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To the Graduate Council:

I am submitting herewith a thesis written by Grant Eugene Spencer entitled "An Analysis of the Pharmacy Department at Saint Mary's Memorial Hospital." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Industrial Engineering.

J. R. Buchan, Major Professor

We have read this thesis and recommend its acceptance:

Howard P. Emerson

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

July 18, 1967

To the Graduate Council:

I am submitting herewith a thesis written by Grant Eugene Spencer entitled "An Analysis of the Pharmacy Department at Saint Mary's Memorial Hospital." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Industrial Engineering.

Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Vice President for
Graduate Studies and Research

AN ANALYSIS OF THE PHARMACY DEPARTMENT AT SAINT MARY'S MEMORIAL HOSPITAL

A Thesis

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Grant Eugene Spencer

December 1967

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768722

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CHAPTER I

INTRODUCTION

Today, industrial engineering is rapidly becoming an integral part of many hospital organizations throughout the United States. The techniques of this profession can be applied to all systems within the hospital, one of the most important of which is the pharmacy department. It is within this department that the problem for study in this thesis was chosen.

I. THE PROBLEM

Statement of the problem. This thesis is concerned with a study of the pharmacy department of Saint Mary's Memorial Hospital, located in Knoxville, Tennessee.

Purpose of the study. The main purpose of the study was to discover how the operation of the pharmacy department under question could be improved, with an emphasis on the proper utilization of the non-pharmacist personnel. There were two constraints to the problem, those of service and cost. Service had priority over cost; or, in other words, proper service should be provided, even if additional cost is incurred in providing it.

Importance of the study. The present hospital system is so dynamic that continuing study is needed to insure that proper

pharmaceutical service is provided to hospital patients. The importance of this study can be viewed from a standpoint of the general problems facing hospital pharmacies today.

Perhaps the biggest problem facing hospital pharmacies is the increasing shortage of available pharmacists. Today, hospitals are finding it very difficult to compete with community pharmacies, even when they are able to offer attractive salaries to the pharmacists. This shortage of pharmacists is a limiting factor on the range of services which hospital pharmacies are able to provide (1, p. 142).

Another aspect of importance is the changing role of the pharmacist. The pharmacist's role is no longer one of simply dispensing medications. There are now many other duties, those of instruction and administration, which require his time and talents (8, p. 597).

The enactment of the medicare bill will also have an effect upon the role of the hospital pharmacist. In order to qualify under medicare, hospital pharmacies must comply with certain standards which will cause, in most cases, an increase in the range of services which must be provided.

Limitations of the study. This thesis consists of a study made in order to discover areas in which the pharmacy department at Saint Mary's Hospital could be improved. A detailed analysis of every aspect of the pharmacy was beyond the scope of this thesis. However, recommendations are made concerning areas in which further study might be of benefit to the department.

In order to gain a knowledge of existing pharmacy trends, a study was made of hospital pharmacies other than the one at Saint Mary's. However, all conclusions drawn are based on the needs and operation of the pharmacy at Saint Mary's. The conclusions would need to be generalized in order to be applied to any other hospital pharmacy department.

II. DEFINITIONS OF TERMS USED

In order to add clarity to the thesis, it is felt that certain of the terms used should be defined. The terms defined are ones which might be unfamiliar to the average reader or which might have a particular meaning in relation to the thesis.

Ampoule. An ampoule is a small, sealed vial which contains a solution intended for hypodermic injection.

Inpatient dispensing. Inpatient dispensing is the dispensing of medications to persons who are patients within the hospital.

Non-pharmacist. A non-pharmacist is a non-professional member of the pharmacy staff. The non-pharmacist category includes: nurse, technician, helper, secretary, clerk, pharmacy student.

Outpatient dispensing. Outpatient dispensing is the dispensing of medications to persons who are not patients within the hospital.

Pharmacist. A pharmacist is a person who is a graduate of a college of pharmacy "accredited by the American Council on Pharmaceutical Education, and currently licensed in one of the fifty states, the

District of Columbia, or territories of the United States" (5, p. 2).

Short-term hospital. A short-term hospital is one in which the average stay of the patient is thirty days or less (3, p. 68).

"Stat" orders. "Stat" orders are orders for medications which have priority over all other orders.

Unit dose. A unit dose of medication is one dose of medication which is dispensed in an individual package.

III. METHOD OF STUDY

Traditional industrial engineering techniques, such as work sampling, Methods-Time Measurement (MTM), and time study, were used in this study. In addition, data was gained through literature research, study of the pharmacy records at Saint Mary's Hospital, and general observation by the author. Also, personal interviews were made in order to provide an insight into employee feelings and relationships.

IV. ORGANIZATION OF THE REMAINDER OF THE THESIS

The remainder of the thesis is organized as follows:

Chapter II: Preliminary study.

Chapter III: The drug distribution system.

Chapter IV: Description of functions within the pharmacy department.

Chapter V: Comparison of the pharmacy with other hospital pharmacies.

Chapter VI: Analysis of study.

Chapter VII: Development of a management and control system.

Chapter VIII: Recommendations.

Chapter IX: Summary.

V. BACKGROUND OF THE PROBLEM

In the past, all activities, including the routine tasks, within the hospital pharmacy were performed by pharmacists. Sporadic attempts were made to train non-professional personnel to do certain pharmaceutical tasks, but most of these attempts met with little success. For the most part, pharmacists were skeptical and unenthusiastic, and the non-pharmacists lacked appreciation of the legal limitations placed upon their activities (1, p. 142).

Today, however, the use of non-professional personnel in hospital pharmacies is becoming very widespread throughout the United States. The many services required of the pharmacy can no longer be performed by pharmacists alone. Due to the increasing shortage of qualified pharmacists and to the fact that staffs composed completely of pharmacists would place an added financial burden on the hospitals, non-professional personnel must be employed to perform the routine pharmaceutical tasks.

Of major importance to the problem of the utilization of non-pharmacists are the legal limitations placed upon their activities. It is required by law that pharmacists perform all duties which require pharmaceutical knowledge and judgment. These duties include the

dispensing of narcotics and of prescription medications which require handling prior to dispensing and the compounding of solutions. However, there are many medications which come prepackaged from the supplier and which do not require handling before being dispensed. These medications can be dispensed by non-pharmacists under a pharmacist's supervision. Requisitions for floor stock, such as aspirin and laxatives, can also be filled by non-pharmacists. Non-professional personnel can be used to perform such duties as: controlling of inventory, pricing of medications, receiving and checking shipments, typing, bookkeeping, and housekeeping (1, p. 142).

Because many of the activities performed within the hospital pharmacy are ones which are vital to human care, a need for continued study of the pharmacy system is being recognized throughout the United States. It is an accepted fact that pharmaceutical services can no longer be performed effectively in a haphazard manner. The hospital pharmacy must be headed by a competent pharmacist who is assisted by staff pharmacists and non-pharmacists as needed, and all activities within the pharmacy must be well supervised and coordinated. Steps have been taken, through studies, surveys, legal activities, and professional opinions, to insure that all personnel within the pharmacy are well trained and that all activities are performed correctly and efficiently. However, there is a great need for additional study if the pharmacy system is to efficiently furnish the services required of it. It is hoped that the results of the study presented in this thesis will be of some value, not only to the pharmacy department at Saint Mary's Hospital, but also to the hospital pharmacy system throughout the United States.

CHAPTER II

PRELIMINARY STUDY

The study of the pharmacy department at Saint Mary's Hospital was made for two reasons:

1. To analyze the use of non-pharmacists within the department.

2. To discover ways in which the pharmaceutical services could be provided more efficiently, with a reduction in time or cost or both.

In order to make recommendations concerning the above, a general study of the entire department had to be made. Therefore, this thesis is concerned with all activities within the pharmacy, and any recommendations that the author feels would be of benefit to the pharmacy are made.

I. PRELIMINARY DESCRIPTION OF THE PHARMACY DEPARTMENT

Saint Mary's Memorial Hospital is a 450 bed, short-term hospital which is serviced by a central pharmacy department. The pharmacy department is presently staffed by a head pharmacist, two staff pharmacists, and two non-pharmacists (who are designated as helpers throughout the remainder of the thesis). In addition to the regular staff, the pharmacy receives part-time, non-professional aid in the form of volunteer hospital workers.

The pharmacy department operates from 7:00 A. M. until 11:00 P. M. Monday through Friday and from 7:00 A. M. until 7:00 P. M. on Saturday and Sunday. There is always at least one pharmacist in the pharmacy

during these hours, with the exception of the lunch hours and breaks. Anytime that there is not at least one member of the regular staff in the pharmacy, it is closed and locked.

It is the responsibility of the pharmacy department to see that all medications are dispensed, as needed, properly and efficiently to the nursing stations. The pharmacy dispenses medications only to the patients and personnel of the hospital. No outpatient prescriptions are filled by the pharmacy.

II. WORKING SCHEDULE OF THE STAFF MEMBERS

In order to present a clear picture of the pharmacy department, a listing of the working schedules of the members of the pharmacy is necessary. This step eliminates explanation which would otherwise be needed in the remainder of the thesis.

The working schedule is shown in Table I. The pharmacists are paid a straight salary and are not paid for any overtime. The helpers are paid by the hour and receive overtime pay for work performed in excess of forty-four hours per week. The pharmacists are allowed to take their lunch breaks on company time, but one-half hour per day (three hours per week) is subtracted from each helper's time of forty-eight hours worked per week.

During the remainder of the thesis the staff pharmacists and the helpers are designated as follows: first pharmacist, second pharmacist, first helper, and second helper. This is done in order to aid in the

TABLE I

WORKING SCHEDULE OF THE PHARMACY STAFF

Day	Head Pharmacist	First Pharmacist	Second Pharmacist	First Helper	Second Helper
Monday	7:00-4:00	7:00-3:00	3:00-11:00	7:00-3:00	3:00-11:00
Tuesday	7:00-4:00		3:00-11:00	7:00-3:00	3:00-11:00
Wednesday	7:00-4:00	7:00-3:00	3:00-11:00	7:00-3:00	3:00-11:00
Thursday	7:00-4:00	3:00-11:00		7:00-3:00	3:00-11:00
Friday	7:00-4:00	7:00-3:00	3:00-11:00	7:00-3:00	3:00-11:00
Saturday		7:00-7:00		7:00-3:00	
Sunday			7:00-7:00		7:00-3:00
Total Hours	45	44	44	48	48

differentiation between each member and between the jobs which each performs. Except during the weekend, the first helper works on the first shift, and the second helper works on the second shift.

CHAPTER III

THE DRUG DISTRIBUTION SYSTEM

The distribution of drugs to the patients of the hospital is the basis for the pharmacy's existence, and it is around this activity that all other activities in the department revolve. There are three types of medications which are dispensed. These are: narcotics, stock medications, and requisitioned medications. The medications are transported to the nursing stations by three different methods, which are:

1. A nurse comes to the pharmacy, receives the drugs, and carries them to the nursing station.

2. The medications are put on a four-wheeled cart and delivered to the nursing stations by a messenger.

3. The medications are sent to the stations through a pneumatic tube system.

I. DISTRIBUTION OF NARCOTICS

By law, narcotic drugs must be kept in a locked compartment at all times and may be dispensed from the pharmacy only by a licensed pharmacist. In addition, narcotic records must be kept "in such a manner that the final disposition of any particular item may be readily traced" (5, p. 3). Therefore, utmost care must be taken in storing and dispensing narcotics.

Two containers of each narcotic are kept in stock (in a locked

compartment) at each station. When a narcotic dosage is given to a patient, the nurse who administers the dose records the proper information on a Records of Narcotics Administered form, which is shown in Figure 1. One form is filled out for each container of narcotics. When a container becomes empty, it is taken, along with the corresponding completed form, to the pharmacy. The container is then refilled by the head pharmacist and is dispensed to a registered nurse, who signs the accompanying form. This form is the same as the one mentioned previously.

While in the pharmacy department, the narcotics are stored in a vault equipped with a combination lock, the combination of which is known only by the head pharmacist. Proper records are kept by the head pharmacist of the inventorying of each narcotic. The form on which this information is recorded is shown in Figure 2.

II. DISTRIBUTION OF STOCK MEDICATIONS

Stock medications are medications which are kept in stock at the nursing stations. Although narcotics could be classified as stock items, they are not treated as such because of the care which must be observed in dispensing them. The medications which are classified as stock in this thesis are of two types: emergency items and routine items. The emergency drugs are those which are kept at the nursing stations because the need for them occurs at random times or on short notice, and they must be close at hand when needed. Examples of such drugs are: hemostatics (drugs which retard the flow of blood), drugs to prevent shock, and drugs to deaden excessive pain. The routine items are

ST. MARY'S MEMORIAL HOSPITAL
KNOXVILLE, TENNESSEE
RECORD OF NARCOTICS ADMINISTERED

Figure 1. Record of narcotics administered.

ST. MARY'S MEMORIAL HOSPITAL
KNOXVILLE, TENNESSEE
RECORD OF NARCOTICS ADMINISTERED

Floor_____ Drug_____ Date_____
Dosage_____

No.	Date	Time	Name of Patient	Physician	Dose Administered	Given By: (Dr. or Nurse)
25						
24						
23						
22						
21						
20						
19						
18						
17						
16						
15						
14						
13						
12						
11						
10						
9						
8						
7						
6						
5						
4						
3						
2						
1						

Issued by:_____
Pharmacist

Received by:_____
Nurse

Figure 2. Narcotics record.

ST. MARY'S HOSPITAL PHARMACY
KNOXVILLE, TENNESSEE

NARCOTIC RECORD

ITEM_____

DATE	BOTTLE No.	ITEM	AM'T ISSUED	AM'T REMAINING	SIGNATURE

medications which are administered at the discretion of the nurse and which are not charged to the patient. These medications include such items as aspirin and laxatives.

Both the emergency and the routine medications are dispensed from the pharmacy in the same manner. When the stock of an item at the nursing station reaches a certain point, an order, along with the medication container, is sent to the pharmacy to have the item refilled. The order is filled by a helper and then checked by a pharmacist, after which it is transported to the nursing station on the cart. A stock requisition form is shown in Figure 3.

III. DISTRIBUTION OF REQUISITIONED MEDICATIONS

About 75 per cent of the medications dispensed by the pharmacy are those for which a prescription requisition is required. This type of medication is that which is ordered from the pharmacy by a nurse after a doctor prescribes it for a patient. The distribution system for these medications is a step by step procedure. It is as follows:

1. The nurse transcribes the doctor's order for a medication onto a three part requisition form, which has been imprinted with the patient's identification. The requisition is shown in Figure 4. Only one item is written on each requsition because this aids the pharmacy in the recording of the number of prescriptions filled. It is also an aid if a prescription must be traced after it has been filled. One copy of the requisition is kept at the nursing station as an aid in making sure that the medication order is received and administered to the

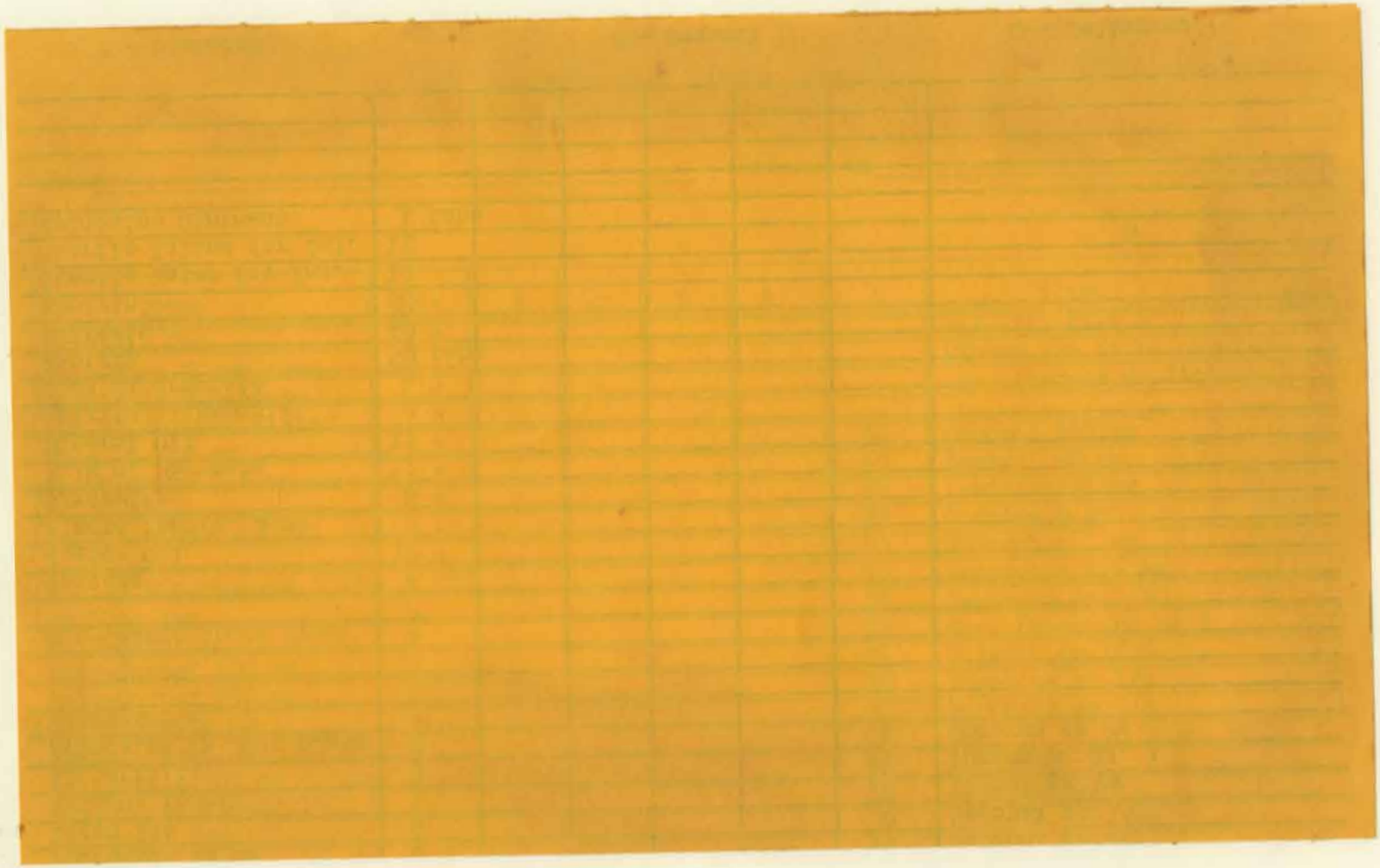


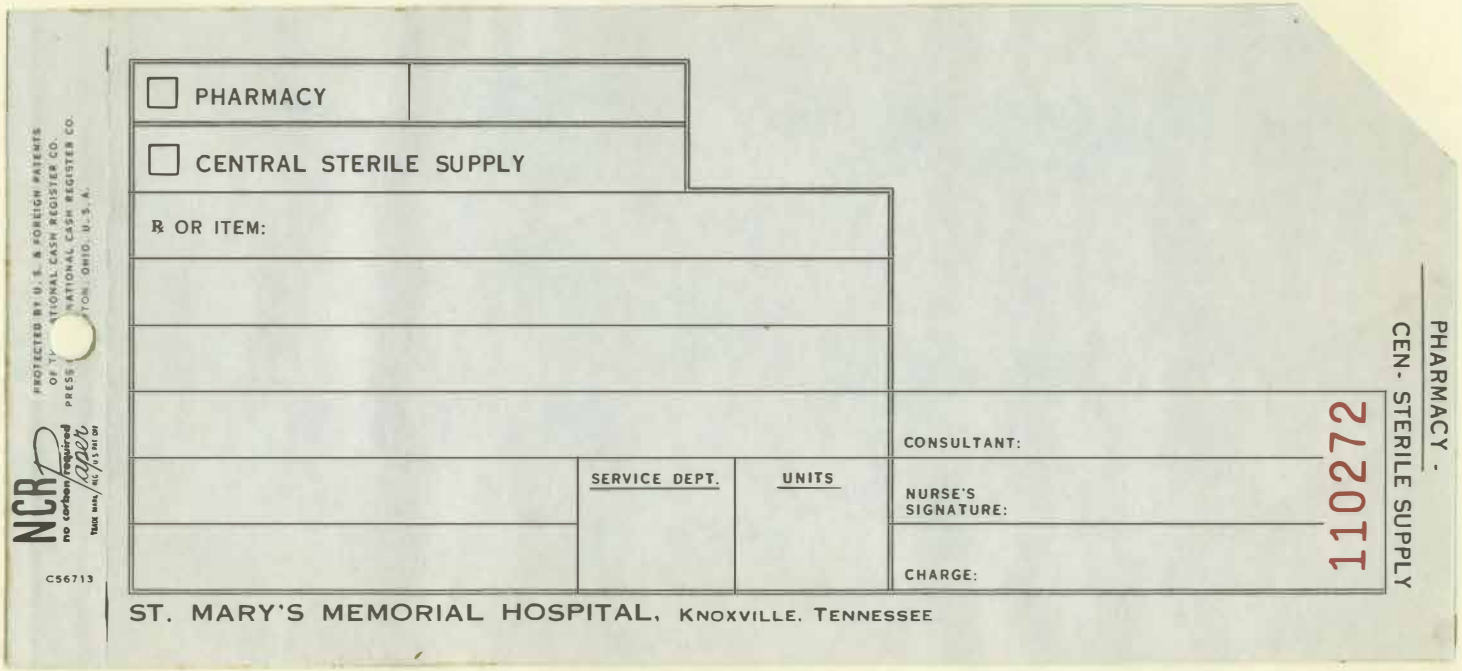
Figure 3. Stock drugs order form.

REQUISITIONS - STOCK DRUGS
I.M.C. Page 2

Date _____ Ordered by _____

ITEMS	S	R R	D	D	R	S	ITEMS
Pyralgin 2cc	2						Narcotic List
Quinidine 2 gms tabs	20						(These are to be counted
(Quinidine Gluconate							and charged on dismissal)
(.08 GM/cc 10cc Vials	1						
Ritalin 100 mg	1					50	Demerol 100 mg
(Scopolamine 0.5 mg						50	Demerol 50 mg
(1/120 gr	4					50	Leritine 25 mg
(Scopolamine 0.43 mg						20	Codeine ½ gr
(1/150 gr	4					50	Numorphan 1 mg
(Sodium Bicarbonate 3.175						50	Numorphan 1.5 mg
(gm 50cc Amp	4					25	Pantopon gr 1/3
Solv-B-Forte	2					50	Sod. Phenobarb gr 2
Solv-Cortef 100 mg	2					25	Dilauid gr 1/32
Solv-Cortef 250 mg	6					30	Morphine gr 1/4
(Streptomycin GM 1						30	Morphine gr 1/6
(Powder, Amp	2					50	Empirin No. 3 Comp.
Terramycin 500 mg I.V.	2					50	Percodan
Tetanus Antitoxin 1500 U	2					50	Nembutal gr 1½
Thiomerin 2cc	2					0	Nembutal gr 3/4
Thorazine 25 mg	6					50	Seconal gr 1½
Tigan 2cc	6					0	Seconal gr 3/4
Tetanus Toxoid	2					50	Tuinal gr 1½
Vistaril 1cc	3					25	Phenaphen No. 3
Xylocaine 1% 20cc plain	2					1	Cocaine gr 2¼
Glucose 50%	2						
Non-Charge Stock Drugs							
Cascara	6 oz.						
Castor Oil	12 "						
Fleets Phosfo. Soda	5 "						
Glycerine	6 "						
Milk of Magnesia	12 "						
Mineral Oil	12 "						
Spirits of Ammonia	2 "						
Soda Bicarbonate	4 "						
Aspirin	50 tabs						
Bufferin	50 "						
Empirin	50 "						
Sterile Water for Inj.	12						
Sterile Saline for Inj.	12						
Xylocaine Ointment	1 tube						

S - Standard R - Request D - Delivered



PHARMACY - CEN- STERILE SUPPLY

110272

☐ PHARMACY

☐ CENTRAL STERILE SUPPLY

℞ OR ITEM:

CONSULTANT:

SERVICE DEPT. | UNITS

NURSE'S SIGNATURE:

CHARGE:

ST. MARY'S MEMORIAL HOSPITAL, KNOXVILLE, TENNESSEE

NCR no carbon required paper

C56713

Figure 4. Medications requisition.

patient properly. When the patient is dismissed from the hospital, this copy is sent to the accounting department. The remaining copies, along with an imprinted medication label, is sent to the pharmacy through the pneumatic tube system.

2. Upon arrival of the requisition at the pharmacy, it is removed from the tube and put in one of two places. If it is a requsition for a medication which must be filled by a pharmacist, it is placed on the pharmacists' desk. If the filling of the prescription does not require professional knowledge, it is laid on the helpers' work table.

3. The requisition is then filled, signed, and priced by the proper person, and the label is attached to the medication container. Also, if the requisition is one which must be filled by a pharmacist, directions for administering the medication to the patient are typed on the medication label. Each requisition and label are also stamped with a number so that an easy count of the number of prescriptions filled can be made. The numbering system is also another aid in the tracing of filled prescriptions, since each item has its own number. This step and the one previous bring out another reason for the listing of only one item on each requisition. If more than one item were ordered on a requisition, some requisitions would have to be filled in part by a pharmacist and in part by a helper. After the requisition is numbered, the two parts are separated. The original is kept on file in the pharmacy department and the remaining copy is sent to accounting, where it is matched with the copy sent from the nursing station.

4. The next step consists of one of two procedures. If the

medication is a solid and of the proper size to fit into a tube, it is placed in a bin which designates the nursing station to which it is to be dispensed. Once a bin has accumulated a sufficient supply to fill a tube, the medications are packed into a tube and sent to the station through the tube system. However, there are several types of medications which cannot be sent through the tube system, and these medications are sent to the nursing stations by a second method. This method consists of placing the medication on the delivery cart, which in turn is transported to the nursing stations four times daily. Medications which are delivered by cart are those which are in liquid form (there is danger of breakage of the liquid containers if they are sent through the tube carrier) or which are too large to be accomodated by a tube.

5. A nurse at the station receives the drug and prepares it for issuance to the patient.

There is one exception to the method of dispensing requisitioned drugs. If a medication is needed quickly, a nurse takes the requisition to the pharmacy. She waits at the pharmacy while the prescription is being filled and then returns to the station with the medication.

At the present, there is no priority system for dispensing requisitioned medications. The pharmacists simply fill the requisitions in the order in which they receive them. If a medication is needed quickly, either the requisition is labeled "stat" or a nurse goes to the pharmacy to receive the medication.

IV. SUMMARY

Figure 5 is a diagrammed representation of the medication distribution system. Figure 6 shows the response system to a doctor's order. Although several possible responses are shown, only the response to a medication order is detailed.

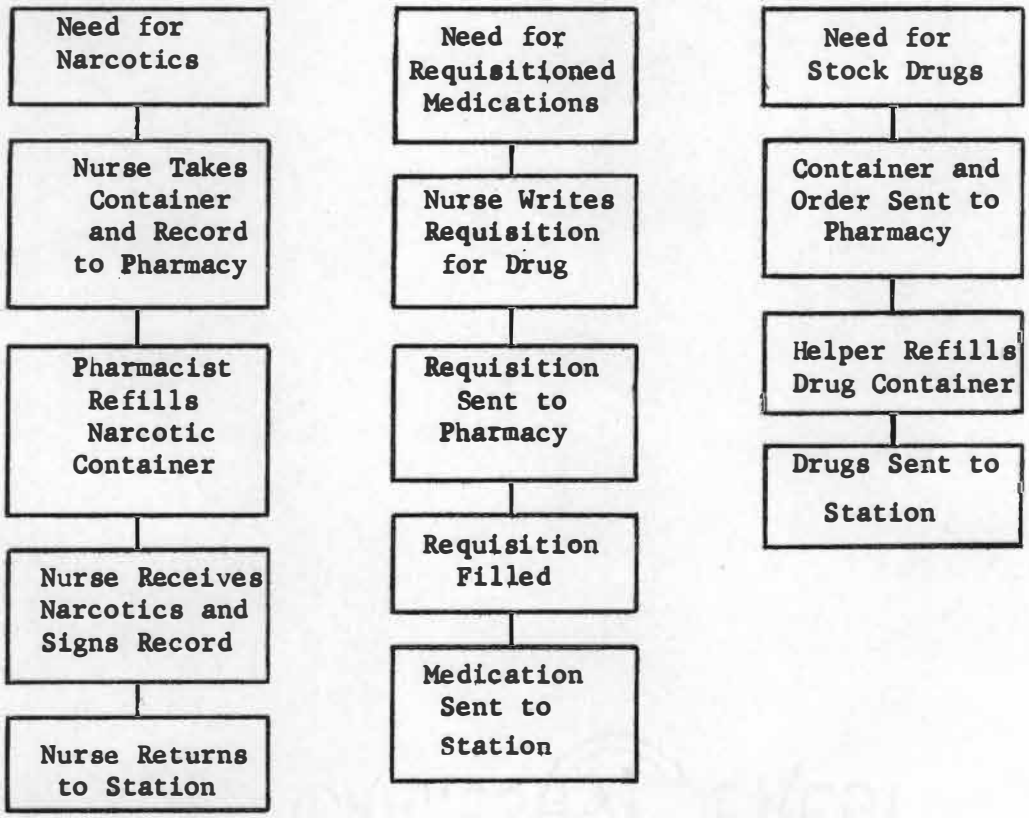


Figure 5. Medication distribution system.

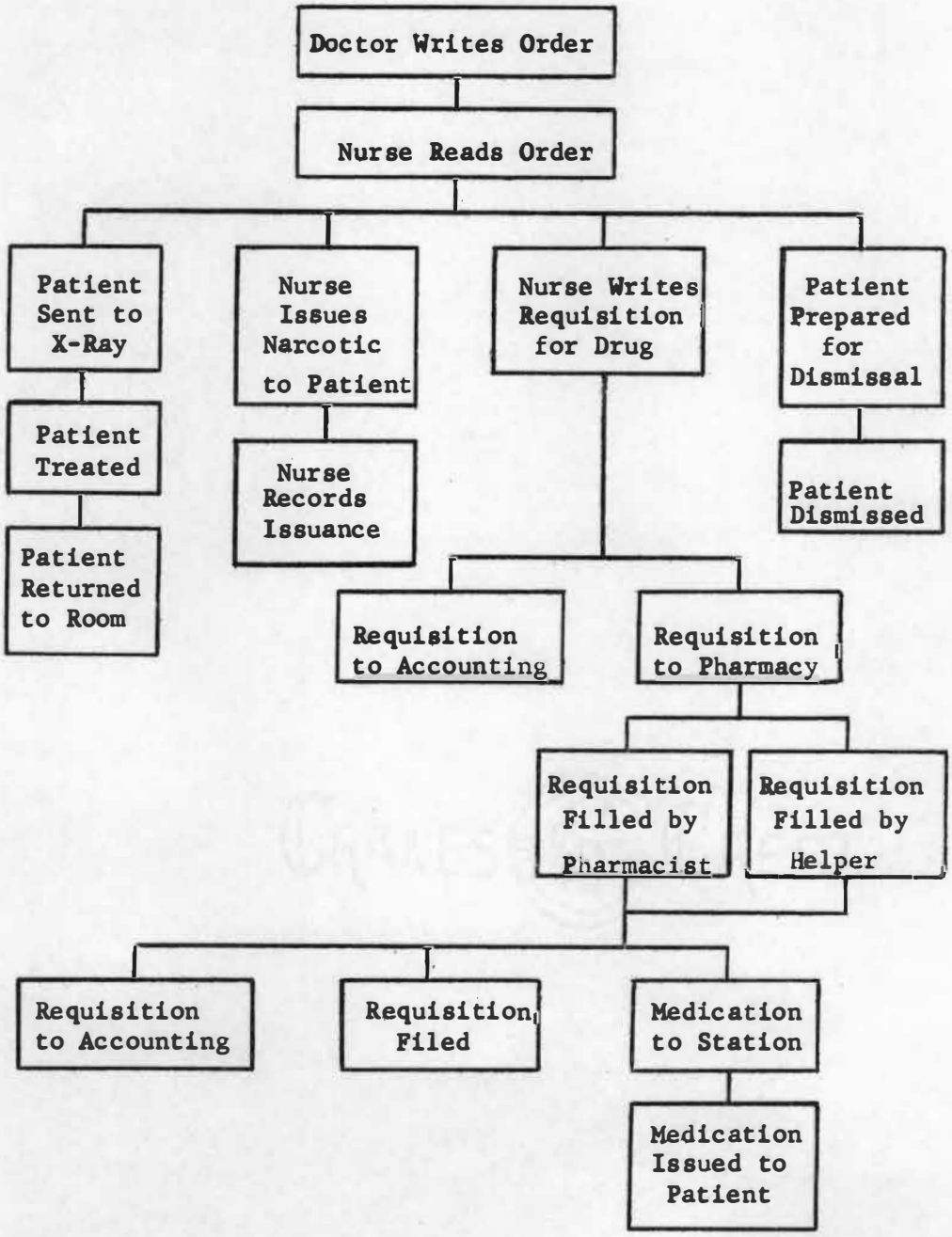


Figure 6. Response to doctor's order.

CHAPTER IV

DESCRIPTION OF FUNCTIONS WITHIN THE PHARMACY DEPARTMENT

The purpose of this chapter is to report the results of a study of the various activities within the pharmacy department. The study consisted of observing each job performed in the pharmacy, with an emphasis on three details:

1. The time required for the job to be performed.
2. How the job is performed.
3. Who performs the job.

The purpose of the study was to gain insight as to how and by whom each job could be performed most efficiently.

I. DISTRIBUTION OF NARCOTICS

The head pharmacist dispenses all narcotics since only she has access to them. The time which she allots to the job is the hours between 9:00 A. M. and 1:00 P. M. on Monday, Wednesday, and Friday. The nurses bring the empty narcotic containers (along with the corresponding records) to the pharmacy from 9:00 until 9:30. The pharmacist then works until about 12:30 (except for a thirty minute lunch break), at which time the nurses start arriving to receive the filled containers. By 1:00, the narcotics are usually completely dispensed. Upon observance of this job, the author found that the pharmacist must work quickly and steadily in order to finish the job in the time allotted to it. If there are an

excessive number of delays (phone calls, visitors, etc.), she is unable to complete the distribution of narcotics by 1:00.

II. DISTRIBUTION OF FLOOR STOCK

As previously stated, the floor stock is prepared by the helpers and then checked by one of the pharmacists. The orders for stock medications, accompanied by the empty containers, arrive in the pharmacy from the nursing stations by 10:00 A. M. and are filled by 7:00 P. M. during the week and by 3:00 P. M. on Saturday and Sunday. As they are filled they are placed on the cart, which is taken to the stations at 10:00 A. M., 1:00 P. M., 4:00 P. M., and 7:00 P. M. Therefore the stock items are delivered to the stations three times a day. The helpers do not have a set schedule for filling the stock orders; instead they perform this job whenever they are able to take time from the job of filling prescriptions. Because of the intermittent times at which the stock orders are filled, a study of this activity was difficult to make. However, a work sampling study (shown in Table II) showed that the helpers spend about 8 per cent of their total working time in the performance of this activity. Since their total working time is ninety-six hours per week, a good allocation of time to the job of filling stock orders is seven and one-half hours per week, considering the uncertainty of the study. The study also showed that the second helper should be allotted five hours and the first helper should be allotted two and one-half hours of the total time.

TABLE II

WORK SAMPLING STUDY

Activity	Number of Observations First Helper	Second Helper
Filling Stock Orders	3	6
Tube Delivery	5	4
Other	50	48
Total	58	58

III. DISPENSING OF REQUISITIONED MEDICATIONS

The dispensing of requisitioned medications is a continuous job and takes precedence over all other jobs in the pharmacy department. This is the reason that narcotic orders are filled only when there are two pharmacists on duty and also the reason that floor stock is filled at intermittent times.

As stated previously, the prescriptions for which requisitions are required are filled by both the pharmacists and the helpers. The pharmacists fill all prescriptions which require the transfer of medications from the manufacturers' containers to individual dispensing containers and all prescriptions which require the mixing of solutions. The helpers fill the remainder of the prescriptions, which consist of medications which are dispensed in the manufacturers' containers. The majority of these medications are items which may ordinarily be purchased without a doctor's prescription. Examples of these items are: throat lozenges, mouth washes, and common cold remedies. The helpers also fill all requisitions for ampoules. The helpers' work area is very close to the pharmacists' desk so that the pharmacists are able to keep a close check on the helpers' work.

From a study of the prescriptions filled over a period of thirteen week days, the data shown in Table III was collected. Table IV shows the breakdown of the individual work loads insofar as the filling of prescriptions is concerned. A time study (shown in Table V) revealed that the filling of a prescription by a helper takes about three minutes

TABLE III

BREAKDOWN OF THE PRESCRIPTIONS FILLED

First Shift		Second Shift		Nurses'	
Pharmacist	Helper	Pharmacist	Helper	Service	Total
120	94	107	50		371
126	101	133	61	7	428
117	104	122	50		393
144	81	93	79		397
121	67	171	93		452
118	100	94	59		371
127	122	112	58	11	430
128	78	90	92		388
148	133	99	54	4	438
139	125	133	55		452
120	101	148	67	3	439
112	104	86	78		380
129	112	117	81	1	440
1649	1322	1505	877	26	5379

TABLE IV

AVERAGE TOTALS AND RELATIVE FREQUENCIES OF PRESCRIPTIONS FILLED PER DAY

	Orders Filled	Per Cent of Total Orders Filled	Per Cent of Orders Filled Per Shift
Total	414		
Pharmacists' Total	245	58.6	
Helpers' Total	169	40.9	
First Shift Total	228.5	55.2	
Second Shift Total	183.5	44.3	
First Shift Pharm.	126.5	30.6	55.5
Second Shift Pharm.	116.5	28.2	63.2
First Helper	102	24.6	44.5
Second Helper	67	16.1	36.8
Nurses' Service	2	0.5	

TABLE V

TIME STUDY OF PRESCRIPTION FILLING

Number	Time in Minutes Pharmacist	Helper
1	1.8	2.6
2	1.9	2.9
3	2.1	2.7
4	1.6	4.4
5	1.7	2.7
6	1.6	2.5
7	7.2	3.8
8	2.1	2.6
9	2.2	3.9
10	1.7	2.6
11	1.9	2.8
12	1.8	4.2
13	7.6	2.7
14	2.2	2.6
15	1.8	2.5
16	1.6	2.7
17	1.5	3.2
18	6.1	3.0
19	2.0	2.6
20	1.7	2.8
Average Time	2.6	3.0

per prescription. Correlating this knowledge with the data shown in Table IV, page 28, it was calculated that the first helper spends about five hours per day and the second helper spends about three and one-fourth hours per day filling orders for requisitioned medications. A time study (also shown in Table V, page 29), of the prescriptions filled by the pharmacists revealed that 2.6 minutes are required for them to fill a prescription. Again using Table IV, page 28, it was calculated that the pharmacist on the first shift spends about five and one-half hours per day and the pharmacist on the second shift spends about five hours per day filling requisitioned medication prescriptions. A pace rating was not applied to any of the values taken during the time studies, because the object of the studies was to reveal the actual time spent in filling prescriptions. An MTM analysis of the procedure followed in the dispensing of tablets and capsules was made in order to set a standard for this type of prescription filling. From this analysis, which is shown in Table VI, a standard time (using a 5 per cent allowance for fatigue and delays) or 1.89 minutes per prescription was calculated, a time which can be rounded to 1.9 minutes.

One interesting note from Table IV, page 28, is that the first helper fills a greater percentage of prescriptions on the first shift than does the second helper on the second shift. This is explained by the fact that the pharmacist working the second shift fills some prescriptions which could be filled by the second helper. This is done in order to free the helper for other routine jobs, which are described on following pages.

TABLE VI

MTM ANALYSIS OF FILLING PRESCRIPTIONS

Left Hand	Motion	Right Hand	Motion	Body	Motion	Tmu
Reach for Req.	R16B	Reach to Pen	R8B			15.8
Grasp	G1B	Grasp	G1A			3.5
Move Req.	M16B	Move Pen	M8B			15.8
				Read Req.		194.6
		Position Pen	P1SE			5.6
				Sign and Price		194.6
		Move Pen	M8B			10.6
		Release	RL1			2.0
		Reach to Stamp	R4B			6.4
		Grasp Stamp	G1A			2.0
		Move Stamp	M10C			12.9
		Position Stamp	P1NSD			16.0
		Stamp Req.	AP1			16.2
		Move Stamp	M10B			12.2
		Release	RL1			2.0
		Reach to Req.	R10B			11.5
		Position Fingers	P1SE			5.6
		Grasp Req.	G1B			3.5
		Tear off Top Copy	M6B			8.9
		Move Copy	M6B			8.9
		Release	RL1			2.0
		Reach to Label	R8B			10.1
		Grasp	G1B			3.5
				Read Label		135.0
Move Req.	M10C					13.5
Position	P1SE					5.6
Release	RL1					2.0

TABLE VI (continued)

Left Hand	Motion	Right Hand	Motion	Body	Motion	Tmu
				Turn Body	TBC2	37.2
Reach to Type	R16B	Move Label to Type	M18C			20.4
		Position	P1SE			5.6
Turn Carriage	T150M					12.7
Reach to Keyboard	R12B	Reach to Keyboard	R10B			16.9
Position Fingers	P1SE	Position Fingers	P1SE			5.6
				Type Label		416.0
		Reach to Label	R10B			11.5
		Grasp	G1A			2.0
				Inspect		83.4
Reach for Vial	M30C	Remove Label		Turn Body	TBC1	26.7
Grasp Vial and Top	2-G4B					18.2
Move to Right Hand	M30A			Turn Body	TBC1	27.1
		Regrasp Label	3-G2			16.8
		Position Label	P1SD			11.2
		Insert Label	M2A			4.0
		Release	RL1			2.0
		Reach for Req.	R6B			8.6
		Grasp Req.	G1B			3.5
				Stand	STD.	43.4
				Walk to Cabinet	W-P	60.0
				Search Cabinet		55.6

TABLE VI (continued)

Left Hand	Motion	Right Hand	Motion	Body	Motion	Tmu
		Reach to Cab. Door	R18D			15.6
		Grasp Knob	G1A			2.0
		Open Door	M8B			10.6
				Search for Drug		55.6
Move Vial to Table	M6A	Reach for Drug	R10A			8.7
Release	RL1	Grasp	G1A			2.0
Reach to Drug	R6A	Move Drug to LH	M10A			11.3
Reach to Drug Cap	R1D					3.6
Grasp	G1A					2.0
Twist Cap	T90S					5.4
Move Cap	M6B					8.9
Release	RL1					2.0
Reach to Vial	R6B					8.6
Grasp	G1A					2.0
Move to RH	M6A	Tilt Drug				8.1
				Transfer Drug		416.0
Move Vial	M6B					8.9
Release	RL1					2.0
Reach to Cap	R4B					6.4
Grasp	G1A					2.0
Move to Drug Bottle	M8C					10.6
Position	P1SE					5.6
Turn Cap						5.4
				Search Cabinet		83.4
Reach to Cabinet	R10D	Move Drug to Cabinet	M12B			12.9
Grasp Door	G1A	Release	RL1			2.0
Shut Door	M8A	Reach to Table	R12C			14.2

TABLE VI (continued)

Left Hand	Motion	Right Hand	Motion	Body	Motion	Tmu
Reach to Vial	R12C	Reach to Vial Top	R2C			14.2
Grasp Vial	G1A	Grasp Top	G1A			2.0
Move to RH	M2C	Move to LH	M2C			5.2
		Position	P1SE			5.6
		Put on Top	AP1			16.2
				Turn Body	TBC2	37.2
				Walk to Bin	W-P	105.0
				Select Bin		83.4
		Move Vial to Bin	M12B			13.4
Release	RL1					2.0
				Turn	2-TBC2	74.4
				Walk to Desk	W-P	150.0
				Turn	2-TBC2	74.4
				Sit	SIT	34.7
Total						3013.8

The sample shown in Table III, page 27, should present a very good estimate of the relative work loads. Prescriptions filled during an additional ten days were studied, and the data collected from these prescriptions coincided very closely with the data presented in Table III, page 27. However, the data is biased by the very nature of the pharmacy operation. On Tuesday and Thursday, there is no staff pharmacist on duty during the first shift. The head pharmacist fills the prescription orders on these days, but she must attend a meeting at 2:00 P. M. Therefore, there is an hour delay before the second shift pharmacist comes on duty at 3:00. Requisitions accumulate during this time, which means that there is an extra number (an average of about fifteen) of prescriptions which must be filled by the second shift pharmacist on Tuesday and Thursday. Another bias is created by the fact that the pharmacy closes at 7:00 P. M. on Saturday and Sunday. There are always prescriptions (an average of about twenty) which are still to be filled at closing time on these days. This means that on Monday the first shift pharmacist must fill an extra number of prescriptions. When the pharmacists have to fill an extra number of prescriptions, they simply work at a faster pace in order to dispense the medications as quickly as possible.

Prescriptions filled on Saturday and Sunday were excluded from the sample taken because of the different working hours of these days. However, a separate study showed that an average of 320 prescriptions are filled during the twelve hours that the pharmacy is open on the week-end days. Extending this figure to a sixteen hour day (and allowing for the fact that the late hours of the day are not as busy as the earlier

hours), it is seen that the number of prescriptions filled on a weekend day coincides very closely with the number filled on a day during the week.

IV. CREDITING OF UNUSED DRUGS

Drugs which are not used by the patient are returned to the pharmacy for credit to the patient's account. These drugs are termed refunds, and there are an average of 120 of them each day. It is the duty of the second helper to make out the credits for all returned medications. This job requires approximately four hours per week. The pharmacist on the second shift restocks the refunds, a job which takes about three hours each week.

V. DELIVERY OF DRUGS

The helpers have the responsibility of seeing that the medications (excluding narcotics) are delivered to the nursing stations. About 70 per cent of these medications are sent through the pneumatic tube system. The helpers insert the containers of medications into tubes and then dispense them to the proper stations. Any medication not sent through the tube carrier is delivered on the cart (or received at the pharmacy by a nurse).

A work sampling study (shown in Table II, page 25), revealed that the insertion of the medications into the tubes and tube carrier requires about 8-1/2 per cent of the first helper's time and about 7 per cent of the second helper's time. These percentages show that the first helper

spends four hours per week and the second helper spends three and one-quarter hours per week filling tubes with medications and sending them to the stations. In an attempt to set a standard, an MTM analysis was made of the procedure of filling and dispatching one tube. From this analysis, which is shown in Table VII, a standard time of .75 minutes (rounded from .73) per tube was calculated. Correlating this knowledge with the number of medications sent per tube (3.1) and the total number sent per day, it was calculated that the first and second helpers should spend 3.8 and 3.15 hours per week, respectively, on this job. These values are very close to those calculated from the sampling study.

In addition to the above, the second helper must transport the cart to the nursing stations during the second shift. Each delivery takes an average of about twenty minutes, with the helper making ten deliveries each week. This job, then, requires about three and one-half hours per week to perform.

VI. PREPACKAGING OF MEDICATIONS

Tablets and capsules which are not dispensed in the manufacturers' containers are dispensed in units of twelve in small cylindrical vials. The medications are prepackaged in the vials and put into stock until needed. This activity saves the pharmacists considerable time because they do not have to transfer the drugs to the vials when they fill the prescriptions.

The job of prepackaging medications is performed by the second

TABLE VII

MTM ANALYSIS OF TUBE DELIVERY

Left Hand	Motion	Right Hand	Motion	Body	Motion	Tmu
				Turn	TBC1	18.3
				Walk	2-W-P	30.0
		Reach for Tube	R12B	Bend	B	29.0
		Grasp Tube	G1A			2.0
				Arise	AB	31.9
				Turn	2-TBC1	37.2
				Walk	2-W-P	30.0
				Turn	TBC2	37.2
Reach to Tube Top	R12D	Place Tube on Table	M12B			14.6
Grasp Tube Top	G1B					3.5
Disengage	D2D					11.8
Open Top	M4A					6.1
Release	RL1	Release	RL1			2.0
Reach to Packing	R12B	Reach to Packing	R12B			12.9
Grasp Packing	G1A	Grasp Packing	G1A			2.0
Regrasp Packing	3-G2	Unroll Packing	6-M8B			63.6
		Tear Off	M8B			10.6
Reach to Tube	R12B		)			
Grasp Tube	G1A	Wad Paper	12-G2)			67.2
		Position	P1SE			5.6
		Pack Tube	M8A			8.1
		Release	RL1			2.0
Release	RL1	Withdraw Hand	R8B			10.1
				Repeat Packing		180.3
				Select Bin		27.8

TABLE VII (continued)

Left Hand	Motion	Right Hand	Motion	Body	Motion	Tmu
		Reach for Drug	R10B			11.5
		Grasp Drug	4-G2			22.4
		Move to Tube	M10C			13.5
		Position	P1SD			11.2
		Insert Drug	M8B			8.1
		Release	RL1			2.0
		Withdraw Hand	R8B			10.1
				Repeat Packaging		360.0
		Reach to Tube Top	R6B			8.6
		Grasp	G1A			2.0
		Move Top	M6A			8.1
		Fasten Top	AP2			10.6
Move Tube to Carrier	M16C	Reach to Dial	R16B			18.7
Position Carrier	P1SE					5.6
Insert Carrier	M2A					4.0
				Select Dial Position		27.8
		Turn Dial	T90S			5.4
		Reach to Button	R4A			6.1
		Push Button	AP2			10.1
Total Tmu						1178.2

helper. Although the job is done by a helper, there is no danger of mistakes being made because of the control measures taken by the pharmacist. Each afternoon the head pharmacist selects the medication which needs to be prepackaged that evening. She then puts the manufacturer's container on the helpers' work bench, along with several empty vials and an empty bin with the name of the drug being prepackaged on it. In prepackaging the medications, the helper puts twelve tablets into each vial and then puts the filled vials into the bin. When the bin is full, the pharmacist on duty checks the operation, stocks the bin on its proper shelf, and stores the manufacturer's container.

Using the method just described, the only possible mistake which can be made by the helper is one of putting an incorrect number of tablets or capsules into a vial. This mistake is of very little importance, since it has no bearing on patient safety. Also, a mistake of this type could be made by a pharmacist as easily as by the helper.

The helper spends an average of forty minutes each day performing this activity, for a total of about three and one-half hours per week. Observation of this job revealed that the amount of time allotted to it is satisfactory. There are certain other medications which could also be prepackaged, but at the present the work load of the pharmacy does not permit this to be done.

VII. ORDERING AND RECEIVING

The head pharmacist does all the ordering, receiving, and stocking of medications. She schedules meetings with salesmen between the hours

of 1:00 P. M. and 3:00 P. M. on Monday, Wednesday, and Friday, usually two each day. Each salesman inventories the stock of medications which his company supplies and then informs the pharmacist of the amount of each drug in stock. The head pharmacist then orders the drugs needed from the salesman. A record of the order point (arbitrarily established by the pharmacist) and the amount of each drug on hand is kept in a card file. The head pharmacist also checks and stores all deliveries of drugs. This job is done during the same hours allotted to the ordering of drugs.

VIII. OTHER JOBS PERFORMED IN THE PHARMACY

Bookkeeping. Bookkeeping, which requires approximately ten hours per week, is done by the head pharmacist and by the volunteer workers. The pharmacist does about six hours of this work, and the volunteers do the other four.

Meetings. The head pharmacist attends two meetings each week, which require a total of four hours.

Checking. The pharmacist must check all prescriptions filled by the helpers. This job requires about four hours per week of the first pharmacist, four hours per week of the second pharmacist, and two hours per week of the head pharmacist.

Housekeeping. The cleaning of the pharmacy is done by the helpers. This job requires one hour each morning. Therefore the first helper spends six hours each week and the second helper spends one hour each week in the performance of this job.

IX. INTERRUPTIONS IN THE PHARMACY

The pharmacy, because of the nature of its operation, is the object of many interruptions. An observation of random hour intervals (shown in Table VIII), revealed that an average of 4.3 telephone calls and 5.1 visitors to the pharmacy occurs each hour. The nature of these interruptions is: questions, "stat" requisitions, and requisitions for hospital personnel. It is virtually impossible to determine the time consumed by these interruptions, but it is probably no more than 3 per cent of each pharmacist's working time. These interruptions will be included in the category of miscellaneous time consumed, which also includes idle time and delays.

X. CONCLUSIONS

Table IX shows a breakdown of the jobs performed by each staff member. Although the time allotted to each job may not be completely correct, the allocation is probably as true as possible under the circumstance of having to study so many different jobs. The analysis of the results of this work study will be made in a subsequent chapter.

TABLE VIII

STUDY OF INTERRUPTIONS

Hour	Number of Interruptions Telephone Calls	Vistors
1	3	4
2	5	5
3	7	5
4	4	4
5	2	3
6	5	7
7	4	5
8	5	5
9	3	6
10	6	5
11	3	7
12	4	3
13	7	6
14	3	4
15	4	7
16	5	6
17	3	3
18	5	5
19	4	6
20	4	6
Average Number	4.3	5.1

TABLE IX

JOB BREAKDOWN

Job	Time Required (Hours Per Week)				
	Head Pharm.	First Pharm.	Second Pharm.	First Helper	Second Helper
Narcotics	10.5				
Requisitions	9	32.5	30	30	21.5
Floor Stock				2.5	5
Refunds			3		4
Delivery				4	6.75
Prepacking					3.5
Ordering, etc.	6				
Bookkeeping	6				
Meetings	4				
Checking	2	4	4		
Housekeeping				6	1
Lunch, Breaks	4	4	4	4.5	4.5
Miscellaneous	3.5	3.5	3	1	1.75
Total Hours	45	44	44	48	48

CHAPTER V

COMPARISON OF THE PHARMACY WITH OTHER HOSPITAL PHARMACIES

In order to become more prepared to make recommendations concerning Saint Mary's pharmacy department, the author conducted a study of other hospital pharmacies. This was done in order to gain a knowledge of trends in hospital pharmacies today. The study consisted of two phases:

1. Observation by the author of three other short-term hospital pharmacy departments. The data from this study is shown in Appendix A, and results are discussed below.

2. Study of literature concerning hospital pharmacies.

I. COMPARISON WITH OTHER HOSPITAL PHARMACIES OBSERVED

Staffing. In comparing the number of personnel staffed by each pharmacy studied, it is seen that the staffing of a hospital pharmacy is not simply a function of the size of the hospital. In fact, Baptist Hospital and the University of Tennessee Hospital, which are the two smallest hospitals, have larger pharmacy staffs than do Fort Sanders and Saint Mary's. This is explained mainly by the fact that the two pharmacies with the largest staffs dispense medications to both inpatients and outpatients, while the other two pharmacies dispense only to inpatients. At both hospitals in which medications are dispensed to outpatients, the number of outpatient prescriptions filled at least equals the number of inpatient prescriptions filled. Another reason for the

large pharmacy staff at the University of Tennessee Hospital is the fact that the messenger method of delivering medications to the nursing stations causes a need for two extra persons on the staff.

In comparing the two pharmacies that fill only inpatient prescriptions, there is a very good correlation between the size of the hospitals and the size of the pharmacy staffs (the pharmacy at Saint Mary's, a 450 bed hospital, employs three pharmacists and two helpers; and the pharmacy at Fort Sanders Hospital, which consists of 385 beds, employs two pharmacists, two helpers, and a part-time maid). If the other two hospital pharmacies dispensed medications only to inpatients, the size of their staffs would correlate much closer with the size of the staffs at the other hospitals. If this were the case, the author estimates that the pharmacy serving the smallest of the hospitals would require at least two pharmacists and two helpers in order for the activities within the pharmacy to be properly performed. The size of the pharmacy staff will never vary in direct proportion to the size of the hospital, since all hospitals have a basic work load, with only certain activities, such as the number of prescriptions filled, increasing in range with an increase in the size of the hospital.

Workload of personnel. The study revealed that the other pharmacies utilize their personnel in much the same manner as does the pharmacy at Saint Mary's Hospital. In every hospital, the pharmacists perform only the jobs which require professional knowledge, and the remainder of the tasks are performed by non-pharmacists under the supervision of

pharmacists. The type of delivery system which a pharmacy utilizes is a major factor in determining the work load of the helpers, as is seen in the description of each pharmacy department.

The functions performed by non-pharmacists in the other hospital pharmacies that are done by pharmacists at Saint Mary's are typing of labels and receiving and stocking of medications. Aside from these jobs, the distribution of duties is essentially the same in all pharmacies, although certain jobs are performed differently in each case.

II. COMPARISON WITH LITERATURE STUDY

University of Kentucky Medical Center. The University of Kentucky Medical Center, which consists of 318 beds, has a pharmacy department which differs markedly from Saint Mary's pharmacy in its manner of staffing. The pharmacy at this hospital operates two shifts daily (from 7:00 A. M. to 12:00 P. M.) seven days a week and employs one pharmacist and three non-pharmacists on each shift (9, p. 2). This is in contrast to the pharmacy department at Saint Mary's Hospital, which staffs more pharmacists than non-pharmacists. The reason for this difference is the fact that the Kentucky hospital utilizes the unit dose system (9, p. 1). A large majority of the medications dispensed are in the unit dose form. Because the unit dose medications are prepackaged either by the suppliers or by pharmacists, the final dispensing can be done by a non-pharmacist. The major duty of the pharmacists as far as the dispensing medications is concerned is therefore one of supervision (9, p. 4).

National surveys. Some very interesting comparisons can be drawn from a survey concerning hospital pharmacy personnel made by Turnbull and Bowles (8). This survey includes data taken from ninety-eight hospitals, thirty-five of which are hospitals having from 400-499 beds, which is the bed range that fits Saint Mary's Hospital. In this range, it was found that the average number of pharmacists is 5.03 per hospital, and the number on non-pharmacists employed per hospital is 3.33 full time and 1.85 part-time. Also, in the non-professional area, the number of female employees is 20 per cent more than the number of men employees. This is explained by the fact that most clerical and routine fuctions are best performed by women. Also, through the present time, women can usually be employed for less pay than can men for any given job. This fact is in contrast with the fact that both helpers employed by Saint Mary's pharmacy are men. The survey also shows that the average number of pharmacy operating hours is 11.24 hours per day from Monday through Friday, 9.4 hours on Saturday,and 7.83 hours on Sunday. About 48 per cent of the pharmacy departments surveyed replied that they lack an adequate staff to perform the pharmacy duties correctly.

The entire survey shows that Saint Mary's pharmacy differs from the average pharmacy department in the United States. In the pharmacy departments surveyed, the average number of persons employed is about 70 per cent more and the hours operated are about 40 per cent less than in the pharmacy department at Saint Mary's Hospital. The difference is explained by two facts, the first of which is that 94 per cent of the pharmacies surveyed provide outpatient prescription service in addition

to the regular prescription service (8, p. 602). This means that more personnel is needed to perform the activities required of the pharmacy department. The other reason is one explained in a statement made by Turnbull and Bowles (8, p. 598):

> In the case of the hospitals operated by religious orders, the results may shift in the opposite direction, i.e., pharmacists performing many non-pharmacist functions. In addition one pharmacist might essentially be doing the work of several pharmacists since the number of work hours per week in religious hospitals is generally more than that which might be expected of the average employee.

Hospitals operated by religious orders were excluded from the national survey, and Saint Mary's is a Catholic hospital.

The same survey brings out the fact that, except for the job of drug delivery, every activity within the pharmacy is more often performed by pharmacists than by non-pharmacist. This is in contrast to Saint Mary's pharmacy, where non-pharmacists perform many of the services required of the pharmacy. In fact, the operation of Saint Mary's pharmacy department seems to repudiate the statement that pharmacists perform many non-pharmacist tasks in hospitals operated by religious orders. The survey suggests that, throughout the country, non-professional personnel are not utilized in pharmacies as they should be. This is also the opinion of Turnbull and Bowles.

Another survey (3, pp. 103-104) shows that an average of eighty-nine prescriptions per day are filled per pharmacist in the United States. At Saint Mary's, with two pharmacists filling prescriptions each day, the pharmacists fill an average of 122 prescriptions each per day. The persons who conducted the survey consider 107 prescriptions filled per

pharmacist per day to be normal. This survey also indicates the fact that pharmacists spend so much time filling prescriptions that they do not have sufficient time to properly perform their other duties.

III. ANALYSIS OF THE STUDY

The study presented in this chapter brings out three facts about Saint Mary's pharmacy department. These are:

1. The type of drug distribution system that the pharmacy uses has a significant effect upon the manner of staffing and upon the distribution of the work load among the staff members.

2. The pharmacy staff has a heavier work load per member than those persons at most comparable hospitals.

3. Non-professional personnel are utilized about as effectively as by any pharmacy studied and more effectively than by the average pharmacy.

CHAPTER VI

ANALYSIS OF THE STUDY

The purpose of this chapter is to present a basis upon which conclusions and recommendations concerning the study can be drawn. This is done by presenting an analysis of the study, with an emphasis on revealing the good and bad points of Saint Mary's pharmacy department.

I. THE DRUG DISTRIBUTION SYSTEM

Narcotics. The present narcotic distribution system is a good one in several respects. Every phase of the system is performed smoothly and with expedition. The narcotics are distributed only by a pharmacist and only to registered nurses. The forms used enable the pharmacy department to maintain strict control over the distribution of the narcotics.

There is one drawback to the present system. Only the head pharmacist has access to the narcotics, and there are times when narcotics are needed when she is not on duty. This need very seldom arises, but when it does, there is a delay prior to the filling of the narcotics order. The pharmacist on duty must first obtain a key to the head pharmacist's office from the housekeeping department and then call the head pharmacist in order to obtain the combination to the vault in which the narcotics are kept. This delay could very easily be

eliminated by keeping a key to the office and a combination to the vault secured in the staff pharmacists' desk.

Floor stock. The dispensing of stock drugs is accomplished efficiently enough, but there is one phase of the system which could be improved. The containers in which many of these drugs are dispensed are small and furnish the nursing stations with only from one to three days supply of the medications. The stations have facilities in which much larger containers could be stored. If larger containers were used, the stock drugs would not have to be replenished as often as at present, therefore saving time in both the pharmacy and at the nursing stations.

Requisitioned drugs. Observation of the distribution system of the requisitioned medications quickly brought a glaring problem to the attention of the author. At times these drugs are not prepared and sent to the nursing stations as quickly as they should be. Upon further study, this problem was found to be due to four factors:

1. Breakdown of the pneumatic tube carrier.

2. Overaccumulation of requisitions during the hour on Tuesday and Thursday that there is no pharmacist filling prescriptions.

3. Inability of the pharmacists to fill all requisitions by 7:00 P. M. on Saturday and Sunday nights.

4. Lack of a priority system whereby the pharmacists would know which requisitions should be filled immediately and which ones could be filled at a later time.

Another aspect of the system which was given special attention is the policy of entering only one item on each requisition. It was found that the number of requisitions used would be decreased by about 25 per cent if more than one item were entered on the requisitions. This would result in a monetary savings to the hospital (but not to the pharmacy, since the cost of the requisitions is charged to Nursing Service, General). However, listing more than one entry on the requisitions would eliminate two important advantages of the present system. These advantages are:

1. Both helpers and pharmacists fill requisition orders, and valuable time is saved because the requisitions do not have to be passed from one pharmacy member to another.

2. The numbering system, which is a very effective means of control, would lose its effectiveness if more than one entry were made on the requisitions.

Delivery of medications. It was stated previously that the pneumatic tube carrier breaks down at random times. Upon investigation, it was found that this problem is almost always due to misuse by the personnel of the hospital.

Another problem presented by the use of the tube system is the fact that liquid medications cannot be sent through it because of the danger of breakage. A study was conducted in order to try to discover a modified tube in which liquid drugs might be sent. It was found that if a liquid medication were completely surrounded by a foam lining, it could be delivered in a tube without danger of breakage. However, the

special tubes would have to be custom made at extra cost. Also, only one container could be delivered in each tube, and the time required to pack the medications into tubes would be much greater than that required to put them on the delivery cart.

Taking all factors into consideration, the pneumatic tube system is as effective a method of delivering drugs as any observed. Except during the occasional breakdowns, the drugs are sent to the nursing stations quickly and efficiently. The Brewer system (see Appendix A) does offer one advantage over the tube system, that of drugs being at the nursing stations the moment they are needed. However, at Saint Mary's all emergency drugs are kept at the stations; and the remainder of the drugs are delivered quickly enough through the present delivery system, so long as there is no breakdown in the human element involved. The Brewer system presents a problem of pilferage, since persons at the stations can receive drugs from the machines. Therefore, very close control by the pharmacy and by the head nurses must be maintained. Another disadvantage of the Brewer system is the fact that much of the pharmacists' time is consumed in the filling of the machines.

The delivery cart is a very good means of transporting stock drugs to the nursing stations. In addition, most of the requisitioned drugs which must be delivered on the cart are those which do not have to be rushed to the stations. When a drug is needed before it can be delivered by cart, a nurse must go to the pharmacy to receive it.

The major problem, then, in the delivery system at Saint Mary's Hospital is the fact that medications are occasionally needed before the

delivery system can get them to the stations. However, this problem arises with the use of any delivery system, and the only solution to the problem is to have a nurse go to the pharmacy and receive the medication. Study revealed that a major cause of this problem is the fact that nurses are unable, at times, to send requisitions to the pharmacy as soon as orders are written. They then must go get the medications in order to dispense them to the patients on time.

II. PRICING AND CREDITING

An alternate method of charging patients for medications was studied. The method studied is that of deferring charges until the patient is dismissed from the hospital. Then, from a record of the medications administered to the patient, a total charge can be written up. This method eliminates the need for crediting the patient for unused medications. However, incorporation of this method would create the separate job of making out charges. At present, the pricing and crediting take very little additional time, because these jobs are performed as the medications are dispensed and placed back into stock, respectively.

III. ORDERING AND RECEIVING OF MEDICATIONS

At the present, the pharmacy department orders medications from more companies than it should. This is necessary, however, because the doctors usually specify the brand name when they order a medication. This problem could be solved by the development of a formulary system, whereby a pharmacy and therapeutics committee, consisting of physicians

and pharmacists and appointed by the medical staff of the hospital, would evaluate and select the medications which are considered most useful in patient care (3, p. 140). The development of this system would create a standardization of the drugs ordered by the doctors and would probably result in a reduction in the cost of purchasing drugs. In Mirror to Hospital Pharmacy, a statement is made, based on a national survey, that hospitals having a formulary system spend less for drugs in ninety-five out of one hundred cases (3, p. 97).

The receiving and inventorying of the medications are two jobs which could be revised. The receiving is done entirely by the head pharmacist, who first checks the invoices against the medications received and then puts the drugs into stock. This job could be performed very easily by one of the helpers, resulting in a savings of the pharmacist's time. At the present, however, the work load of the helpers is such that neither of them could fit the performance of these jobs into his schedule. Most of the inventorying is done by the salesmen, who inform the head pharmacist as to the amount of stock on hand. Much better control could be maintained over the amount of drugs ordered if this job were performed by some member of the pharmacy staff.

IV. WORK LOAD

From Table IX, page 44, it can be seen that each member of the staff carries a large work load. In fact, the pharmacist work load is about 92 per cent and the helper work load is about 96 per cent. These figures are based on what is considered by the author to be normal time.

A spot check using MTM analysis confirmed this level (see page 37). Although there are slack periods in the pharmacy, there are also periods during which the staff must work at a pace of as high as 20 per cent higher than normal. From observation made, it was found that the overall pace of the pharmacy staff is very close to normal time. Table IX, page 44, also points out the fact that the head pharmacist has no time to perform the administrative duties of the department.

Figure 7 and Figure 8 compare hours available by and hours required of the pharmacists and the helpers, respectively. Although it can be seen that the total hours available are more than the total hours required in both cases, this does not present the whole picture. It can also be seen that there are hours required when there are no hours available, such as after 7:00 P. M. on Saturday and Sunday. Another aspect not shown is the fact that the pharmacy should provide certain services which it does not have the time to provide at present. These services will be discussed in the next chapter.

V. THE PHARMACY STAFF

One of the reasons for the problems which arise within the pharmacy department is the complete disorganization of the staff. Figure 9 shows the theoretical organization of the department, and Figure 10 shows the actual organization of the department. From observation and interviews, it was found that there are three causes of the lack of organization within the department. These causes are: lack of cooperation, lack of communication, and lack of supervision. These factors are interrelated

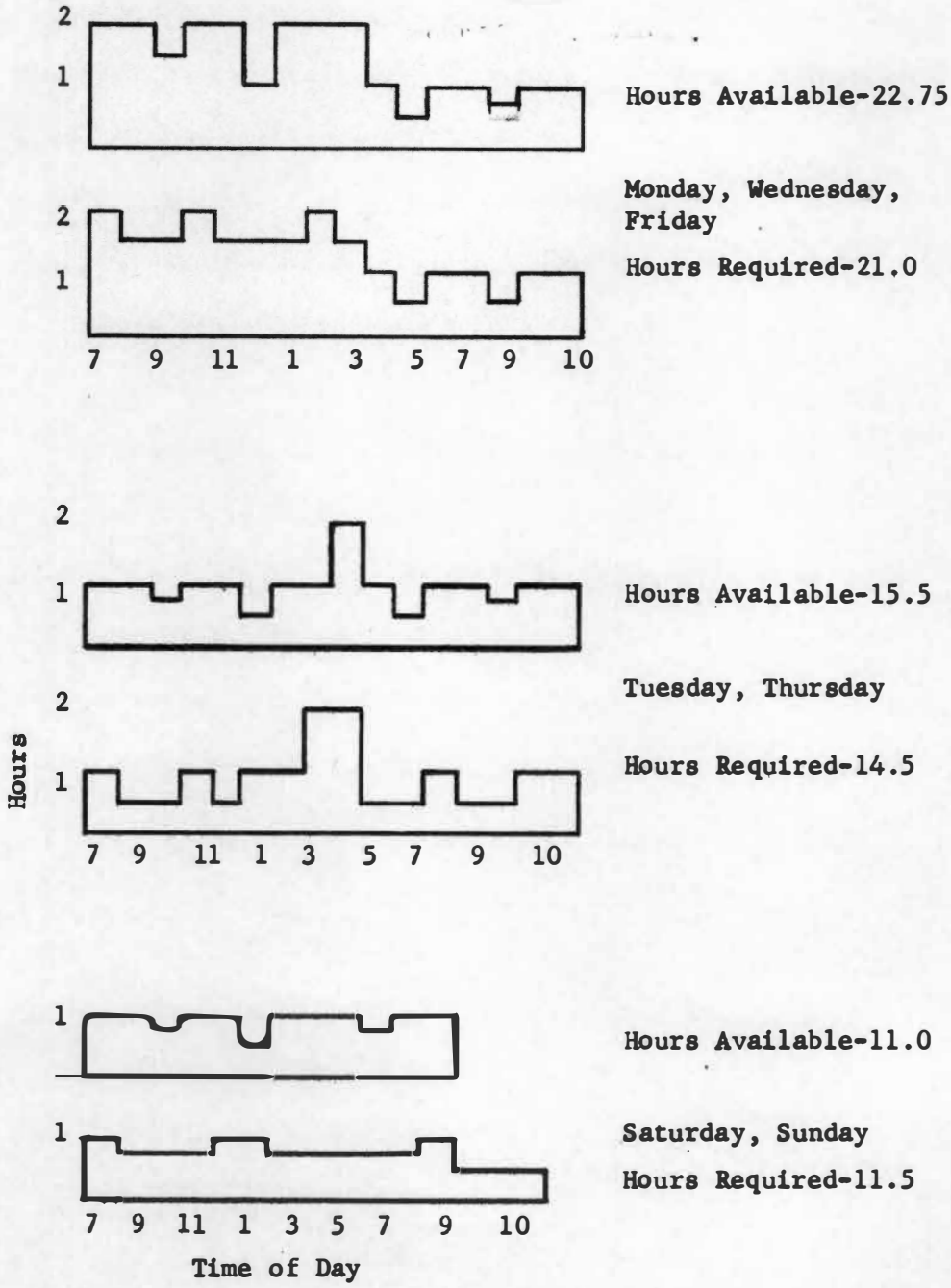


Figure 7. Pharmacist hours available and required.

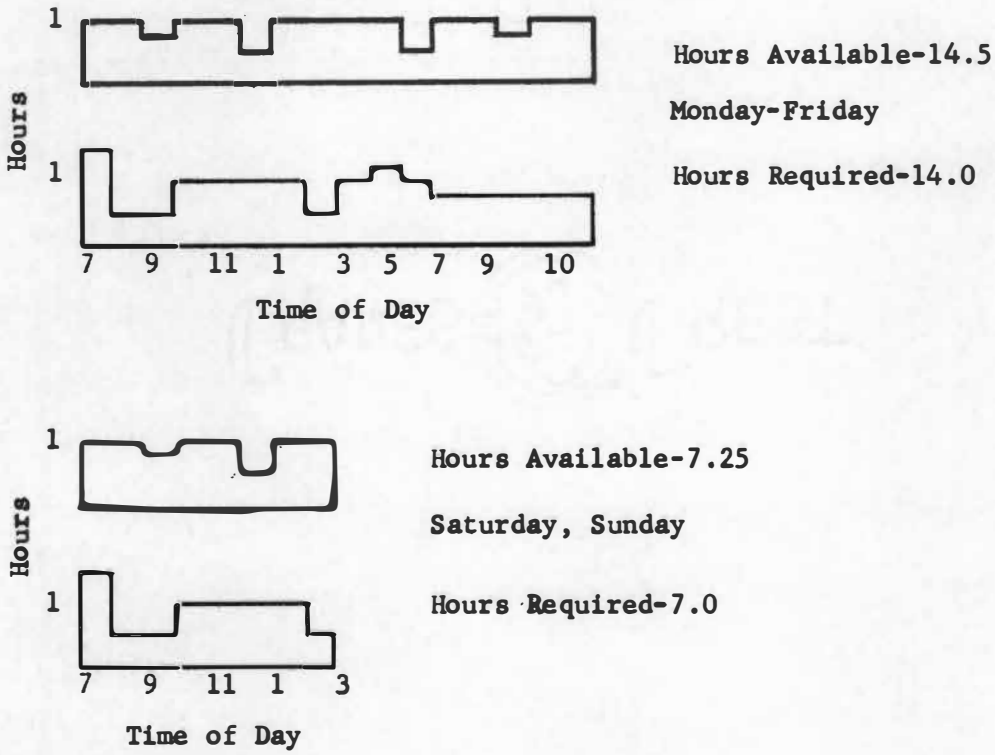


Figure 8, Helper hours available and required.

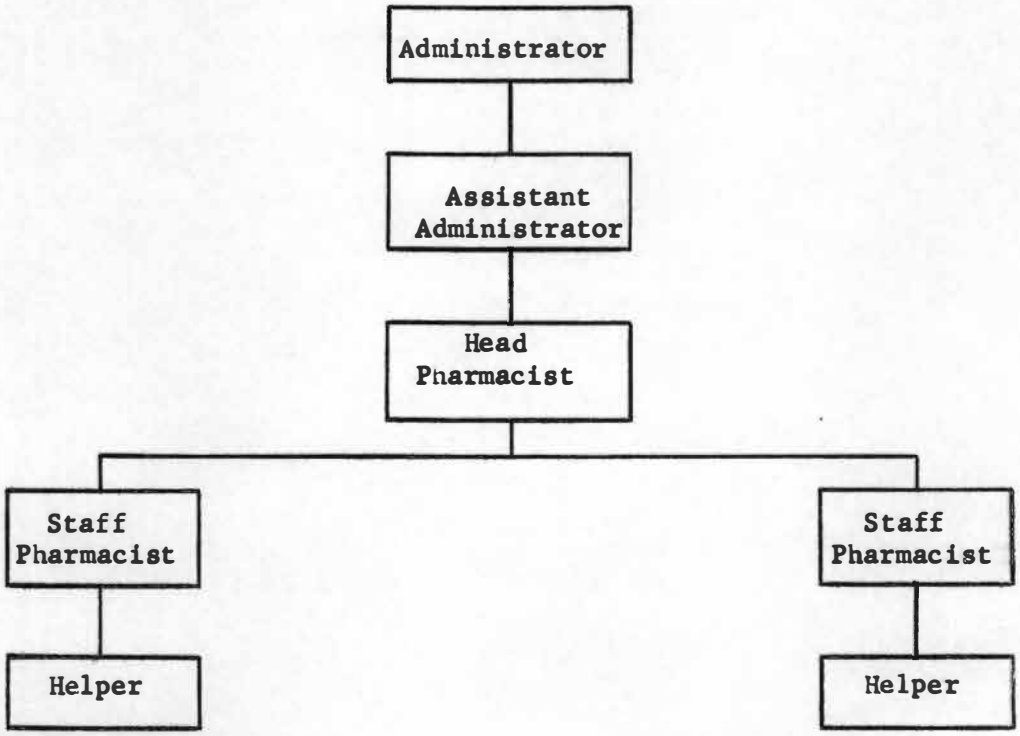


Figure 9. Theoretical organization of the pharmacy department.

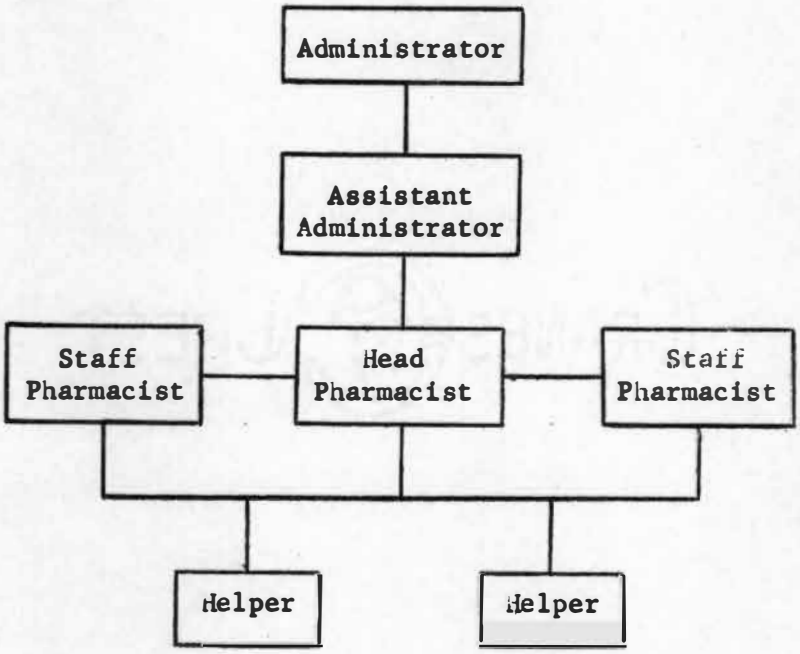


Figure 10. Actual organization of the pharmacy department.

and stem from the feelings and personalities of the members of the pharmacy. Each pharmacist feels that he is overworked. In addition to this, the staff pharmacists seem to resent the fact that a woman is their immediate superior. The conclusion was also drawn that both staff pharmacists desire the job of head pharmacist and are therefore wary of each other. The head pharmacist feels that the staff pharmacists will not follow her orders and therefore does not give them amy. She also feels that they do not put forth their best efforts in performing their jobs. Each person does his own job without an attempt to correlate it with those of the other members of the department. There is no supervision, so each member does as he pleases. This lack of supervision is reflected in the work of the helpers, who, although having set jobs, become confused when an assignment given them by the head pharmacist conflicts with one given them by a staff pharmacist.

The work load study brought out the fact that each member of the staff gives the hospital a "fair day's work." However, a hard working staff does not insure, or even imply, an efficient system. In addition to the performance of the required duties, there must be well defined lines of authority, close correlation of the jobs performed in the department, and proper communication among the members.

VI. OTHER AREAS STUDIED

Prepackaging. The prepackaging of medications is a valuable aid in decreasing the time required to fill orders for tablets and capsules. At the present, however, only about 60 per cent of the tablets and

capsules are being prepackaged. Certain of the remainder of these drugs are used too rarely to warrant being prepackaged, but the prepackaging of about 15 per cent more of these medications would result in additional time saved in the filling of prescriptions. At the present the job of prepackaging is done completely by hand. Through the use of a mechanical device, the time required to perform this job could be reduced considerably. Such a device could be bought, or it could be made in the hospital maintenance shop. An analysis of the time saved by a mechanical device would probably show that the cost of obtaining one would be justified.

Communication outside the department. Although the head pharmacist attends two meetings per week, very few of the policies and activities of the pharmacy department are communicated to the rest of the hospital. Most communication is done through personal conversations and phone calls, many of which cause unnecessary delays in the department.

A pharmacy and therapeutics committee would increase the efficiency of the communications between the medical staff and the pharmacy department. In addition to this, the pharmacy should prepare written statements periodically in order to inform the remainder of the hospital as to the policies and activities of the department.

VII. SUMMARY

This chapter has pointed out several changes and improvements which could be made within the pharmacy department. However, the discussion of a possible change does not presuppose a recommendation. Final recommendations depend upon which changes would optimize the improvement of the overall pharmacy system.

CHAPTER VII

DEVELOPMENT OF A MANAGEMENT AND CONTROL SYSTEM

In order to strengthen the pharmacy system and to try to insure that it will operate more efficiently in the future, regardless of the personnel filling the positions, the development of a management and control system is in order at this point.

The first step in the development of this system is the formation of a pharmacy and therapeutics committee. This committee, which is discussed further in the next chapter, would be invaluable in coordinating policies and the use of medications between the pharmacy department and the medical staff. A major responsibility of the committee would be the development of a formulary system whereby the inventory of medications could be controlled more effectively.

Written policies concerning all important functions of the department should be established. Except for job descriptions (shown in Appendix B) and an organization chart of the department, there are no pharmacy policies actually written on paper, Additional policies should be established concerning the areas of: narcotics handling, pricing of medications, objectives of the pharmacy, purchasing, checking filled requisitions, orientation program for new employees, and handling of medications by nursing personnel. Each policy should be formed by the head pharmacist and a representative from each hospital department to which the policy is applicable. In order to insure that all procedures set forth in the policies are followed, the personnel of the pharmacy

department should be properly informed of their duties and positions, which should be clearly defined, within the department. The staff pharmacists should be under the direct supervision of the head pharmacist, and each helper should be supervised by the staff pharmacist with whom he is working. This would help eliminate confusion in the performance of the pharmacy functions and would also help to pinpoint the causes of errors and problems.

A communications system between the first and second shifts should be integrated into the department. The staff pharmacist on each shift should prepare a short daily report concerning occurrences and problems which should be brought to the attention of the other pharmacists. This report would be prepared at the end of each shift and then forwarded to the head pharmacist and to the staff pharmacist on the next shift. This step would help eliminate misunderstandings between the shifts and would provide the head pharmacist with information about occurrences during the second shift and the weekend.

More control should be incorporated into the dispensing of requisitioned medications. One step in this implementation would be the establishment of a priority system for filling these orders. This could easily be done by having the nurse enter the criteria by which the drug should be delivered in lower left corner of the requisition (shown in Figure 4, page 17). In most cases, this criteria is the time that the drug is needed. In addition to this step, a check procedure should be devised in order to pinpoint delays in the dispensing of the requisitioned medications. This check could be formed by inserting the following steps

into the procedure for filling requisitions:

1. The doctor records on the patient's order sheet the time at which he orders the medication.

2. The nurse records on the requisition the time at which she sends it to the pharmacy.

3. The pharmacist or helper records on the requisition the time at which he fills the prescription. This time should be recorded by a machine similar to a time clock.

The insertion of this procedure into the system would have two advantages. First, if a medication were not dispensed to the floor efficiently, the point at which it was delayed could be pinpointed, and the reason for the delay could be determined. Also, such a check would eliminate any tendency on the part of the pharmacy personnel to delay filling requisitions. Of course, the success of this procedure would depend on proper discipline at the nursing stations, whereby the nurse writing the requisition would enter the correct time.

At the present, a monthly report is prepared by the head pharmacist for the administration and accounting departments informing them of the drugs and drug values issued during the previous month. The report which is prepared for the assistant administrator should be expanded to show savings or additional costs incurred in the department during that month. In addition, a statement concerning problem areas should be included in the report. An incentive system could be developed whereby the head pharmacist would receive a bonus for monetary savings which are achieved within the department. This bonus could be a percentage of any yearly

savings which exceed his annual salary. However, such a system might be incompatible with hospital policy, since this system is not in effect in any other department.

Because there are already plans to computerize certain areas within the hospital, a study should be conducted to investigate the feasibility of computerizing a portion of the pharmacy department, or at least developing a card punch and teletype system. One such system would be the entering of requisition orders on computer cards. Through the use of this system, dosage information could be gathered and sorted easily, charges could be electronically posted, and inventory could be automatically updated.

The incorporation of all or part of the system discussed, along with the recommendations made in the next chapter, should result in a more efficient pharmacy operation.

CHAPTER VIII

RECOMMENDATIONS

The recommendations made in this chapter are presented under two categories. The first category consists of recommendations which are feasible at the present time. The second category concerns areas in which future study should be made. Study and analysis of these areas are not included in this thesis because of one or both of two reasons:

1. Study in an area is beyond the scope of this thesis, but might provide the basis for another thesis.

2. Changes in an area are not justified under the present facilities of the hospital and/or the pharmacy. However, such changes could become feasible at some later time, for instance, during a major hospital expansion.

I. RECOMMENDATIONS FOR PRESENT CHANGE

Staffing. It is recommended that a new head pharmacist be hired. If such a move were made, this person would be given complete authority over the pharmacy department and would be directly responsible to the assistant administrator for all activities within the department. Although such action would create an additional fixed annual expense to the department, the author feels that it is justified for the following reasons:

1. Service to the hospital patients is the basis on which

the pharmacy exists. Because the activities of the pharmacy have an effect upon the welfare of the patients, it is imperative that all activities, especially the dispensing of medications, be performed efficiently, even if additional cost is incurred in doing so.

2. There are ten hours per week (from 2:00 P. M. to 3:00 P. M. on Tuesday and Thursday and from 7:00 to 11:00 P. M. on Saturday and Sunday) during which requisitions accumulate without being filled, because there is no pharmacist on duty in the pharmacy. The accumulation of these requisitions also delays the filling of subsequent requisitions. In order to dispense all requisitioned medications properly, it is felt that there should be a pharmacist on duty during the hours just discussed.

3. The pharmacy does not provide the range of services which it should. For example, there is no pharmacy and therapeutics committee, no formulary system, no inspection of the drug stock at the nursing stations, limited coordination between the pharmacy activities and the policies of the hospital, and insufficient pharmaceutical training of student nurses. These are activities, some of which will be discussed in subsequent sections of the chapter, which should be provided by the pharmacy. It is estimated that five hours (at the least) per week would be required to perform these activities. If possible, the head pharmacist should perform the duties concerning the services just discussed.

4. The working hours of the pharmacists on the staff should be reduced to forty hours per week per pharmacist. At the present the three pharmacists work a total of 125.5 hours per week. Reducing this total to 120 hours would require an additional 5.5 hours per week. The addition

of another pharmacist would allow this step to be taken and would eliminate the erratic working hours of the staff pharmacists. It is hoped that this action will result in a reduction in the tension existing between the present staff members.

5. Inventory should be taken by a member of the pharmacy staff. This would require an additional estimated two hours per week.

6. The pharmacists would be able to perform their professional duties more properly. At the present they have time only to perform the physical jobs, and at times even these are not executed properly. Such professional jobs as supervision of the helpers, administration, and interpretation of the uses of medications could be performed more efficiently. An estimated time for the proper performance of these duties is about ten additional hours per week.

7. Possibly the most important reason for the hiring of a new head pharmacist would be the provision of much needed supervision and coordination within the department. Proper lines of authority would be established, and much better control would be exerted over all activities of the department. With the proper supervision would also come better communication among the staff members and closer correlation among the jobs of the department.

It has been seen that services which would require at least an additional 32.5 hours per week should be provided by the pharmacy department. A summarization of the additional hours is shown in Table X. It is hoped that the provision of these services and the increased efficiency

TABLE X

ADDITIONAL HOURS REQUIRED

Activity	Additional Hours Required Per Week
Filling Prescriptions	10
Duties of the Head Pharmacist	5
Reduction of Working Hours	5.5
Inventory	2
Professional Duties	10
Total	32.5

of the department would result in savings (such as from the development of a formulary system) which would at least in part compensate for the cost of the addition of another pharmacist. However, even if this does not prove to be the case, it is felt that such a move would be justified because of the reasons previously stated.

The present staff should be kept intact, with the present head pharmacist becoming an assistant to the new head pharmacist. It is felt that there should be no expansion of the helper personnel, because the present helpers are performing almost all of the non-professional functions of the pharmacy; and the addition of another helper would only create idle time. An organization chart of the proposed staff is shown in Figure 11. The jobs and working schedules of the staff members would be rearranged to properly meet the needs of the pharmacy. A suggested schedule of working hours and job functions of each member is shown in Table XI. Figure 12 and Figure 13 compare anticipated hours available by and hours required of the pharmacists and the helpers, respectively, under the proposed system.

Formation of a Pharmacy and Therapeutics Committee. A pharmacy and therapeutics committee should be formed. This would be possible with the hiring of a new head pharmacist, because, as stated previously, he would have time for administrative duties. The committee, which could be composed of the head pharmacist and representatives of the medical staff, the hospital administration, and the nursing department, should perform the following duties (4, pp. 3-4):

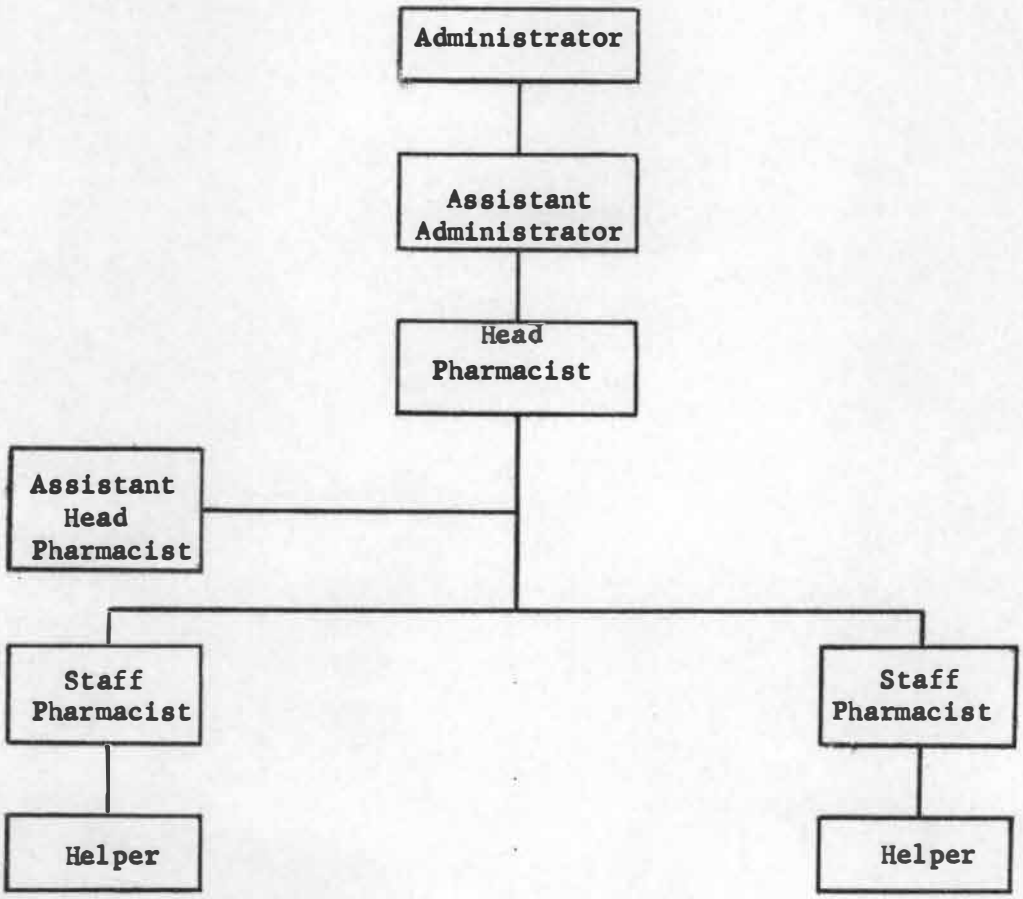


Figure 11. Proposed organization of the pharmacy department.

TABLE XI

SUGGESTED WORKING AND FUNCTION SCHEDULE

Staff Member	Working Hours	Function
Head Pharmacist	8:00 A.M.-4:30 P.M. Monday-Friday	Dispensing of Narcotics Administrative Duties Ordering of Medications
Assistant Head Pharmacist	7:00 A.M.-3:30 P.M. Monday-Friday	Fill Prescriptions Assist Head Pharmacist Inventorying Receiving
Staff Pharmacist	7:00 A.M.-3:30 P.M. Saturday-Sunday 2:30 P.M.-11:00 P.M.	Fill Prescriptions Restock Refunds Prepackage Drugs
Staff Pharmacist	2:30 P.M.-11:00 P.M. Thursday-Friday	Fill Prescriptions Restock Refunds Prepackage Drugs
Helper	7:00 A.M.-3:00 P.M. Monday-Saturday	Fill Prescriptions Replenish Floor Stock Housekeeping
Helper	3:00 P.M.-11:00 P.M. Tuesday-Saturday	Fill Prescriptions Replenish Floor Stock Housekeeping Deliver Drugs Price Refunds Prepackage Drugs

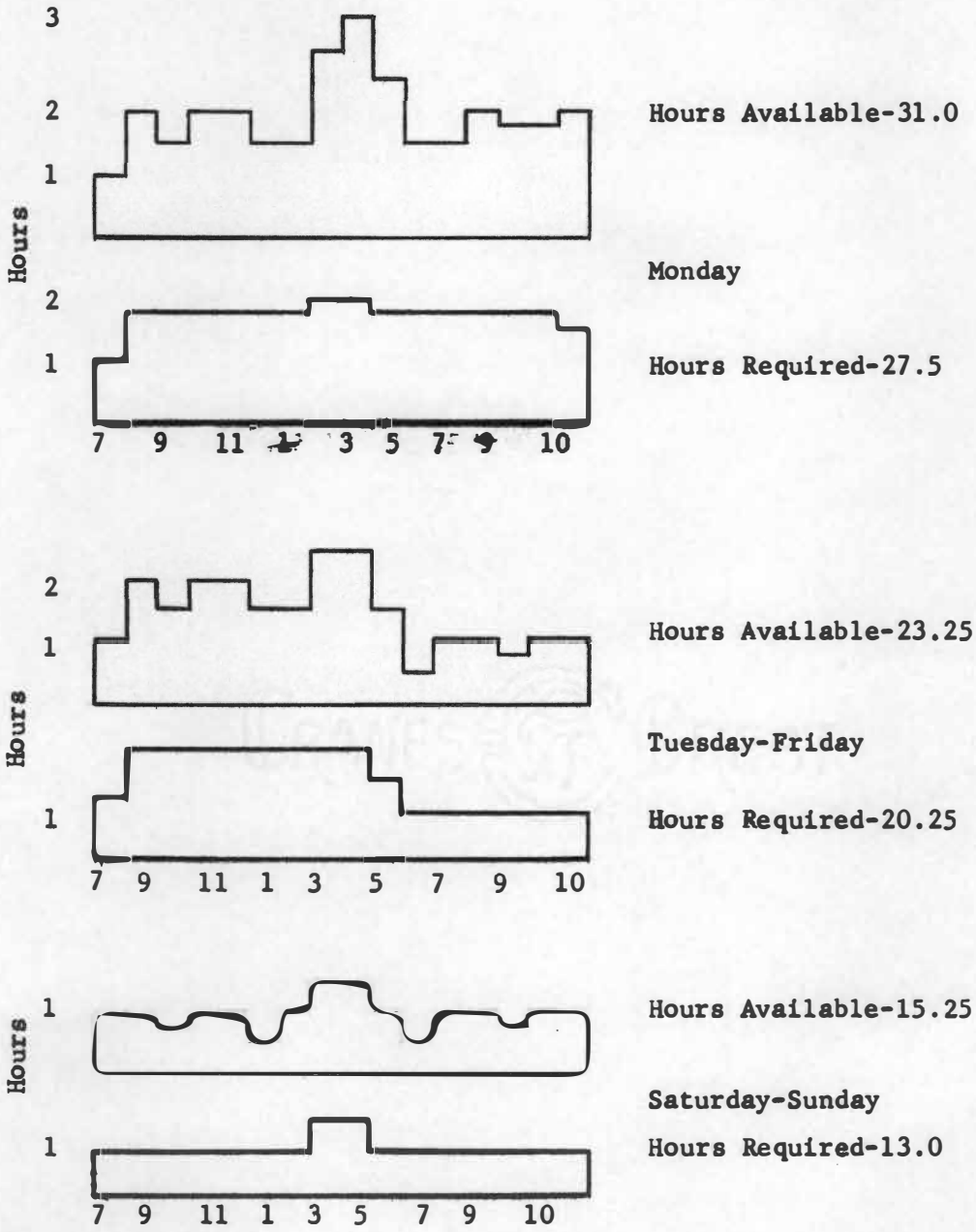


Figure 12. Anticipated pharmacist hours available and required.

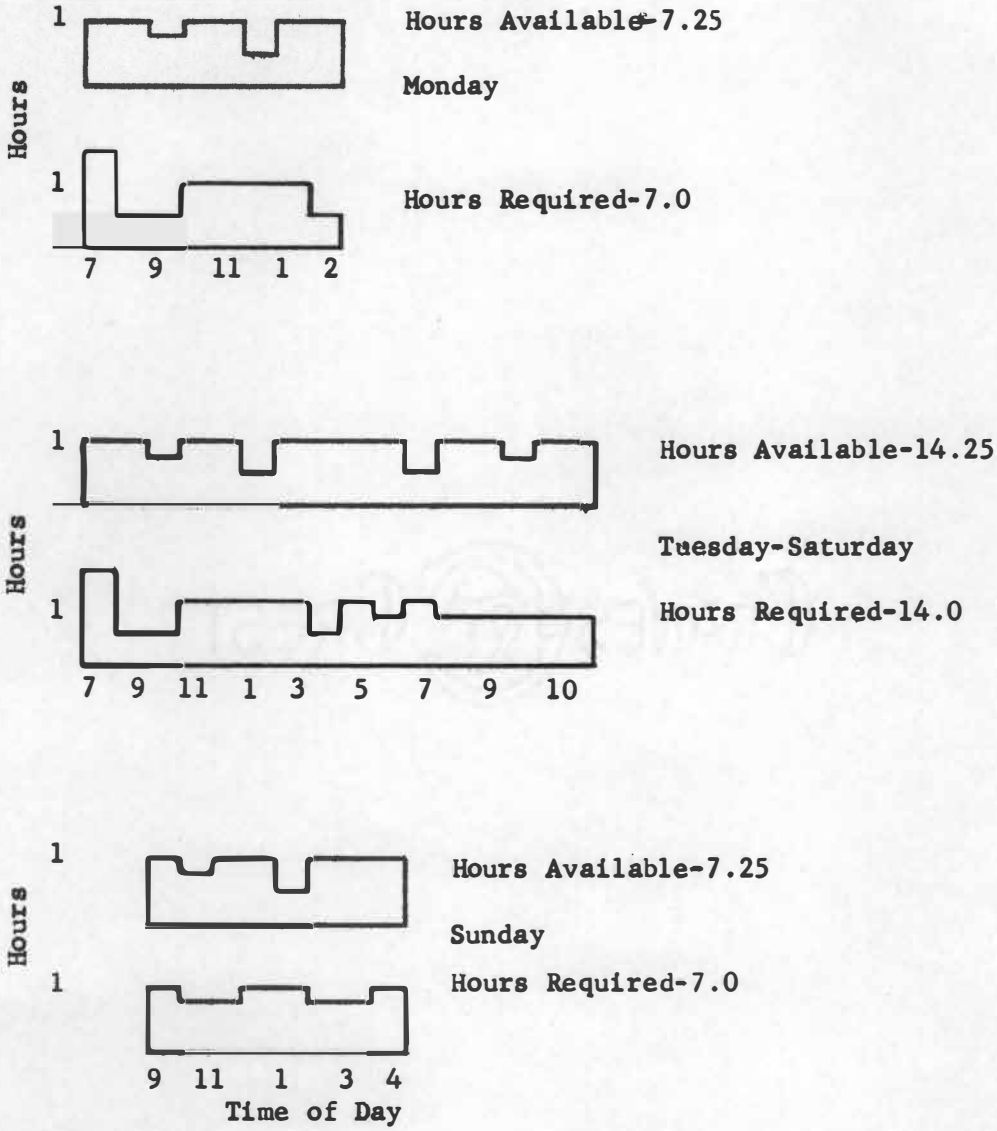


Figure 13. Anticipated helper hours available and required.

1. Establish and review periodically a drug formulary list. With drugs being purchased under generic names instead of brand names, savings which could be passed on to the patients could be realized. This is an important step to be taken, especially in light of recent activities in congress concerning the subject of drug prices.

2. Develop a written statement of pharmacy rules and policies.

3. Prevent duplication in the stocking of the same basic drugs.

4. Make decisions as to which drugs should be stocked by the nursing stations and other departments.

In addition to the valuable functions which would be performed by the committee, there is another reason for its existence. In order to be eligible under the medicare bill (Section 1861-E of the Social Security Act-Medicare), a hospital must have an active pharmacy and therapeutics committee (4, p. 3). This committee, if formed, should meet at least quarterly to review policies and regulations.

Distribution of medications. Although the narcotics should continue to be distributed as they are at present, it is recommended that every pharmacist have access to the narcotics in case an emergency arises.

Another step toward the expedition of dispensing requisitioned drugs would be the prepackaging of as many tablet and capsule medications as possible. The second helper could be assisted in the performance of this job by the second shift pharmacists in their spare time. The prepackaging of the additional medications would be contingent upon the hiring of another pharmacist, since helper time is the only time which

can be allotted to the job at the present.

A statement should be issued by the hospital administration to all personnel concerning the proper use of the pneumatic tube system. Although this action would not eliminate misuse of the system, it would be a step in the right direction.

A final recommendation in the area of the distribution of medications is that larger containers should be used for the stock drugs. This change would save time both at the nursing stations and in the pharmacy.

Ordering and receiving. Although the jobs of inventorying, receiving, and stocking could be performed by a helper, a pharmacist will probably have to perform this duty because of the existing high work load of the helpers. Only the head pharmacist should confer with salesmen and order medications. This step should be taken in order to insure control and consistency in the stocking of medications.

Summary. The incorporation of the changes and additions recommended by the author would bring about changes in the functions and working schedules of the staff members. Although Table XI, page 74, shows a suggested schedule of work, it is by no means a final recommendation. The adjustment of the jobs performed by each member would have to be done after the addition of the new head pharmacist, at which time it could be seen how each person's job is affected.

II. RECOMMENDATIONS FOR FUTURE STUDY

Unit dose system. The prepackaging of tablet and capsule drugs which is presently being done at Saint Mary's Hospital may be thought of as a modified unit dose system. However, the ultimate unit dose system is one in which each dose of each drug is dispensed in an individual package. Such a system would be incompatible with some of the present facilities of the pharmacy, of which the tube system is one. The tube carrier is not well suited to the unit dose system, because tablets and capsules packaged in individual doeses would often prove too bulky to be sent through the tube carrier. Also, the unit dose system requires fewer pharmacists than helpers. This is because the medications, being individually packaged and labeled, can be dispensed by helpers under the supervision of a pharmacist. Although it is impractical at the present time, the unit dose system might prove to be very feasible at some future time. Therefore, any major expansion or physical change of the pharmacy should be accompanied by a detailed study of the possibility of incorporating a complete unit dose system.

There are certain drawbacks to the unit dose system. Today, only about 32 per cent of the tablets and capsules used in hospitals are available from industry in unit dose strip packages. The remainder of the medications must be packaged within the pharmacy department. The University of Kentucky Medical Center, which has a complete unit dose system, uses a Uni-Strip Packer obtained from the Ivers-Lee Company at a cost of $3,000.00. Also, almost no liquids are available in unit doses.

These may be packaged using a Filamatic Liquid Filler which is available from the National Instrument Company. With the incorporation of the unit dose system, it may also be necessary to purchase a small dispensing cabinet, at a cost of $15.00, for each nursing station (9, p. 1).

Brewer system. Like the unit dose system, a detailed study of the Brewer system is beyond the scope of this thesis. Also, the incorporation of the Brewer system would probably prove to be unfeasible at the present time because:

1. A very high cost is involved with the incorporation of the Brewer system.

2. The tube system is an effective means of transporting medications to the nursing stations.

It is recommended that any hospital expansion should be accompanied by a study of the Brewer system. This study should include economic and efficiency comparisons between the pneumatic tube and Brewer systems. This study should also be made in conjunction with the study of the unit dose system, in order to determine if the different systems could be combined in some way.

At the present time, there is much debate about the legality of the Brewer system because of the fact that nurses receive the medications from machines instead of from pharmacists. In some states the system has been declared legal, and in others it has been declared illegal (2, p. 102). The system is making gains as to its legality all over the United States, and the precedent has been set in Tennessee, with two

hospitals in Knoxville already using the system.

Drug distribution system. It is the author's opinion that the present drug distribution system is an efficient one, and only the minor changes previously recommended need to be made at the present. However, events may occur in the future which will require a completely different type of distribution system. An example of such an event would be the passing of a law in Tennessee requiring pharmacists to read and interpret doctors' orders for medications. Such a law has already been enacted in the state of Michigan (7, p. 202). If a major change in the distribution system were required, a detailed analysis would have to be made in order to determine the best possible system.

Technician training. Finally, it is recommended that an investigation be made concerning the feasibility of establishing a formal training course for pharmacy technicians. Such a program would benefit not only Saint Mary's Hospital, but also other area hospitals as well. The course could be taught to technicians from hospitals in the area. In addition to the above, the hospitals could work in conjunction with The University of Tennessee to have basic courses, such as chemistry, taught to the technicians. The final objective of such a program would be to enable the technicians to perform their jobs more efficiently. Also, with the proper training, technicians would be able to relieve pharmacists of some of their present duties.

An example of one training program is one which is being taught at

Long Island Jewish Hospital in New York. During the program, technicians are taught basic facts about such subjects as:

1. Purposes and functions of the pharmacy department.
2. Role of the pharmacy technician.
3. Restrictions by law on technician activities.

In addition, they are given instructions concerning specific jobs which they are expected to perform (6, pp. 402-403).

CHAPTER IX

SUMMARY

This thesis has presented the author's findings and recommendations concerning the pharmacy department at Saint Mary's Hospital. It was stated initially that one of the main objectives of the thesis was to analyze how the helpers could be most effectively utilized, since the shortage of pharmacists is becoming an increasing problem. The recommendations made might indicate that the utilization of non-pharmacists in pharmacy departments is limited, and that pharmacists perform most of the work. However, this is not necessarily the case. The author simply felt that the recommendations made would best solve the problem under question. It should be pointed out that non-pharmacist personnel is being utilized almost as efficiently as possible at Saint Mary's Hospital. The helpers in the pharmacy simply do not have the training and background to perform many of the tasks within the department.

It should be pointed out that the findings and recommendations presented in this thesis should not be applied directly to any other hospital pharmacy department. All pharmacy departments observed by the author are operated differently, and studies of them would produce different sets of findings. Some of the material presented is, of course, basic to all hospital pharmacies; and it might be helpful to anyone making a study of hospital pharmacy departments. However, each study should be conducted according to the needs and operation of the individual

pharmacy department.

A final conclusion is that there is an ever increasing need for knowledgeable help within hospital pharmacies, a need which cannot be completely met by professional personnel. Therefore it is essential that non-pharmacists be properly trained in the operation and needs of the hospital pharmacy department.

REFERENCES

REFERENCES

A. SELECTED REFERENCES

1. Bowles, Grover C. "Proper Utilization of Non-pharmacist Increases Efficiency of Pharmacist," Modern Hospital, 105:142, August 1965.

2. "Drug Distribution System Makes Gains in Legal Tangle," Hospitals, 40:102, December 16, 1966.

3. Francke, Don, Clifton Latiolais, Gloria Francke, and Norman Ho. Mirror to Hospital Pharmacy. Easton, Pennsylvania: Mack Printing Company, 1964.

4. Mahaffey, Fred T. Letter from Secretary of National Association of Pharmacy to Secretaries of State Boards of Pharmacy. Personal Correspondence, February 22, 1966.

5. "Minimum Standards for Pharmacies in Hospitals." A Report Prepared by the American Society of Hospital Pharmacists, Washington, D. C., January, 1966.

6. Pike, M. "Hospital Pharmacy Technician Training Program: Long Island Jewish Hospital," American Journal of Hospital Pharmacy, 23:402-403, August, 1966.

7. Smalley, Harold E. and John R. Freeman. Hospital Industrial Engineering. New York: Reinhold Publishing Company, 1966.

8. Turnbull, Ronald T. and Grover C. Bowles. "Current Trends in the Utilization of Hospital Pharmacy Personnel," American Journal of Hospital Pharmacy, 22:597-605, November, 1965.

9. "Unit Dose System at the University of Kentucky Medical Center." A Report Prepared by the University of Kentucky Medical Center, Lexington.

B. ADDITIONAL REFERENCES

10. "Abilities Required of Hospital Pharmacists," American Journal of Hospital Pharmacy, 19:493, September, 1962.

11. Archambault, George F. "Qualifications and Responsibilities of Lay Help in the Hospital Pharmacy," American Journal of Hospital Pharmacy, 15:210-215, March, 1958.

12. Brown, Ray E. "Dynamics of the Hospital Pharmacy," American Journal of Hospital Pharmacy, 18:437-441, August, 1961.

13. "Critical Shortage of Hospital Pharmacists," British Hospital and Social Service Journal, 75:52-53, January 8, 1965.

14. "Guiding Principles on the Operation of the Hospital Formulary System," American Journal of Hospital Pharmacy, 21:40, January, 1964.

15. "Medication Control and Charge System." A Report Prepared by Community Systems Foundation, Ann Arbor, Michigan, November, 1965.

APPENDIXES

APPENDIX A

STUDY OF OTHER HOSPITAL PHARMACY DEPARTMENT

The information presented in this appendix is the result of personal study by the author and is important insofar as it provides a basis for comparison with the main study. This study consisted of observing three hospital pharmacies in the Knoxville area other than the one at Saint Mary's Hospital.

I. UNIVERSITY OF TENNESSEE MEMORIAL RESEARCH CENTER AND HOSPITAL

The pharmacy department at the University of Tennessee Memorial Research Center and Hospital, which has a 300 bed capacity, has operating hours from 8:00 A.M. to 9:00 P.M. Monday through Saturday and from 12:00 noon to 9:00 P.M. on Sunday. There are twelve people on the pharmacy staff, which is broken down in the following manner: three full time pharmacists (a head pharmacist and two staff pharmacists), one part-time pharmacist, one secretary, five pharmacy clerks (helpers), and two messengers. There are two reasons for the pharmacy having such a large staff. The first is that the pharmacy dispenses a large volume of outpatient medications. In fact, the number of prescriptions filled for outpatients exceeds the number filled for inpatients. It is estimated that one pharmacist and one clerk on duty at all times could properly dispense the inpatient medications. The second reason for the large staff is that the pharmacy has no mechanical means for receiving requisitions from and sending medications to the nursing stations. These jobs are performed entirely by the messengers employed by the pharmacy department.

The pharmacists perform all jobs requiring professional knowledge in the pharmacy and the clerks perform the routine tasks, such as stocking, inventorying, and pricing. The clerks also prepackage medications, type labels, and fill certain requisition orders. All of these jobs are done under the close supervision of a pharmacist. The secretary carries out the duties of bookkeeping, filing, miscellaneous typing, and answering the telephone.

II. EAST TENNESSEE BAPTIST HOSPITAL

The pharmacy serving the smallest hospital, East Tennessee Baptist Hospital (a 260 bed hospital), also dispenses medications to outpatients.

The pharmacy department operates from 8:00 A.M. to 8:00 P.M. seven days a week and is staffed by three pharmacists and three helpers. Working hours are such that more persons are on duty during the middle hours of the day than during the early and late hours.

Because the drug distribution system is very different from those previously encountered and because it has an effect on the work load distribution of the personnel, it deserves some attention at this point. The pharmacy department at Baptist Hospital uses the Brewer system in dispensing its medications. The Brewer system consists of a machine at each nursing station from which drugs can be obtained by the nurses. The medications are first prepackaged into small containers (twelve tablets to a container), which are then placed into the machines by a pharmacist. Only the pharmacists are able to open the machines, but the nurses can receive one container of a medication by inserting a prescription for the medication into a machine and then pushing certain buttons on the machine. It is estimated that about 75 per cent of the requisitioned drugs are dispensed through the Brewer machines.

The use of the Brewer system of dispensing medications means that almost all of the tablet and capsule form of drugs must be prepackaged. This job is performed by the helpers under the supervision of a pharmacist. The pharmacist then makes a final check of the medications as he puts them into the machines.

The helpers also perform such routine tasks as inventorying, pricing, and refunding. The pharmacists fill outpatient prescriptions and perform all other professional tasks, including the ordering of medications.

III. FORT SANDERS PRESBYTERIAN HOSPITAL

The pharmacy department at Fort Sanders Presbyterian Hospital, wich has a 385 bed capacity, operates from 7:00 A.M. to 7:00 P.M. seven days a week and is staffed by two pharmacists, to helpers, and one part-time maid.

The pharmacy dispenses drugs only to patients of the hospital. The delivery of drugs to the nursing stations is done by two different methods. A few of the medications are distributed through Brewer machines, but most of them are sent to the stations on a dumbwaiter.

As in the other hospitals, the pharmacists fill narcotic orders and requisitions requiring professional knowledge, order medications from the suppliers, and correlate the duties of the pharmacy with those of the hospital. The helpers prepackage, inventory, and replenish floor stock. They also fill certain prescriptions, which are then checked by a pharmacist. The maid cleans the pharmacy and the department (Central Supply) adjoining it.

APPENDIX B

JOB DESCIRPTIONS OF THE PHARMACY DEPARTMENT

The job descriptions listed below were taken from the personnel files at Saint Mary's Hospital. It is seen that the descriptions compare very well with the duties actually performed.

I. HEAD PHARMACIST

The head pharmacist supervises, directs, and participates in the activities of the pharmacy. He instructs, individually, nurses assigned the responsibility of issuing narcotics to patients. He dispenses narcotics and requisitioned prescriptions as needed, orders drugs from salesmen, and checks requisitions filled by the pharmacist aides. He performs the tasks of preparing reports and inventorying.

II. STAFF PHARMACIST

The staff pharmacist compounds and dispenses prescriptions for all medications except narcotics. He occasionally fills stock drug requisitions, restocks credited drugs, and checks requisitions filled by the pharmacist aides.

III. PHARMACIST AIDE

The pharmacist aide (designated in this thesis as helper) performs a variety of tasks under the direction of the head and staff pharmacists. These tasks consist of: filling prescriptions for routine medicines and supplies, filling floor stock, receiving orders and delivering medications, answering the telephone, stocking of drugs, crediting of unused drugs, and housekeeping.