5,020.20-7,132.26) while the average total demand of clinical pharmacists at MOH primary care centers by the year 2030 will be (2787.55) with range (2,325.00-3,303.16). The total requirement of a clinical pharmacist in all sectors by the year 2030 will be (12,077.88) with range (8,501.28- 12,077.88). **Conclusion:** The MOH hospitals and primary care centers sectors will be with the highest demand for clinical pharmacists in the future. Targeting for more graduated clinical pharmacist from the college of pharmacies, opening new clinical pharmacist jobs, and implementation of new vision of pharmacy practice by 2030 is required in Saudi Arabia.

Key word: Clinical pharmacist, Workforces, Ministry of health, Saudi arabia.

INTRODUCTION

The Ministry of Health started with the logo "the patient first" for achievement of several elements during the updated healthcare system strategic plan.^[1] That is required to improve healthcare Human Resources including pharmacy practice. Clinical pharmacy staff was new workforce at MOH standard, released through the general administration of pharmaceutical services during first pharmacy strategic plan and updated with a new one.^[2] Despite the clinical pharmacy was started at the non-MOH organization in mid-1985 and expanded in the mid-1990s but still the calculation of clinical pharmacist demand and requirements for pharmacy future services was not done.^[3] Several studies reported pharmacist workforces including the clinical pharmacy workforce Especially in United States of America (USA) and other countries.^[4-15] Few studies reported the projection of clinical pharmacist in the future.^[6,16] It is hard to find an invigoration in Saudi Arabia, or Gulf and Middle East countries about clinical pharmacy workforce demand currently and in the future. The objective of this study is to explore the current and future clinical pharmacist demand at all healthcare sectors in Kingdom of Saudi Arabia.

METHODS

It is a prospective analysis of fifteen years (2016-2030) of health care provider hospital and MOH primary care centers projecting demand of clinical pharmacists in the future. All data were derived from Ministry of health statistical Year Books.^[17-27] It included the current and future demand for clinical pharmacist's workforces at hospitals in Kingdom of Saudi Arabia. The type of hospital included having bed capacity of 50-1500 beds with Adults public hospitals, pediatrics and maternity hospitals, Psychiatric hospitals, Diabetic centers, Cardiology centers, Oncology Centers, Renal Dialysis Centers, and Medical cities. All clinical Pharmacist works at MOH Hospitals or Primary care centers and non-MOH government hospitals including: University Hospitals, Armed Forces Hospitals, National Gaud Hospitals, Security Forces hospitals, King Faisal Specialist hospital and research center, Royal Commission for Jubail and Yanbu Hospitals, Aramco Hospitals, included in the study. All private hospitals also included in the study. All community pharmacies or pharmacy technician excluded from the study. All clinical pharmacists were expected to provide pharmaceutical according to ASHP definition and requirements. All type of pharmacy services were based on Saudi Central Board of hospital accreditation, a joint

Table 1: The number and type of hospitals.

Region	Years															Average
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Riyadh	952.44	976.63	1,001.44	1,026.87	1,052.96	1,079.70	1,107.13	1,135.25	1,164.08	1,193.65	1,223.97	1,255.06	1,286.94	1,319.63	1,353.14	1141.93
	319.68	327.80	336.13	344.66	353.42	362.39	371.60	381.04	390.72	400.64	410.82	421.25	431.95	442.92	454.17	383.28
Jeddah	370.92	380.34	390.00	399.91	410.07	420.48	431.16	442.11	453.34	464.86	476.67	488.77	501.19	513.92	526.97	444.71
Taif	268.80	275.63	282.63	289.81	297.17	304.72	312.46	320.39	328.53	336.88	345.43	354.21	363.20	372.43	381.89	322.28
Madina	338.16	346.75	355.56	364.59	373.85	383.34	393.08	403.07	413.30	423.80	434.57	445.60	456.92	468.53	480.43	405.44
Quseen	337.08	345.64	354.42	363.42	372.65	382.12	391.83	401.78	411.98	422.45	433.18	444.18	455.46	467.03	478.89	404.14
East Province	390.72	400.64	410.82	421.26	431.96	442.93	454.18	465.71	477.54	489.67	502.11	514.86	527.94	541.35	555.10	468.45
Alhasa	228.60	234.41	240.36	246.47	252.73	259.14	265.73	272.48	279.40	286.49	293.77	301.23	308.88	316.73	324.78	274.08
Heralbatin	120.00	123.05	126.17	129.38	132.66	136.03	139.49	143.03	146.67	150.39	154.21	158.13	162.14	166.26	170.49	143.87
Aseer	279.60	286.70	293.98	301.45	309.11	316.96	325.01	333.27	341.73	350.41	359.31	368.44	377.80	387.39	397.23	335.23
Bisha	92.40	94.75	97.15	99.62	102.15	104.75	107.41	110.13	112.93	115.80	118.74	121.76	124.85	128.02	131.27	110.78
Tabouk	212.40	217.79	223.33	229.00	234.82	240.78	246.90	253.17	259.60	266.19	272.95	279.89	286.99	294.28	301.76	254.66
Hail	141.00	144.58	148.25	152.02	155.88	159.84	163.90	168.06	172.33	176.71	181.20	185.80	190.52	195.36	200.32	169.05
North Boarder	157.20	161.19	165.29	169.49	173.79	178.20	182.73	187.37	192.13	197.01	202.02	207.15	212.41	217.80	223.34	188.47
Jazan	267.00	273.78	280.74	287.87	295.18	302.68	310.36	318.25	326.33	334.62	343.12	351.83	360.77	369.93	379.33	320.12
Najran	144.00	147.66	151.41	155.25	159.20	163.24	167.39	171.64	176.00	180.47	185.05	189.75	194.57	199.52	204.58	172.65
Albaha	139.80	143.35	146.99	150.73	154.55	158.48	162.51	166.63	170.87	175.21	179.66	184.22	188.90	193.70	198.62	167.61
Aljof	159.60	163.65	167.81	172.07	176.44	180.93	185.52	190.23	195.07	200.02	205.10	210.31	215.65	221.13	226.75	191.35
Alqurayyat	58.80	60.29	61.82	63.40	65.01	66.66	68.35	70.09	71.87	73.69	75.56	77.48	79.45	81.47	83.54	70.50
Qunfeitha	42.00	43.07	44.16	45.28	46.43	47.61	48.82	50.06	51.33	52.64	53.97	55.34	56.75	58.19	59.67	50.35
TOTAL	5,020.20	5,147.71	5,278.46	5,412.54	5,550.02	5,690.99	5,835.54	5,983.76	6,135.75	6,291.60	6,451.40	6,615.27	6,783.30	6,955.59	7,132.26	6018.96

Table 2: Clinical Pharmacist demand hospitals for the years 2016-2030 at Ministry of Health

	Region	No of Hospitals	Small <100	Medium 100-299	Large 300-399	Large 400- > or = 600	Medical Cities
1	Ministry of health	274	140	95	18	21	2
2	University Hospitals	4	1	0	0	2	1
3	Armed Forces Hospitals	24	8	11	3	1	1
4	Hospitals in the National Guard	5	0	3	0	0	2
5	Hospitals, Security Forces	3	0	0	2	1	0
6	King Faisal Specialist Hospital and Research	2	0	0	1	1	0
7	Hospitals, the Royal Commission for Jubail and Yanbu	1	0	0	1	0	0
8	Aramco Hospitals	1	0	0	1	0	0
9	Private hospitals	152	97	32	5	7	0
	Total	466	246	141	31	33	6

Table 3: Primary care center (PCC) clinical Pharmacist demand for the years 2016-2030 at Ministry of Health.

Region	Years															Average
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Riyadh	424.00	434.77	445.81	457.14	468.75	480.65	492.86	505.38	518.22	531.38	544.88	558.72	572.91	587.46	602.38	508.35
Makkah	83.00	85.11	87.27	89.49	91.76	94.09	96.48	98.93	101.44	104.02	106.66	109.37	112.15	115.00	117.92	99.51
Jeddah	90.00	92.29	94.63	97.03	99.50	102.03	104.62	107.27	110.00	112.79	115.66	118.60	121.61	124.70	127.86	107.91
Taif	121.00	124.07	127.22	130.46	133.77	137.17	140.65	144.22	147.89	151.64	155.50	159.45	163.50	167.65	171.91	145.07
Madina	162.00	166.11	170.33	174.66	179.10	183.65	188.31	193.09	198.00	203.03	208.18	213.47	218.89	224.45	230.16	194.23
Quseen	177.00	181.50	186.11	190.83	195.68	200.65	205.75	210.97	216.33	221.83	227.46	233.24	239.16	245.24	251.47	212.21
East Province	140.00	143.56	147.20	150.94	154.78	158.71	162.74	166.87	171.11	175.46	179.91	184.48	189.17	193.97	198.90	167.85
Alhasa	70.00	71.78	73.60	75.47	77.39	79.35	81.37	83.44	85.55	87.73	89.96	92.24	94.58	96.99	99.45	83.93
Heralbatin	40.00	41.02	42.06	43.13	44.22	45.34	46.50	47.68	48.89	50.13	51.40	52.71	54.05	55.42	56.83	47.96
Aseer	249.00	255.32	261.81	268.46	275.28	282.27	289.44	296.79	304.33	312.06	319.99	328.11	336.45	344.99	353.76	298.54
Bisha	85.00	87.16	89.37	91.64	93.97	96.36	98.80	101.31	103.89	106.53	109.23	112.01	114.85	117.77	120.76	101.91
Tabouk	83.00	85.11	87.27	89.49	91.76	94.09	96.48	98.93	101.44	104.02	106.66	109.37	112.15	115.00	117.92	99.51
Hail	105.00	107.67	110.40	113.21	116.08	119.03	122.05	125.15	128.33	131.59	134.93	138.36	141.88	145.48	149.17	125.89
North Boarder	47.00	48.19	49.42	50.67	51.96	53.28	54.63	56.02	57.44	58.90	60.40	61.93	63.51	65.12	66.77	56.35
Jazan	178.00	182.52	187.16	191.91	196.79	201.78	206.91	212.16	217.55	223.08	228.75	234.56	240.51	246.62	252.89	213.41
Najran	68.00	69.73	71.50	73.31	75.18	77.09	79.04	81.05	83.11	85.22	87.39	89.61	91.88	94.22	96.61	81.53
Albaha	105.00	107.67	110.40	113.21	116.08	119.03	122.05	125.15	128.33	131.59	134.93	138.36	141.88	145.48	149.17	125.89
Aljouf	42.00	43.07	44.16	45.28	46.43	47.61	48.82	50.06	51.33	52.64	53.97	55.34	56.75	58.19	59.67	50.35
Alqurayat	19.00	19.48	19.98	20.48	21.01	21.54	22.09	22.65	23.22	23.81	24.42	25.04	25.67	26.32	26.99	22.78
Qunfetha	37.00	37.94	38.90	39.89	40.90	41.94	43.01	44.10	45.22	46.37	47.55	48.76	49.99	51.26	52.57	44.36
TOTAL	2,325.00	2,384.06	2,444.61	2,506.70	2,570.37	2,635.66	2,702.61	2,771.25	2,841.64	2,913.82	2,987.83	3,063.72	3,141.54	3,221.34	3,303.16	2787.55

commission of hospital accreditation, ASHP best practice standards, and general administration of the pharmaceutical care strategic plan.^[2,28-31] All calculations were based on MOH clinical pharmacist workforce standards of hospitals. The calculations were per each region for a total of twenty-one regions for MOH hospital and primary care centers, the expected number of clinical pharmacist requirement in the coming years 2016-2030 per each sector were estimated across Saudi Arabia. All calculation done used Microsoft Excel version ten.

RESULTS

The total numbers of hospitals were 466 in the kingdom of Saudi Arabia, 274 (58.8%) Ministry of Health hospitals, 152 (32.6%) private hospitals, and 40 (8.6%) non-MOH governmental hospitals. Over the eleven years, the average number of hospitals were (423.45) with a range number of (384-467), and the total number was (467) as explored in Table 1. The total average demand of clinical pharmacists at MOH hospitals by the year 2030 will be (6,018.96) with range (5,020.20-7,132.26) while the average total numbers demand of clinical pharmacists at MOH primary care centers by the year 2030 will be (2787.55) with range (2,325.00-3,303.16) as explored in Table 2 and Table 3. The high average requirement of the clinical pharmacists will be in Ministry of health regions (6,018.96), followed by Private hospitals sector (2,507.43) and Armed Forces Hospitals (686.57) pharmacists. The total requirement of a clinical pharmacists in all sectors by the year 2030 will be (12,077.88) with range (8,501.28- 12,077.88) as explored in Table 4.

DISCUSSION

The general administration of pharmaceutical care started pharmacy strategic plan in the mid-2000s and updated plan released in early 2010.^[2] The plan consisted of development all pharmacy practice services and clinical pharmacy programs. The pharmacy administration established more than thirty clinical pharmacy programs including but not limited to the national drug information services, national medication safety program, national pharmacy anticoagulant program and pharmacy pain management services.^[3,32-35] All clinical pharmacy services required a workforce with high qualifications and appropriate numbers. The pharmacy administration started new guidelines for the workforce at hospitals and primary care centers.^[36,37] However, the calculation of demand of clinical pharmacist workforce not yet founded at Ministry of Health organization or non-MOH institutions or private hospital; the authors investigated the clinical pharmacy services workforce demand at MOH hospital and primary healthcare centers with twenty different regions, and at all sectors including non-MOH governmental organization and the private sector. The finding showed of hospitals at all healthcare sectors was lower than what reported in old others.^[6,16] It was due to both studies were done in the USA with the highly significant difference in the population of our countries and USA. Also, the clinical pharmacist requirement in USA was 40% that is more than MOH clinical pharmacist standard. The most jobs of the clinical pharmacist should be available from Ministry of Health and private hospital, and that is because of the high number of hospitals. The results of demand primary care clinical pharmacist are confusing to compare with earlier studies because no such studies are available, and maybe this is the first study to discuss the demand clinical

Table 4: All Clinical Pharmacist forecasting demand for hospitals for years 2016-2030 in all sectors in Saudi Arabia.																
Sector	Years															
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Average
Ministry of health	5,020.20	5,147.71	5,278.46	5,412.54	5,550.02	5,690.99	5,835.54	5,983.76	6,135.75	6,291.59	6,451.40	6,615.27	6,783.29	6,955.59	7,132.27	6,018.96
University Hospitals	215.04	220.50	226.10	231.85	237.73	243.77	249.97	256.31	262.82	269.50	276.35	283.36	290.56	297.94	305.51	257.82
Armed Forces Hospitals	572.64	587.18	602.10	617.39	633.07	649.15	665.65	682.55	699.89	717.67	735.89	754.58	773.75	793.40	813.56	686.57
Hospitals in the National Guard	281.36	268.00	274.81	281.78	288.94	296.28	303.81	311.53	319.44	327.55	335.87	344.40	353.15	362.12	371.32	313.36
Hospitals, Security Forces	103.68	106.31	109.01	111.78	114.62	117.53	120.52	123.58	126.72	129.94	133.24	136.62	140.09	143.65	147.30	124.31
King Faisal specialist hospital and research	139.68	143.23	146.87	150.59	154.42	158.35	162.37	166.49	170.72	175.06	179.50	184.06	188.74	193.53	198.44	167.47
Hospitals, Royal Commission for Jubail and Yanbu	53.40	54.76	56.15	57.58	59.03	60.53	62.07	63.65	65.27	66.92	68.62	70.37	72.16	73.99	75.86	64.02
Aramco Hospitals	43.92	45.04	46.18	47.35	48.56	49.79	51.05	52.35	53.68	55.04	56.44	57.88	59.35	60.85	62.40	52.66
Private hospitals	2,091.36	2,144.48	2,198.95	2,254.81	2,312.08	2,370.80	2,431.02	2,492.77	2,556.08	2,621.01	2,687.59	2,755.85	2,825.84	2,897.62	2,971.22	2,507.43
Total	8,501.28	8,717.20	8,938.64	9,165.67	9,398.48	9,637.20	9,881.99	10,132.98	10,390.37	10,654.28	10,924.90	11,202.39	11,486.93	11,778.70	12,077.88	10,192.59
Average	944.59	968.58	993.18	1,018.41	1,044.28	1,070.80	1,098.00	1,125.89	1,154.49	1,183.81	1,213.88	1,244.71	1,276.33	1,308.74	1,341.99	1,132.51

pharmacist works at primary care centers. The detail demand with detail specialties of clinical pharmacist need further investigations in the future.

CONCLUSION

The projection of clinical pharmacists at MOH hospitals, primary care centers, and non-governmental hospitals with private hospitals is vital for pharmacy strategic plan and Saudi vision 2030 implementation.

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CONFLICT OF INTEREST

None.

SOURCE OF SUPPORT

None.

ABBREVIATIONS USED

TPNS—Total parenteral nutrition services, KFSH and RC—King Faisal Specialist hospital and research center, KKHU—King Khalid University Hospital, GAPC—General Administration of Pharmaceutical care, MOH—Ministry of Health, ASHP—American society of health system pharmacist.

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