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**Lessons from the Past: How the Clinical  
Pharmacy Practice was established in the  
Jordanian Governmental Hospitals?**

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## **Lessons from the Past: How the Clinical Pharmacy Practice was established in the Jordanian Governmental Hospitals?**

**Laila J. Badran**

### **Abstract**

Since August 2000 the absence of Clinical Pharmacists in the Governmental Hospitals was observed by the author, consequently several claims were presented to train and recruit clinical pharmacists in the twenty nine hospitals. The main driving force behind this thorough investigational study which was commenced on August 2002 (by distributing simple questionnaire into all Governmental Hospitals and collecting the data and analyzing the results) was to provide the evidence and to convince the highest authority in the Ministry of Health (the Minister of Health) for the urgent need of introducing the clinical pharmacists in the Governmental hospitals and for the establishment of Job Description and Clinical Pharmacy Departments and divisions in all Governmental Hospitals. This will result in improving the Quality of Health Services in all Governmental Hospitals by preventing the patients from the risk of unavoidable drug/drug interactions and to reduce the excess unneeded prescribed medications (prevent irrational drug use).

**Keywords:** Clinical Pharmacists, Governmental, Hospitals, Jordan, Jordan.

**Acknowledgments:** I do express my thanks to all the Governmental Hospitals Officials: the Directors, the Pharmacists and Administrative Departments who responded to my phone inquiries about the most recent numbers of B.Pharmacists and Clinical Pharmacists who are available in each Hospital in the year 2016. Also I do my thanks to both the Deans of Schools of Pharmacy in Jordan University and in JUST University for responding to my phone inquiries concerning the Pharm.D. and MSc in Clinical Pharmacy who had graduated during the last ten years till the year 2016.

## **Introduction**

In order to improve the Quality of Health Services it is essential to introduce the Clinical Pharmacy Practice in Governmental Hospitals together with the newly established Job Description. In addition of introducing new Clinical Pharmacy Departments with their divisions in every Hospital.

Since August 2000 (Advisor to the Minister of Health for Drug Affairs) the absence of Clinical Pharmacists in the Governmental Hospitals was observed by the author, consequently several claims were presented to train and recruit clinical pharmacists in the twenty nine hospitals [1].

Therefore the main driving force behind this thorough investigational study which was commenced on August 2002 is to convince and provide strong evidence to the Minister of Health, for this major need of introducing the clinical pharmacists in the Governmental hospitals in order to prevent the patients from any risk of unavoidable drug/drug interactions and to reduce the excess un-needed prescribed medications (prevent irrational drug use).

In addition, knowing the important role of clinical pharmacists in Hospitals, the designed questionnaire in August 2002 was aiming to investigate about the existence of clinical pharmacists (in addition to the number of Pharmacists holding a B.Pharmacy degree) in the Ministry of Health (MOH) Hospitals.

## **Methodology**

The simple Questionnaire was designed and distributed into all twenty nine Governmental Hospitals to inquire about the main Criteria that should be in the Organizational Structure of any Hospital. It was directed to the Directors of each of all the Governmental Hospitals, with the following Questions:

1. The total Number of B.Pharmacists (B.Pharmacy Degree)
2. The total number of Clinical Pharmacists (MSc and Pharm D.)
3. The total number of Hospital Pharmacies.
4. The total number of Beds
5. The Total number of In-Patients/ Year
6. The average Total Number of Prescriptions (for all: in-patients, out-Patients and emergency Clinics) per day.
7. The Total Number of Physicians
8. The Total number of Hospital Departments (Medical, Clinical, Surgical, Emergency and other internal medicine...etc).
9. Has each pharmacist working in the Hospital a personal computer?

This Questionnaire was distributed to the twenty nine Governmental Hospitals, by Fax, and the responses were also collected by fax. If any information was not clear, or if the responses were not complete, or if there was any delay in the responses then the author would communicate with the Directors by phone. It took a long time to collect the data but it was a 100% response from

all MOH Hospitals. The Answers were pooled and the collective data was studied and analyzed.

### **Findings / Results**

The results of the collective data from this study are shown in Table 1.

- I-The Striking results of the questionnaire revealed that only two clinical Pharmacists were available in two Hospitals out of the twenty nine hospitals in the MOH. While the other two clinical pharmacists were in different MOH managerial offices and not in the Hospitals as is they are supposed to be. (These were the first four pharmacists who studied for their MSc degree in Clinical Pharmacy in JUST University after being granted the MOH Scholarship from September 2000- to June 2002), as shown in Table 1.
- II-There was a drastic severe Shortage in the number of Pharmacists of B.Pharmacy Degree in all the hospitals, as shown in Table 1.
- III- There were no short and long term training plans.
- IV-There was no Job description for the Clinical Pharmacists (in this study when Clinical Pharmacists is mentioned: it is meant The MSc in Clinical Pharmacy and the Pharm. D. degrees holders).
- V-There were no allocated Clinical Pharmacy Departments or Divisions in any of these Hospitals.
- VI-There were no personal computers with specialized soft-ware neither for the Regular Pharmacists nor for the Clinical Pharmacists.

### **Discussion**

#### *I & II- Comparison between the Numbers of B.Pharmacists and Clinical Pharmacists*

The Numbers of B.Pharmacists in each hospital were not enough to cover the basic principal Job requirements needed for dispensing responsibilities in each Pharmacy for each Hospital, in addition to the absence of Clinical Pharmacists (Table 1). Therefore there is an Urgent need to recruit Clinical pharmacists (of Pharm D. and MSc in Clinical Pharmacy) and Pharmacists (B.Pharmacy Degree) in all Hospitals according to Table 2, Figure 1, Table 3 and Figure 2.

#### *The Method of Calculating the Needed Numbers of Pharmacists and Clinical Pharmacists*

**A-** For the required number of Pharmacists of B.Pharmacy Degree, the following equation is created: (Number of Prescriptions per Day X number of minutes per prescription Per Pharmacist) divided by the number of minutes of working time per day for each Pharmacist= The required number of Pharmacists

of B.Pharmacy degree.

The official working hours per day per Pharmacists is eight 8 hours but we deduce two hours to be allocated for sorting out new medicines, ordering new medicines and some filing, and for two short breaks: thus the remaining actual Six 6 hours will be dedicated for the dispensing job.

Therefore 6 hours X 60 minutes=360 minutes and considering the dispensing average time is 10 minutes (as the result of the author's investigation), then the calculation was completed for each Hospital. Based on this calculation the required number of Pharmacists (B. Pharmacy degree.) is shown in Table 2 and Figure 1.

**B-** For the required number of Clinical Pharmacists (MS.c. in Clinical Pharmacy and Pharm. D.). The calculations will follow the following **Three Phases**:

**Phase I - 2005:** The initiation of the Clinical Pharmacy Department and the basic staff was calculated based on the number of Medical, Surgical, Internal medicine, Clinical and ER Departments, so as to establish the nucleus for Clinical Pharmacy Departments and Divisions in each hospital as shown in Table 3 and Figure 2 [6].

**Phase II - 2010:** The required number of clinical Pharmacists would be calculated with reference to the number of beds per clinical pharmacist, depending on the Medical Department specialty, knowing that some hospitals were planning to expand their capacities in terms of medical Departments, number of physicians, number of Beds and number of In-Patients in terms of length of stay at a given time [11].

**Phase III - 2015:** It would be calculated based on the advanced work load on the Clinical Pharmacists and the increase in the numbers of in-patients, in addition to the Development of each Department and Division of the Clinical Pharmacy and Pharmacy according to workload.

#### *Recruitment of Additional Number of Pharmacists and Clinical Pharmacists in Each Hospital*

As the result of this study the list of the requested number of Pharmacists and Clinical Pharmacist needed to be employed in each Hospital was presented officially to the Minister of Health for actions to be taken as illustrated in both Table 2 and Figure 1, Table 3, Figure 2.

Consequently the Minister of Health had requested officially since the 2<sup>nd</sup> June 2005 from the Civil Service Bureau to recruit each year the Pharmacists who were going to be graduated with MSc degree in Clinical Pharmacy and with Pharm D degrees [5].

#### *III- Short Term and Long Term Training for All Pharmacists*

Since 1<sup>st</sup> August 2000 and 10<sup>th</sup> August 2000 the Advisor to the Minister of Health (the author) was claiming in several reports the demand for awarding

scholarships for pharmacists working in the MOH Hospitals to study for MSc degree in Clinical Pharmacy [1]. Consequently, the First Four 4 Pharmacists were granted Scholarships to study for MSc degree in Clinical Pharmacy for two years from September 2000 to June 2002. Then it was followed by several scholarships.

Parallel to that achievement the Advisor to the MOH presented a developing plan on 7<sup>th</sup> October 2002 for long term scholarships [6] during the following years 2003, 2004, 2005 for three groups each group consisted of thirty five pharmacists (working in the MOH Hospitals) in order to have their M.Sc. degree in Clinical Pharmacy.

- A- Short Term Training (for one Month) of All the Pharmacists of B.Pharmacy who are working in the Hospital Pharmacies: on Intensive Specialised Computer courses and on Good Pharmacy Practice GPP and on the method of the work of Drug Therapeutic Committees (divided into groups during one year).
- B- Short Term Training for Pharmacists who had achieved their MSc degree in Clinical Pharmacy and Pharm.D, (Devided into groups during one year) for one month on intensive Computer Courses on Specialised Soft wares
- C- Long Term Training: Long Term Training Plan for ninety nine Pharmacists who were working in the MOH Hospitals, by Awarding Scholarships to Jordan University of Science and Technology JUST to study for MSc Degree in Clinical Pharmacy:

<i>no</i>	<i>Scholarship Duration</i>	<i>University for MSc</i>	<i>Pharmacists Number</i>
1	Sept. 2005-June 2007	2 Years in JUST	Three 3 Pharmacists
2	Sept. 2007- June 2009	2 Years in JUST	Five 5 Pharmacists
3	Sept. 2010- June 2012	2 Years in Jordanian Universities	Two 2 Pharmacists

But due to economical constraints and the restricted budget of the Ministry of Health, the Scholarships to the Jordanian Universities to study for MSc. in Clinical Pharmacy, were limited only to two Pharmacists every two years starting from 2010 onwards.

Furthermore the first Short term intensive training course on Clinical Pharmacy: Basic Principles and Guidelines, was achieved on April/May 2005 for seven intensive days for thirty Pharmacists working in all MOH Hospitals, to encourage them to study for their MSc degree in clinical Pharmacy, in cooperation with the author in MOH and JUST university by selecting the specialized lecturer in Clinical Pharmacy.

*IV- Establishment of the First Job-Description for Clinical Pharmacists (the MSc Clinical Pharmacy and Pharm. D. Degrees holders)*

The author established and presented to the Minister of Health on 18th March 2002, the First Paper stating the main major principles of the Job Description for

the Clinical Pharmacists who were going to work at the different twenty nine MOH Hospitals [2].

Consequently on 2nd December 2002 the Minister of Health formed a special committee in order to discuss in several meetings, the main points of the proposed Job Description which was presented by the author. Furthermore the Minister expanded the committee [3] by appointing new additional members on 28<sup>th</sup> October 2004 (the Head of the committee was the Chief of Internal Medicine Department / Albasheer Hospital, the Author was the Deputy: the other members were representing the Departments of clinical Pharmacy from both Jordan University and JUST, a Clinical pharmacist from the Royal Medical Services, a Clinical pharmacist from Albasheer Hospital. After five intensive consecutive meetings the final Job Description was issued, approved and signed by the Minister of Health on the 2<sup>nd</sup> of June 2005 and was disseminated to all MOH Hospitals [4].

Parallel with the establishment of the Job Description, the the Pharmacovigilance center was Established in November 2001: After the assembly of a specialized committee from members of the MOH (the Author)Advisor to the MOH for Drug Affairs and the Director of Pharmacovigilance Department in the Drug Directorate-MOH”, University of Science and Technology Faculty of Medicine, the Jordan University Hospital and the Expert from WHO: the Jordanian Pharmacovigilance Center JPC was established and resulted in the production of the Jordanian Pharmacovigilance Yellow Reporting Form to be used by all Hospitals and Health centers and Department of Pharmacovigilance / Drug Directorate.

#### The Clinical Pharmacy National Day for All Jordanian Hospitals

The author was preparing for a very important unique National One Day event, Titled “The Vital Role of Clinical Pharmacists in Hospitals and their Job Description” for the year 2006 and was planning to invite the Specialized Physicians, Clinical Pharmacists and Hospital Pharmacists from all Governmental, Military and Private Hospitals (about 500 Five Hundred Participants) and was preparing the information booklet to be printed in order to be distributed to participants, but all of this was suddenly and unexpectedly Stopped.

#### *V- Reform of the Organizational Structure in order to Incorporate the Clinical Pharmacy Departments in the MOH Hospitals*

As the result of the designed study and after analyzing the collective data about the existing Organizational Structures of each of the twenty nine Hospitals, it was found that the Clinical Pharmacy Departments and Divisions did not exist and had no presence nor function nor employees.

Therefore the author designed a new Original Hospital Organizational Structure incorporating the Clinical Pharmacy Departments and Divisions, to be an Ideal Model for all the twenty nine MOH hospitals. (taking into consideration



the different sizes and working capacity of each individual separate hospital). In this Model the Clinical Pharmacy Department (and its Divisions) is Linked directly to the Pharmaceutical Affairs Director-Assistant (usually in most of the Hospitals is a B. Pharmacist). As illustrated in Figure 3 [9].

It had been observed that, as a result of such a prevailing problem in having great shortage in the number of B.Pharmacists: when the Clinical pharmacists were employed in some hospitals (instead of practicing their specialization in different medical clinical departments Parallel with the physicians in each medical-ward and to follow up in-patients) they were dragged away from the clinical medical departments in the hospital and were forced to work in the regular Hospital Pharmacies.

It has been observed that because having the Clinical Pharmacists under the supervision of the Pharmacy Department Director in each Hospital, this problem did not help clinical pharmacists play their role in the right position in the hospital because of these two major reasons:

1. The lack in the number of pharmacists (B.Pharmacy degree holders) in the Pharmacies of all Hospitals.
2. The cultural Mentality of the Director Assistant of Pharmaceutical Affairs (which happened to be B.Pharmacy Degree holders in most of the Hospitals), Or Director of Pharmacy Department (depending on the size of the Hospital) who were underestimating the vital role of the clinical pharmacists in the different Medical Clinical Departments in most Hospitals.

Therefore this resulted into a real Struggle between the two groups of B.Pharmacy degree holders and the “Pharm.D. and M.Sc. in Clinical Pharmacy” Degrees holders. Therefore in order to overcome this very destructive non-productive problem, it was suggested by the Author for a new Reorganizational Structure in which the Department of Clinical Pharmacy should be linked directly to the Director Assistant of Medical Technical Affairs of the Hospital (who is a physician), because they recognize, respect and appreciate the Clinical Pharmacists Role in the Hospital , which reflected in the reduction of drug consumption and protecting the in-patients from severe drug/drug interactions and recognizing the adverse drug reactions, thus they play a major role in the Patient’s Safety.

Practically it had been discovered that there was a huge struggle between the B. Pharmacists and the Clinical Pharmacists regarding work responsibilities. Therefore in order to reduce the struggle between the two groups of Pharmacy specialties (i.e the B.Pharmacists and the Clinical pharmacists) the Author proposed the second Modified Alternative Model of the Hospital Organizational Structure in which the clinical Pharmacy department and its Divisions is linked to the Director-Assistant Technical Medical Affairs of the Hospital as shown in Figure 4 [10].

VI- Request for Personal Computers with New Specialized Softwares to be used in the computer systems so as to facilitate getting the important medical

information about drugs and Patient's Medical History, and to document all the Hospital Pharmaceutical Data (Main Pharmacies: 120 -Departmental hospital Pharmacies 180 -Emergency Pharmacies 30 – and Hospital drug Stores 60). Then the Clinical Pharmacy Departments and Divisions need 60 Computers with other soft-wares that document the patients' medical history [7]. Starting from 2014 new computer software had been implemented in most of Governmental hospitals called "Hakeem".

## **Conclusions**

The Pharmacy Sector in the MOH needs major support and upgrading in all Pharmacy sub-specialties in particular the Clinical Pharmacy Sector in all MOH Hospitals.

As a result of this first study the author had performed a more detailed study covering all pharmacists and presented a very well structured plan for the development of the Pharmacy Sector in the MOH. With particular emphasis on Clinical Pharmacy: long term training (for MSc degrees), the additional numbers to be employed, and the urgent need to introduce the Clinical Pharmacy Departments (with the relevant Divisions) in the Organizational Structure of all MOH Hospitals, which was presented by the Author In order to upgrade the level of performance in the Governmental Hospitals [7, 8].

### *Bridging the Gap*

About fourteen years have already elapsed, how is the situation now since the study was performed in 2002 until this year 2016?

Are there real improvements in the number of Pharmacists and Clinical Pharmacists in the twenty nine MOH Hospitals?

Enourmous efforts were done by the author to get the latest information about the present available numbers of Pharmacists and Clinical Pharmacists in the twenty nine Hospitals (by Personal communication: individual investigation with each Hospital officials), This resulted into the following data as in Table 4, Figure 5, Table 5 and Figure 6. It is obvious that the problem still exists. Due to Budget constraints the MOH did not grant Scholarships for the required number of Pharmacists to study for MSc. in Clinical Pharmacy.

According to the latest information in 2016 it has been stated that JUST University has already graduated within the last ten years not less than seven hundreds 700 Post Grads in MSc Clinical Pharmacy and also Pharm D. Pharmacists.

In addition Jordan University has already graduated not less than six hundreds 600 MSc. In the Clinical pharmacy and Pharm D. Pharmacists (Personal Communications with both JUST and Jordan Universities Deans). These numbers could easily fill the gap for these specializations and could compensate for the shortages in numbers of Clinical Pharmacists as well as B.Pharmacists in all the

twenty nine Governmental Hospitals. Therefore there is no need for additional Scholarships from MOH.

Furthermore as it is observed from Table 6 that there is still huge shortage in the numbers of Clinical Pharmacists in thirteen of the Hospitals have more than 50% shortages in the required numbers., and twelve of them have 100% shortage, while eighteen Hospitals have more than a 50% shortage in the numbers of B.Pharmacists.

This means the problem is still existing and that the struggle between the Clinical Pharmacists and B.Pharmacists will continue until the Gap is eliminated, by recreating the required enough numbers of B.Pharmacists and the Clinical Pharmacists in all Governmental Hospitals, as stated in Table 4, Figure 5, Table 5 and Figure 6.

An additional Five years study (comprehensive plan) 2005-2010 was Prepared by the author and presented to the Minister of Health for developing the Pharmacy Sector in the MOH. This study was the result of analysis of the answers on a specially designed questionnaire that had been distributed to all MOH Hospitals, Directorates and Health centers [7].

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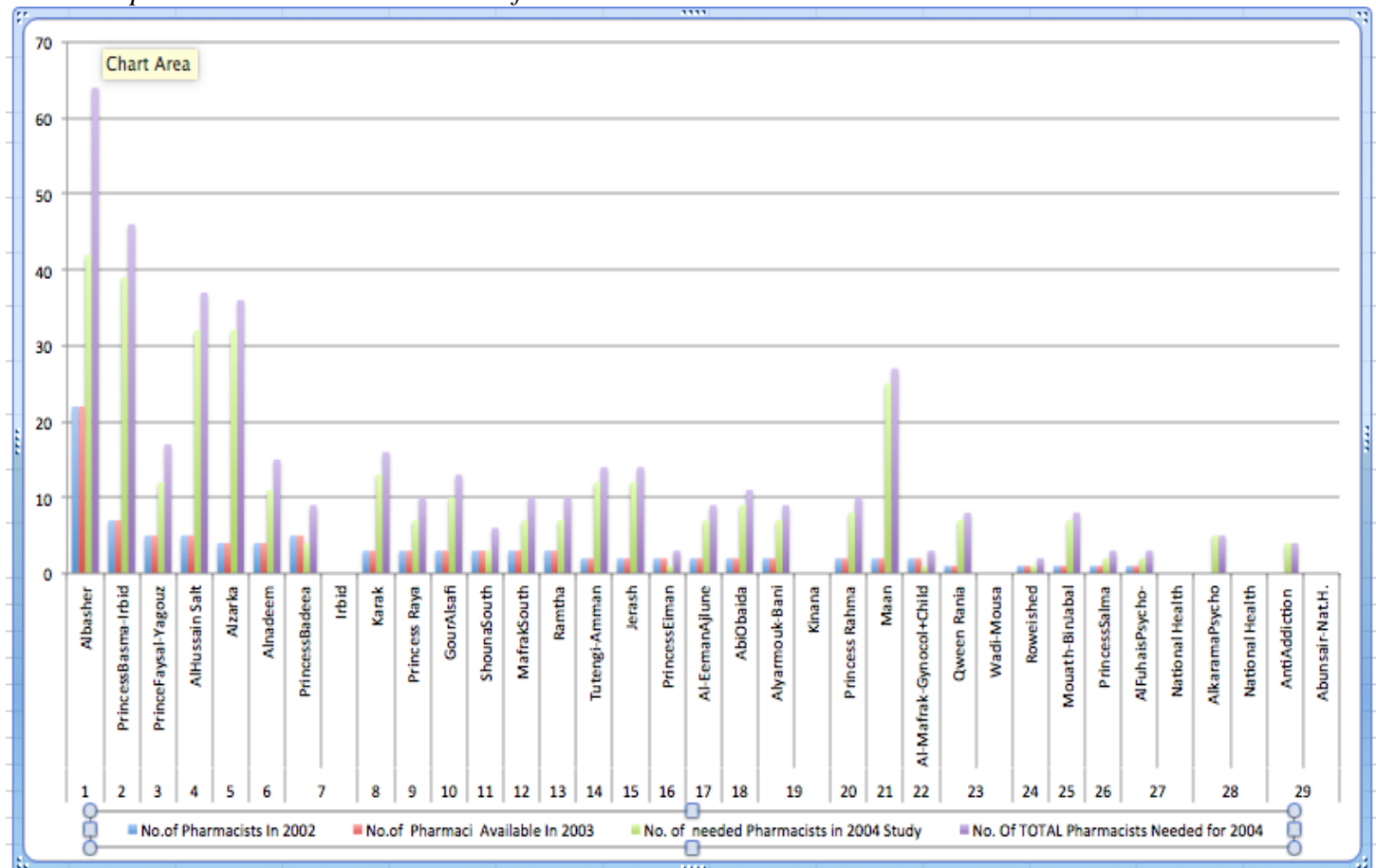
**Table 1. Collective Data of the Twenty Nine Governmental Hospitals in JORDAN -2002-2003 Study**

No	Names of Hospital	No .of Pharmacies	No. of Pharmacists	No. of ER Medi-Surg Departnts	No.of Clinical Pharmacts	No. of Physicians	No. of Beds	No.of in-Patients / Year	No. of Total Prescrip / Day
1	<b>Albasher</b>	4	22	17	1	507	811	59171	2305
2	<b>PrincessBasma /Irbid</b>	4	7	8	1	173	204	15561	1670
3	<b>PrinceFaysal Yagouz</b>	4	5	7	0	54	130	15819	600
4	<b>AlHussain Salt</b>	4	5	8	0	141	152	15180	1314
5	<b>Alzarka</b>	4	4	10	0	194	289	26135	1300
6	<b>Alnadeem</b>	4	4	7	0	51	91	9905	525
7	<b>PrincessBadeea Irbid</b>	4	5	1	0	37	95	12075	338
8	<b>Karak</b>	4	3	7	0	65	126	11264	580
9	<b>Princess Raya</b>	4	3	6	0	30	60	6720	342
10	<b>GourAlsafi</b>	4	3	8	0	25	62	4389	460
11	<b>ShounaSouth</b>	4	3	5	0	27	39	3432	200
12	<b>MafrakSouth</b>	4	3	4	0	32	70	4285	365
13	<b>Ramtha</b>	4	3	9	0	37	56	7395	370
14	<b>Tutengi-Amman</b>	4	2	13	0	72	129	11351	490
15	<b>Jerash</b>	2	2	10	0	50	135	14058	490
16	<b>PrincessEiman</b>	2	2	6	0	25	30	622	100
17	<b>Al-EemanAjlune</b>	2	2	6	0	39	105	8426	340
18	<b>AbiObaida</b>	2	2	5	0	31	46	4848	400
19	<b>Alyarmouk-Bani Kinana</b>	4	2	10	0		50	2962	340
20	<b>Princess Rahma</b>	4	2	4	0	39	109	7826	350
21	<b>Maan</b>	4	2	6	0	46	122	7411	1000
22	<b>Al-Mafrak-Gynocol+Child</b>	2	2	3	0	18	102	9786	95
23	<b>Qween Rania Wadi-Mousa</b>	2	1	6	0	42	69	2848	289
24	<b>Roweished</b>	1	1	4	0	11	17	540	74
25	<b>Mouath-BinJabal</b>	3	1	5	0	27	32	2903	284
26	<b>PrincessSalma</b>	2	1	6	0		32	684	120
27	<b>National Psycho HealthAlFuhais</b>	1	1	1	0	22	245	1253	100
28	<b>AlkaramaPsycho National Rehab.</b>	1	0	1	0	1	150	150	196
29	<b>AntiAddiction Abun.Nat-Rehab</b>	1	0	1	0	2	20	253	140

**Table 2.** *Number of Pharmacists (of B. Pharmacy Degree) Available till 2003 - in all the Twenty Nine MOH Hospitals and the needed Numbers for 2004*

No	Names of Hospital	No.of Pharmacists In 2002	No.of Pharmacists Available In 2003	No. of needed Pharmacists in 2004 Study	No. of TOTAL Pharmacists Needed for 2004
1	Albasher	22	22	42	64
2	PrincessBasma /Irbid	7	7	39	46
3	PrinceFaysal Yagouz	5	5	12	17
4	AlHussain Salt	5	5	32	37
5	Alzarka	4	4	32	36
6	Alnadeem	4	4	11	15
7	PrincessBadeea Irbid	5	5	4	9
8	Karak	3	3	13	16
9	Princess Raya	3	3	7	10
10	GourAlsafi	3	3	10	13
11	ShounaSouth	3	3	3	6
12	MafrakSouth	3	3	7	10
13	Ramtha	3	3	7	10
14	Tutengi-Amman	2	2	12	14
15	Jerash	2	2	12	14
16	PrincessEiman	2	2	1	3
17	Al-EemanAjlune	2	2	7	9
18	AbiObaida	2	2	9	11
19	Alyarmouk-Bani Kinana	2	2	7	9
20	Princess Rahma	2	2	8	10
21	Maan	2	2	25	27
22	Al-Mafrak-Gynocol+Child	2	2	1	3
23	Qween Rania Wadi-Mousa	1	1	7	8
24	Roweished	1	1	1	2
25	Mouath-BinJabal	1	1	7	8
26	PrincessSalma	1	1	2	3
27	AlFuhaisPsycho-National Health	1	1	2	3
28	AlkaramaPsycho National Health	0	0	5	5
29	AntiAddiction Abunsair-Nat.H.	0	0	4	4

**Figure 1.** Number of Pharmacists (of B. Pharmacy Degree) Available till 2003 - in All the Twenty Nine MOH Hospitals and the needed Numbers for 2004

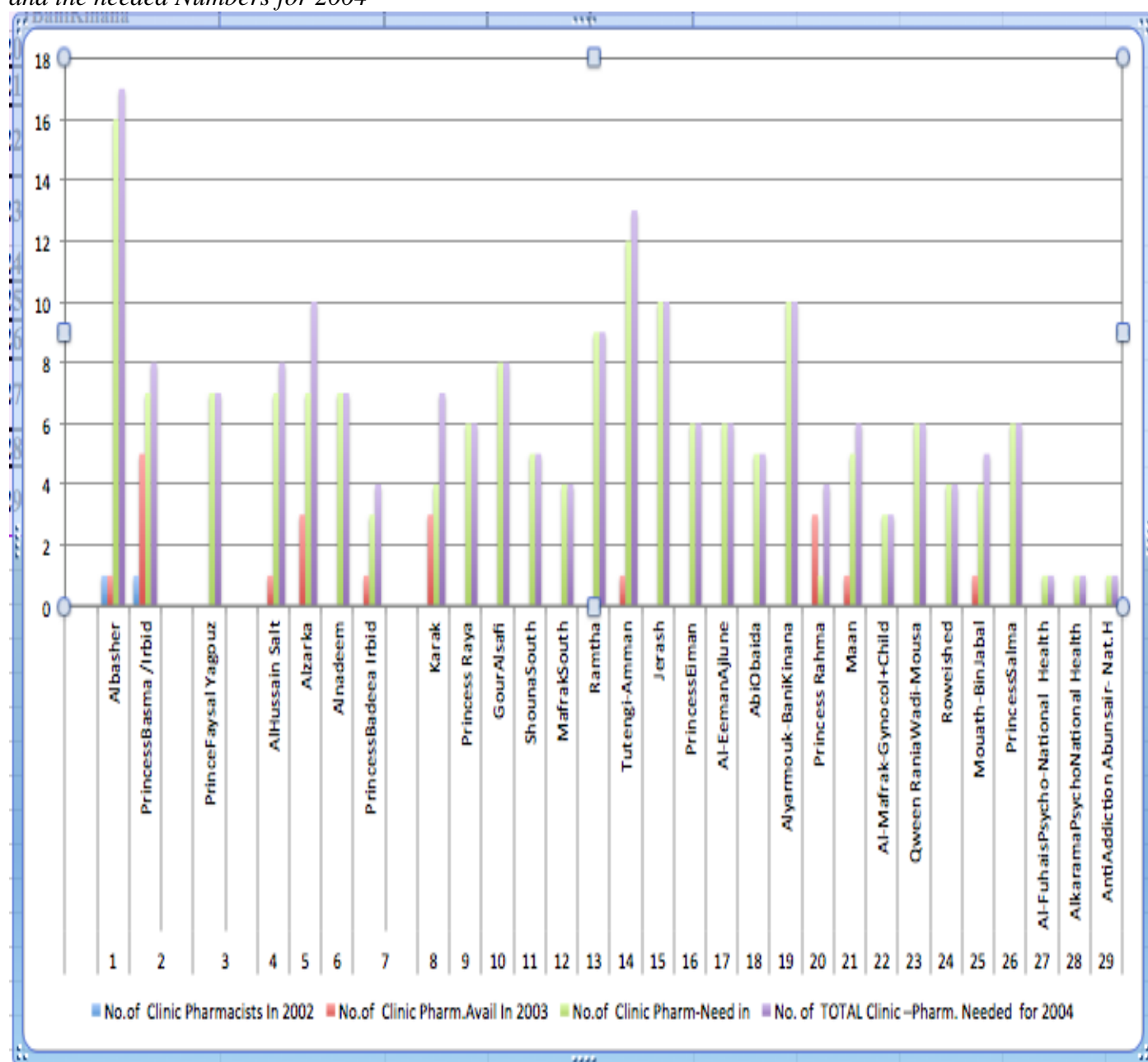


**Table 3.** *Number of Clinical Pharmacists Available till 2003 - in All the Twenty Nine MOH Hospitals and the needed Numbers for 2004*

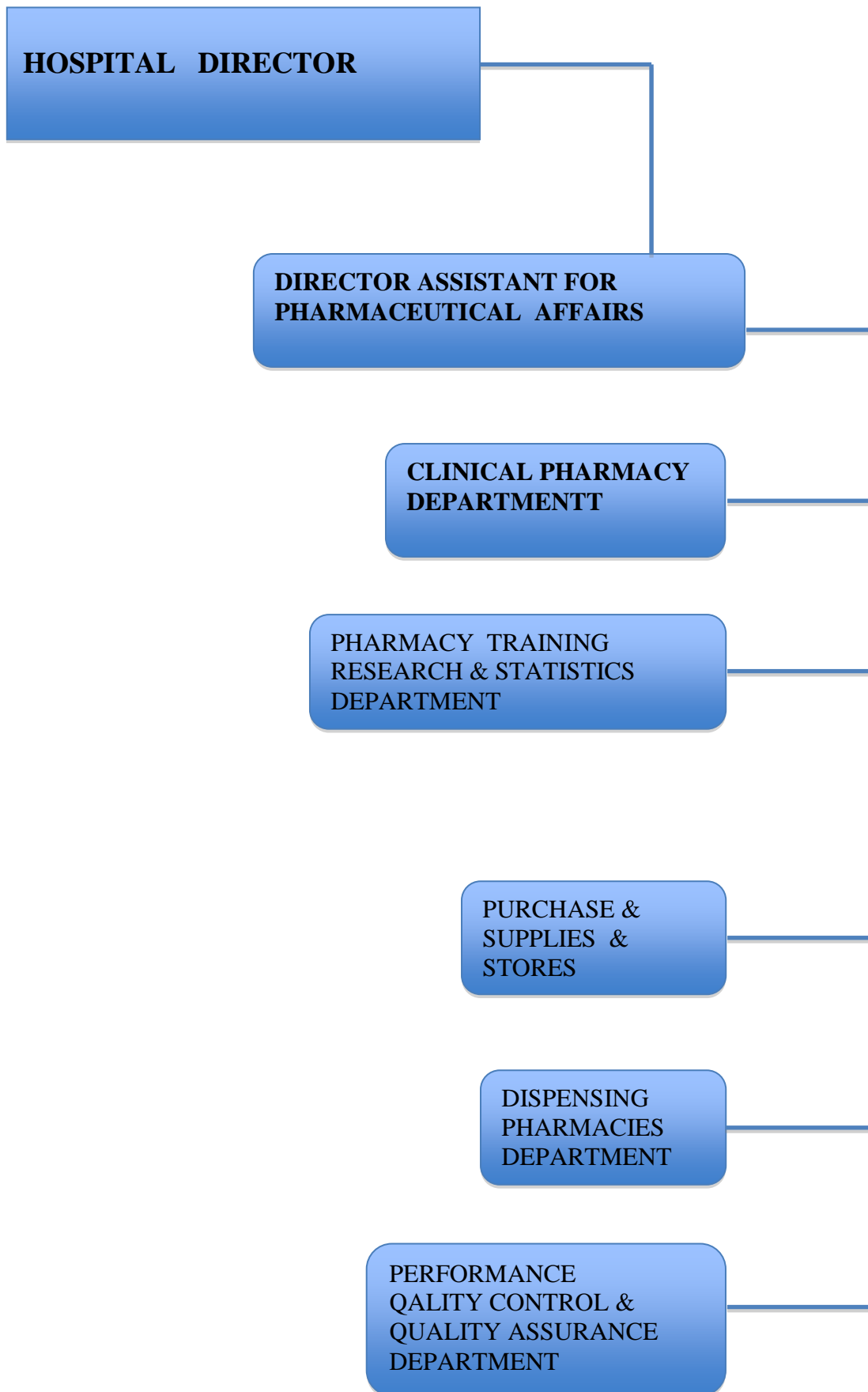
No	Names of Hospital	No.of Clinic Pharmacists In 2002	No.of Clinic Pharm.Avail In 2003	No.of Clinic Pharm-Needed In 2004 Study	No. of TOTAL Clinic –Pharm. Needed for 2004
1	Albasher	1	1	16	17
2	PrincessBasma /Irbid	1	5	7	8
3	PrinceFaysal Yagouz	0	0	7	7
4	AlHussain Salt	0	1	7	8
5	Alzarka	0	3	7	10
6	Alnadeem	0	0	7	7
7	PrincessBadeea Irbid	0	1	3	4
8	Karak	0	3	4	7
9	Princess Raya	0	0	6	6
10	GourAlsafi	0	0	8	8
11	ShounaSouth	0	0	5	5
12	MafrakSouth	0	0	4	4
13	Ramtha	0	0	9	9
14	Tutengi-Amman	0	1	12	13
15	Jerash	0	0	10	10
16	PrincessEiman	0	0	6	6
17	Al-EemanAjlune	0	0	6	6
18	AbiObaida	0	0	5	5
19	Alyarmouk-Bani Kinana	0	0	10	10
20	Princess Rahma	0	3	1	4
21	Maan	0	1	5	6
22	Al-Mafrak-Gynocol+Child	0	0	3	3
23	Qween Rania Wadi-Mousa	0	0	6	6
24	Roweished	0	0	4	4
25	Mouath-BinJabal	0	1	4	5
26	PrincessSalma	0	0	6	6
27	Al-FuhaisPsycho-National Health	0	0	1	1
28	AlkaramaPsycho National Health	0	0	1	1
29	AntiAddiction Abunsair- Nat.H	0	0	1	1



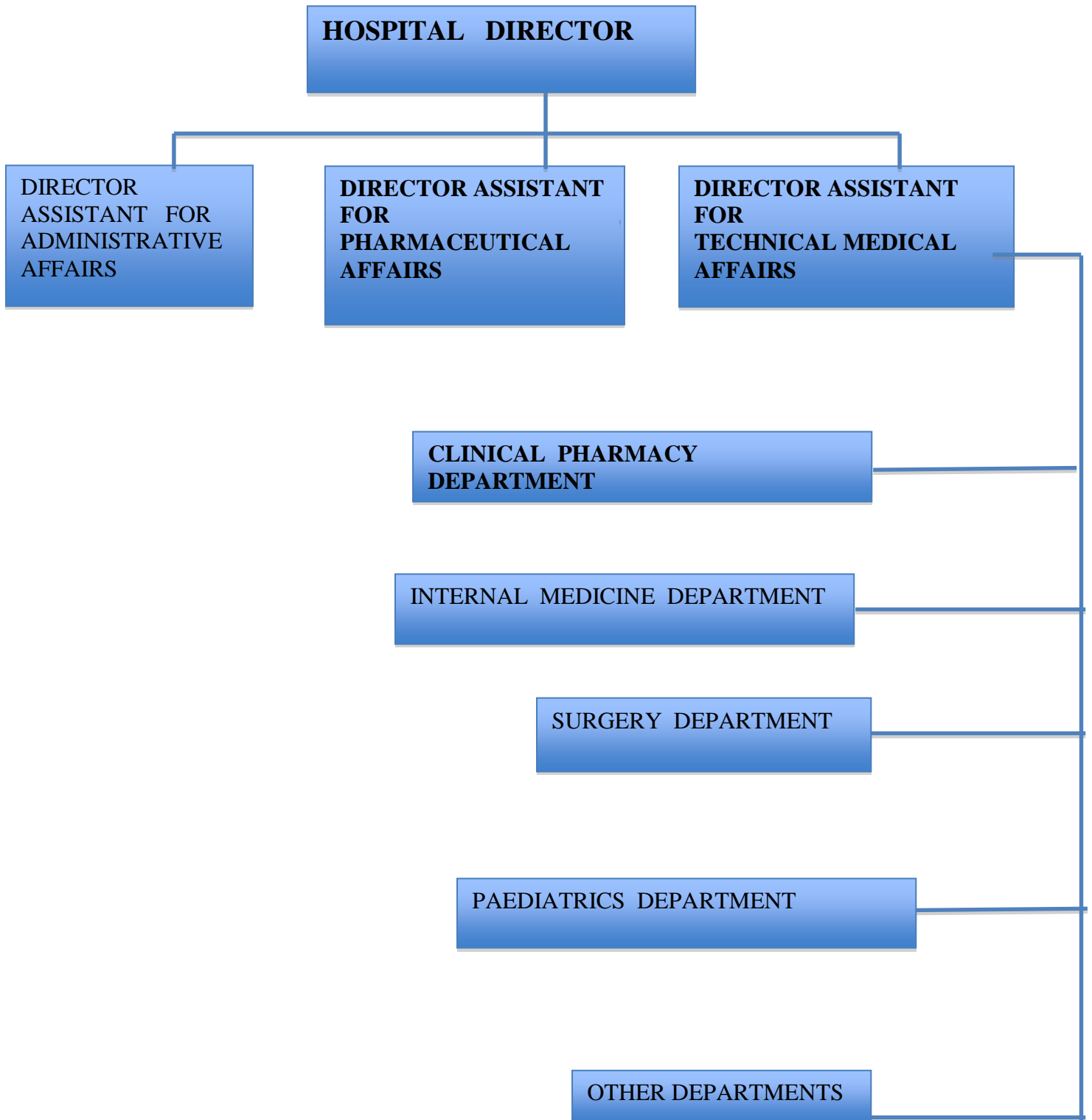
**Figure 2.** Number of Clinical Pharmacists Available till 2003 - in All the Twenty Nine MOH Hospitals and the needed Numbers for 2004



**Figure 3.** *The Original Suggested Organizational Structure Model in February 2006*



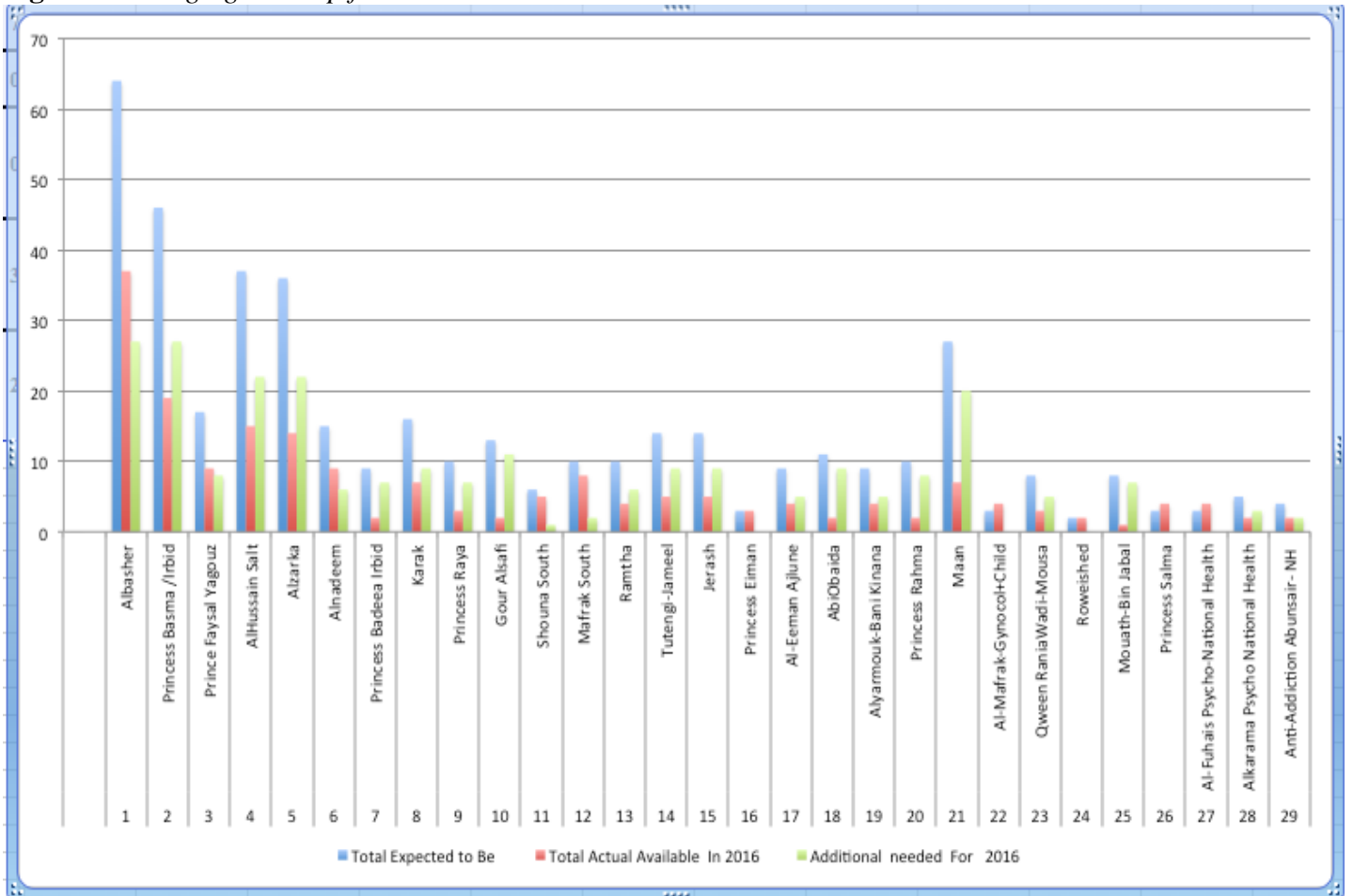
**Figure 4.** *The Alternative Modified Organizational Structure Model in May 2006*



**Table 4. Bridging the Gap for B. Pharmacists between 2004 and 2016**

<b>No</b>	<b>Names of Hospital</b>	<b>Total Expected to Be In 2004</b>	<b>Total Actual Available In 2016</b>	<b>Additional needed For 2016</b>	<b>% of Shortages in Numbers 2016</b>
1	Albasher	64	37	27	42%
2	Princess Basma /Irbid	46	19	27	59%
3	Prince Faysal Yagouz	17	9	8	47%
4	AlHussain Salt	37	15	22	59%
5	Alzarka	36	14	22	61%
6	Alnadeem	15	9	6	40%
7	Princess Badeea Irbid	9	2	7	78%
8	Karak	16	7	9	56%
9	Princess Raya	10	3	7	70%
10	Gour Alsafi	13	2	11	85%
11	Shouna South	6	5	1	17%
12	Mafrak South	10	8	2	20%
13	Ramtha	10	4	6	60%
14	Tutengi-Jameel	14	5	9	64%
15	Jerash	14	5	9	64%
16	Princess Eiman	3	3	0	0%
17	Al-Eeman Ajlune	9	4	5	56%
18	AbiObaida	11	2	9	82%
19	Alyarmouk-Bani Kinana	9	4	5	56%
20	Princess Rahma	10	2	8	80%
21	Maan	27	7	20	74%
22	Al-Mafrak-Gynocol+Child	3	4	0	0%
23	Qween Rania Wadi-Mousa	8	3	5	63%
24	Roweished	2	2	0	0%
25	Mouath-Bin Jabal	8	1	7	88%
26	Princess Salma	3	4	0	0%
27	Al-Fuhais Psycho-National Health	3	4	0	0%
28	Alkarama Psycho National Health	5	2	3	60%
29	Anti-Addiction Abunsair- NH	4	2	2	50%

**Figure 5. Bridging the Gap for B. Pharmacists between 2004 and 2016**

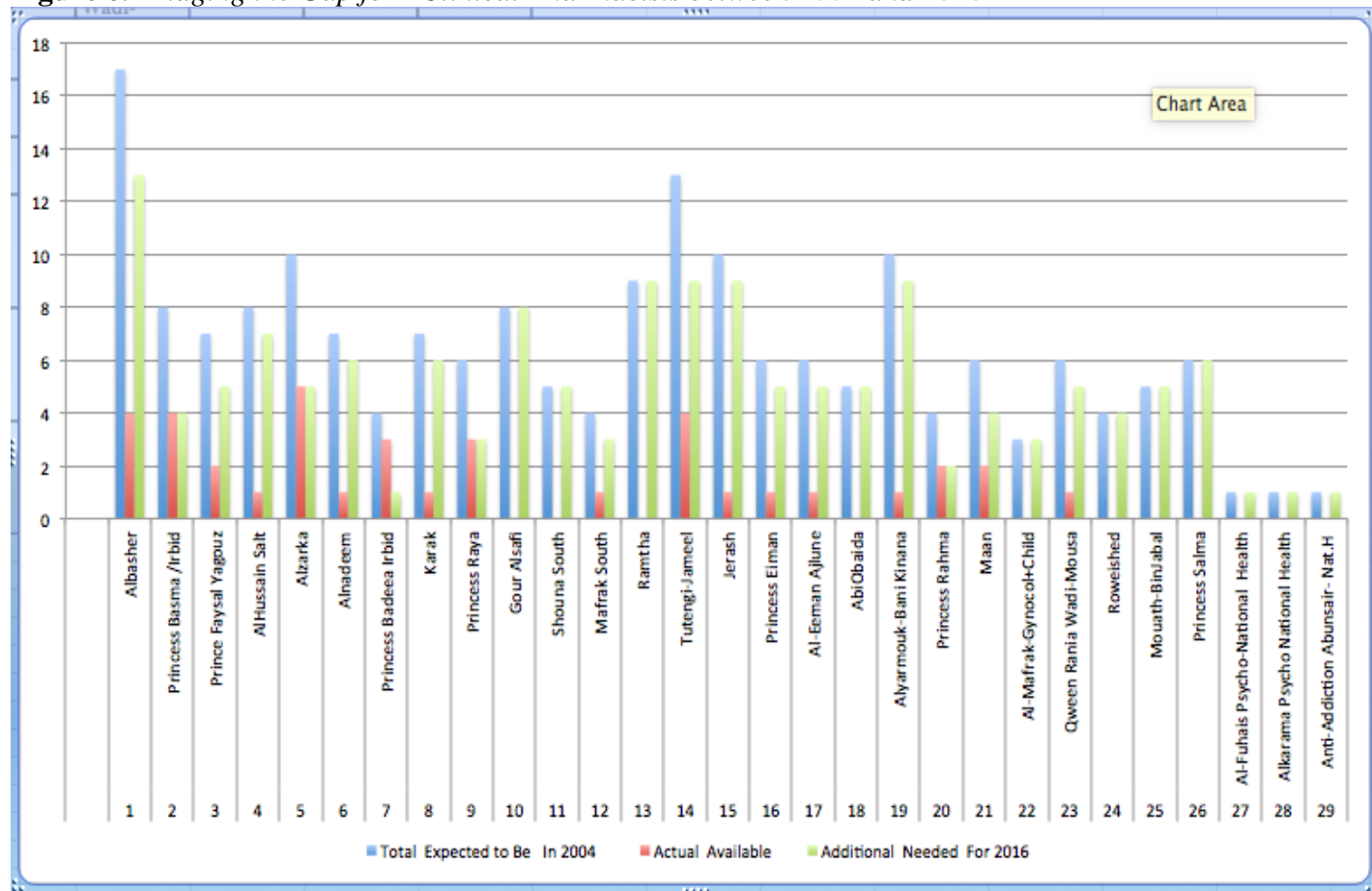


**Table 5. Bridging the Gap for \*Clinical Pharmacists between 2004 and 2016**

<b>No</b>	<b>Names of Hospital</b>	<b>Total Expected to Be In 2004</b>	<b>Actual Available In 2016</b>	<b>Additional Needed For 2016</b>	<b>% of Shortages in Numbers 2016</b>
1	Albasher	17	4	13	76%
2	Princess Basma /Irbid	8	4	4	50%
3	Prince Faysal Yagouz	7	2	5	71%
4	AlHussain Salt	8	1	7	88%
5	Alzarka	10	5	5	50%
6	Alnadeem	7	1	6	86%
7	Princess Badeea Irbid	4	3	1	25%
8	Karak	7	1	6	86%
9	Princess Raya	6	0	6	100%
10	Gour Alsafi	8	0	8	100%
11	Shouna South	5	0	5	100%
12	Mafrak South	4	1	3	75%
13	Ramtha	9	0	9	100%
14	Tutengi-Jameel	13	4	9	69%
15	Jerash	10	1	9	90%
16	Princess Eiman	6	1	5	83%
17	Al-Eeman Ajlune	6	1	5	83%
18	AbiObaida	5	0	5	100%
19	Alyarmouk-Bani Kinana	10	1	9	90%
20	Princess Rahma	4	2	2	50%
21	Maan	6	2	4	67%
22	Al-Mafrak- Gynocol+Child	3	0	3	100%
23	Qween Rania Wadi-Mousa	6	1	5	83%
24	Roweished	4	0	4	100%
25	Mouath-BinJabal	5	0	5	100%
26	Princess Salma	6	0	6	100%
27	Al-Fuhais Psycho- National Health	1	0	1	100%
28	Alkarama Psycho National Health	1	0	1	100%
29	Anti-Addiction Abunsair- Nat.H	1	0	1	100%

\* (In this study it means: MSc. In Clinical Pharmacy and the Pharm D degrees holders).

**Figure 6. Bridging the Gap for \*Clinical Pharmacists between 2004 and 2016**



**Table 6. Comparison of Percentage Shortages between Clinical Pharmacists & B. Pharmacists 2016**

No	Names of Hospital	% of Shortages in Numbers of *Clinical Pharmacists in 2016	% of Shortages in Numbers of B. Pharmacists in 2016
1	Albasher	76%	42%
2	Princess Basma /Irbid	50%	59%
3	Prince Faysal Yagouz	71%	47%
4	AlHussain Salt	88%	59%
5	Alzarka	50%	61%
6	Alnadeem	86%	40%
7	Princess Badeea Irbid	25%	78%
8	Karak	86%	56%
9	Princess Raya	100%	70%
10	Gour Alsafi	100%	85%
11	Shouna South	100%	17%
12	Mafrak South	75%	20%
13	Ramtha	100%	60%
14	Tutengi-Jameel	69%	64%
15	Jerash	90%	64%
16	Princess Eiman	83%	0%
17	Al-Eeman Ajlune	83%	56%
18	AbiObaida	100%	82%
19	Alyarmouk-Bani Kinana	90%	56%
20	Princess Rahma	50%	80%
21	Maan	67%	74%
22	Al-Mafrak-Gynocol+Child	100%	0%
23	Qween Rania Wadi-Mousa	83%	63%
24	Roweished	100%	0%
25	Mouath-BinJabal	100%	88%
26	Princess Salma	100%	0%
27	Al-Fuhais Psycho-National Health	100%	0%
28	Alkarama Psycho National Health	100%	60%
29	Anti-Addiction Abunsair- Nat.H	100%	50%

\*Clinical Pharmacists: in this study means MSc Clinical Pharmacy & the Pharm .D. Degrees