AN EVALUATION OF THE DRUG-DISTRIBUTION SYSTEM AT BRACKENRIDGE HOSPITAL, AUSTIN, TEXAS

A PROJECT REPORT SUBMITTED TO THE FACULTY

OF

BAYLOR UNIVERSITY

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

MASTER OF HOSPITAL ADMINISTRATION

by

Dante A. Chiei

MAJ MSC

San Antonio, Texas

January, 1969

APPROVED BY THE DEPARTMENT OF ADMINISTRATION
MEDICAL FIELD SERVICE SCHOOL

DIRECTOR OF PROJECT

DIRECTOR OF INSTRUCTION

APPROVED BY THE GRADUATE SCHOOL, BAYLOR UNIVERSITY

DEAN OF THE GRADUATE SCHOOL

DATE: January 20, 1965

AN EVALUATION OF THE DRUG-DISTRIBUTION SYSTEM AT BRACKENRIDGE HOSPITAL, AUSTIN, TEXAS

MAJ Dante A. Chiei

103 Pages August, 1969

ABSTRACT

The writer describes a hospital drug-distribution system based on the use of a physician's prescription and a individualized patient medication record maintained by the pharmacy. The pharmacist dispenses a three-day supply of medication in accordance with the physician's prescription. A pharmacy clerk then transcribes pertinent information to the patient medication record. The clerk also calculates a reorder date if more than a three-day supply of medication is required. The purpose of this system is to free the nurse from performing pharmaceutical duties.

ACKNOWLEDGMENTS

Research of this type performed for this project required the assistance and guidance of many individuals in Brackenridge Hospital. This assistance would be impossible without authorization by the Administrator, Ben Tobias.

Sincere appreciation is extended to:

Robert L. Lantos, Director of Pharmacy; and

Mrs. Deanna Scott, Pharmacy Resident.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

In the past twenty years, the number of drugs available to the physician in his armamentum has increased rapidly. Most hospital pharmacies have upwards of 1,000 or more drugs in varying dosage forms; some have as high as 2,000 or 3,000.[1] The result has been a tremendous increase in the burden that has been placed on the nursing staff. No longer does the nurse simply administer medicinals such as aspirin and quinine. She now must be able to administer a multitude of drugs which are tailored to control or alleviate certain specific conditions. In addition to the large number of new drugs becoming available each year, the nurse is expected to be familiar with the problems of obsolescence and deterioration of drugs. This only complicates matters because, according to the Pharmaceutical Manufacturers Association, the life span of a new drug is estimated to be three years.[1] The

---

[1] F. Regis Kenna, "A Pharmacist Looks at Drug Dispensing Machines," Hospitals, XXXVII (February 1, 1963), 60.

[2] Sister M. Cassall, "A Nurse Views the Trends in Pharmaceutical Dispensing Practices," Hospital Management, XCV (June, 1963), 82.

situation is further complicated by the occurrence of therapeutic incompatibilities. (This is when two drugs administered to the same patient cause an undesired reaction.) However, because of the severe shortage of nurses, the administration of drugs is being delegated to various nonprofessional members of the nursing team, such as the aide and practical nurse.[3] Individuals with a limited amount of knowledge in the area of medication are now actually reconstituting, diluting, and compounding various types of complicated medications. These individuals are, in reality, performing the duties of a pharmacist.

The result has been the creation of medication errors, comprising either a deviation from the physician's written order or administration of the wrong drug. The seriousness of medication errors was aptly described by Barker and McConnell when they stated that "though only 36 errors were reported in a year's time (referring to a specific hospital), the number which actually occurred was 51,200."[4] Perhaps

---

[3]Robert C. Bogash, "Drug Packaging and Distribution as Seen by a Hospital Pharmacist," Hospital Topics, XLII (June, 1964), 79.

[4]Kenneth N. Barker and Warren E. McConnell, "The Problems of Detecting Medication Errors in Hospitals," American Journal of Hospital Pharmacy, XIX (August, 1962), 444.

the situation can be attributed to the fact that many of the individuals committing the errors were not aware of their mistakes; also a portion of the blame can be attributed to poor reporting of errors, possibly due to a fear of legal reprisal on the part of the person committing the error. It is conceivable that the number of errors will continue to increase as the number of practical nurses increase, procure the services of registered nurses coming out of retirement, and acquire the services of a large number of foreign-trained nurses. Because of the lack of background, one cannot expect these individuals to be acquainted with the latest procedures, drugs, diagnostic tests, or terminology.

The drug-distribution systems presently in use in many hospitals fail to take these factors into consideration. They are still operated in the old time-worn tradition of expecting the pharmacist to dispense the drugs and the nurse to administer them. Thus, the pharmacist loses jurisdiction over the drugs once they leave the pharmacy. Robert C. Bogash very appropriately summed up the situation when he said, "As he dispenses the product, the pharmacist loses control; he has no assurance that product stability will be maintained through proper storage or that the product will not be used after its

labeled expiration date."[5] This particularly applies to the use of antibiotics and parenteral solutions.

Fundamentally, there are three segments to the drug-distribution operation: writing of the order by the physician, interpretation, and dispensing of the order by the pharmacist. The nurse comprises the third segment, and her responsibility is to order and maintain inventory control over all the medications stored at her station. Often, the nurse is not aware of the medications available at the pharmacy. As a result, she crushes tablets, breaks unscored tablets, and goes as far as to mix injectables without regard to the possible existence of incompatabilities.[6] Under the existing system, the pharmacist is severely limited in his contribution to the medication operation. Seldom does he ever become acquainted with the whole patient through the media of the diagnosis and the medication being prescribed. This situation prevents the pharmacist from acting as a drug consultant and being able to point out deficiencies in certain therapy being prescribed. Therefore, it can be said at this

---

[5] Bogash, op. cit., p. 79.

[6] "Study of Patient Care Involving Unit Dose System Underway in Iowa," Hospital Topics, XLII (June, 1964), 81.

point that the pharmacist is not being utilized to the best of his abilities. MacEachern apparently was aware of this situation when he said, "The pharmacy is the most extensively used of the therapeutic facilities of the hospital. Frequently it is not organized or managed as its importance deserves."[7]

The pharmacist, by virtue of his training, is more qualified to control and monitor the drug-distribution system than any other member of the health team. As a means of comparison, the pharmacist has more extensive training in the field of medicinal chemistry than the average nurse. Cynthia Henderson, a writer of nursing articles, frankly agreed with this point when she said, "Short of adding the entire formal preparation for licensure as a pharmacist, nursing education cannot prepare its students to practice pharmacy."[8] However, an efficient drug-distribution system can only come as a result of co-operation among all members of the health care team.

The need for a drug-distribution system that will prevent medication errors, therefore, becomes a necessity in the

---

[7]Malcolm T. MacEachern, Hospital Organization and Management (Berwyn, Ill.: Physicians' Record Co., 1962), p. 461.

[8]Cynthia Henderson, "The Dispensing Trilemma," American Journal of Nursing, LXV (December, 1965), 61.

hospital operation. An effective system can be obtained only through the co-operative efforts of the nurse and physician with the pharmacist, the pharmacist being given the responsibility for the operation of the drug-distribution system from the time the physician writes the medication order to the point of administration of the medication by the nurse.

Statement of the Problem

To determine if the drug-distribution system in use at Brackenridge Hospital can be improved in order that patient safety and nursing efficiency might be increased.

Reasons for the Study

The administrator at Brackenridge Hospital requested that a detailed analysis be conducted of the present drug-distribution system. His dissatisfaction appeared to center around the pharmacy chart form upon which the system is based. This is the chart to which the nurse posts all medication administered to the patient from the nursing unit drug stock. It is also used to order medications available only from the pharmacy. All medication orders are transcribed from the original doctors' orders to the pharmacy chart by the nurse. This, the administrator claimed, is where the system apparently breaks down because the nurse delineates the task to

the ward clerk. The ward clerk, because of the press of other duties, in many cases fails to completely account for the medications administered from the ward stock. This particular omission has resulted in loss of revenue for the hospital.[9]

The pharmacy director also mentioned that the ward clerks are committing errors in transcribing the doctors' orders for drugs stocked only by the pharmacy. In addition, he claimed that the clerks fail to transmit the completed pharmacy chart to the pharmacy for pricing when a patient is being discharged. As a result, a late drug charge has to be made which has caused irritation among both the patients and third-party payers.[10]

Therefore, the administrator would like to see a procedure devised that will completely relieve the nursing personnel of the responsibility for administering the drug-distribution system. He believes that the development of such a measure will increase the efficiency of the system.

---

[9] Interview with the Administrator, January 31, 1966.

[10] Interview with the Pharmacy Director, February 1, 1966.

Definition of Terms

Medication error--

> . . . the administration of the wrong medication or dose of medication, drug, diagnostic agent, chemical, or treatment requiring the use of such agents, to the wrong patient or at the wrong time, or the failure to administer such agents at the specified time or in the manner prescribed or normally considered as accepted practice.[11]

Drug dispensing--

> . . . involves the issuance of one (1) or more doses of a medication in containers other than the original, such as new containers being properly labeled by the dispenser as to contents and/or directions for use as indicated by the prescriber.[12]

Drug administration--"a single dose is administered to a patient by the nurse as a result of an order of a physician or other licensed practitioner."[13]

Unit dose--"a package containing a predetermined amount or supply for one usual dose, application or use."[14]

---

[11] Barker and McConnell, op. cit., p. 454.

[12] David F. Moravec, "Legal Aspects of Drug Distribution and Administration," Hospital Management, CII (November, 1966).

[13] Ibid.

[14] Kenneth N. Barker, "Interim Report of Committee on Drug Distribution Systems in Hospitals," American Journal of Hospital Pharmacy, XX (August, 1962), 405.

Criteria

1. The safety of the patient must be kept in mind at all times; therefore, the system must be capable of administering the right medication to the right patient at the prescribed time.

2. The system devised must legally protect the hospital by compliance with local, state, and federal laws concerning the practice of pharmacy.

3. A registered pharmacist must monitor the system to reduce the occurrence of medication errors.

4. Emphasis should be placed on the use of the prescriber's original medication order or a direct copy.

5. The system must be able to provide the patient with an up-to-date drug bill at time of discharge.

6. The system should be able to provide medications on a twenty-four hour, seven-day-a-week basis.

CHAPTER II

FACTS BEARING ON THE PROBLEM

1. Any drug-distribution system devised must be practical and economically feasible within present budgetary limitations.

2. The pharmacist under the present drug-distribution system receives only a transcribed copy of the medication order. As a result, he is not familiar with the diagnosis or the other drug orders that may be in effect for the same patient. This prevents him from becoming acquainted with the whole patient.

3. The pharmacy operates on an 8:00 A.M. to 9:00 P.M. schedule, five days a week, Monday through Friday. Coverage is not provided on Saturday and Sunday.

4. The present pharmacy staff consists of five registered pharmacists, two clerks, four part-time undergraduate pharmacy students, and one pharmacy resident.

Assumptions

1. The increasing shortage of nurses will reduce the amount of time the nurse can expend procuring and dispensing medications; therefore, she will have to emphasize

administering drugs, rather than ordering and retrieving them.

2. As treatment increases in complexity, the nurse will be required to spend more time in the area of patient care. This will reduce the amount of time spent in providing medication therapy.

3. The pharmacist is not being employed to the fullest extent of technical ability in the hospital.

4. Funds will be available for the procurement of additional clerks for the pharmacy.

5. It is anticipated that three additional pharmacy residents will be assigned in October, 1966.

6. Future plans of Brackenridge Hospital call for the construction of an additional wing with a capacity of 210 beds.

Review of the Literature

Study of patient care involving unit dose system underway in Iowa.--This study is designed to measure the total medication cycle in hospitals, with emphasis being placed on speeding up drug distribution and simplifying and improving communications in handling medicines.[1]

---

[1] "Study of Patient Care Involving Unit Dose System Underway in Iowa," op. cit, pp. 81-82.

Among the significant factors involved in the study are the use of photo-scanning equipment which provide a direct means of transmitting an actual reproduction of the physician's original medication order; the value of the pharmacist as a consultant to physicians and nurses; testing of a total system of unit dose packaging and labeling to reveal the practicality of this method; an attempt to measure the extent of the medication errors in present systems; and the effect of the proposed changes in procedures on medication errors.

In recent hospital pharmacy history, there has been a great increase in interest in the problems of drug distribution. When it is considered that the pharmacy is now involved in such operations as fluid production, central supply, purchasing, and many others, the drug-distribution operation becomes one of the most important and far-reaching operations in the hospital. Any deficiency in this system will be reflected in other areas in which personnel controlling pharmacy are also active. However, under existing systems, the pharmacy department is limited in its contribution to the medication cycle. The pharmacist does not have the necessary information regarding the patient's diagnosis;

therefore, he cannot act as a consultant and challenge the therapy.

Study contends that these deficiencies arise partially from the static quality of personnel duties and responsibilities, an attitude which is based on the premise that hospital organization is traditionalistic. A second contention is that educational progress for professional hospital personnel has expanded in such a manner that the full potentialities of training frequently are not utilized to the maximum benefit of the institution.

Tradition has given the nurse the major responsibility involving the use of medications within the hospital. The physician has the duty to prescribe and the pharmacist has as his main duty to see that the ward is supplied with the drugs desired. All remaining functions are placed in the hands of the nurse; the ordering of the drugs from the pharmacy; control of the ward inventory; preparation of the drug to be administered; administration of drugs and maintenance of records of the drugs to be administered; administration of drugs; and maintenance of records.

At the same time, the pharmacy staff is not contributing as much in the hospital as their training has prepared

them to contribute. The author contends that a shortage of nurses and pharmacists does not exist, but rather a shortage of nurses and pharmacists practicing their respective professions. Therefore, changes in the present methods of drug distribution must occur.

Two points must be established before any improvement of the situation can occur:

1. Direct orders from physician to pharmacist.

2. The pharmacist assuming those duties of a pharmaceutical nature that tradition has given to the nurse.

This can be implemented by placing a pharmacy substation in the vicinity of several wards. The substation would be staffed by one registered pharmacist, 24 hours a day, and one courier, 24 hours a day. Functions which the pharmacy substation will perform are as follows:

1. Interpreting the physician's medication orders directly from the patient's record.

2. Providing a single dose of all medications to the nurse at the scheduled administration time in a form which is labeled with the size of concentration, identity, and name of patient.

3. Ordering, storing, controlling inventory, and preparing medications in a form ready for administration by the nurse.

4. Consulting with medical and nursing staffs on medication usage.

The planned method involves photographic equipment which will reproduce the order form at a rate of 360 lines per minute, transmit it from the nurses' station to the pharmacy substation, and produce an actual reproduction of the order in the physician's own handwriting.

The objective of this method is to transmit a copy of each order change to the pharmacy substation at the time it is written by the physician. The pharmacist will then interpret directly each order and transcribe it to a medication card for each patient, permitting a direct interpretation and correlation of all orders by the pharmacist.

In addition to the communication study in the project, a system for mechanically packaging all medications in a single-dose package is being developed for testing so that its effect on the safety and efficiency of the medication cycle may be evaluated.

Three package designs developed were the "Hypule," "Dropule," and "Cupule." "Hypule" is a prefilled disposable hypodermic device containing a sterile solution. A modification of the device, the "Dropule," is designed for oral

drop doses, and eye drops. Oral teaspoon doses and ointments are packaged in a single dose in the "Cupule."

From all indications, the system under consideration is capable of reducing medication errors and bringing about the more effective utilization of the existing numbers of pharmacists and nurses. The University of Iowa goes on further to contend that the system being developed is actually capable of alleviating the present shortage of pharmacists and nurses. Apparently, the people at Iowa are taking a step in the right direction.

Experimental distribution system offers total drug control.--This system, developed at the University of Arkansas, utilizes electronic data-processing equipment for the purpose of reducing medication errors.[2] As a secondary safeguard, all medication formerly stored on nursing stations are now kept in a central pharmacy area.

In the central pharmacy area, all tablets, capsules, and suppositories are prepackaged. All injections are packaged

---

[2]Kenneth N. Barker and W. Heller, "The Development of a Centralized Unit-Dose Dispensing System, Part I; Description of the U.S.M.C. Experimental System," American Journal of Hospital Pharmacy, XX (November, 1963), 568.

and labeled in a disposable syringe. Transportation of medications to nursing stations is via an automatic conveyor dumbwaiter system. Only bulk disinfectants and emergency drugs remain on the nurses' station.

In this system, a carbon copy of the physisian's medication order is sent via pneumatic tube to the pharmacy. The information on the order is key punched into an IBM card. This card is then filled with the remainder of the cards for that patient. The cards are then placed on a telegraphic reader, and transmits the order to a teletype receiving unit on an appropriate nursing unit. It prints out a drug summary form for the nurse for one patient.

All cards are electronically sorted every two hours. Cards with doses due are placed in an accounting machine which prints the medication order on front of an individual envelope for filing and dispensing.

This system relieves the nurse of the responsibility for the interpreting and dispensing the physician's medication order. As a result, she is free to devote additional time to the nursing care of her patients.

Transmitting physicians' orders with an automated writing device.--As hospital pharmacy continues to extend its services by way of longer hours, expanded drug information facilities, more adequate student programs, compounding of special formulations, as well as by increased research and investigational studies, it will become increasingly necessary to take full advantage of the findings of allied sciences to expedite our activities.[3]

The major concern of the pharmacist, nevertheless, remains steadfast in this ever-changing complex; namely, to provide optimum patient care through safe, sound, and select dispensing methods to meet the particular needs of the present time. However, nearly every advancement involves potential dangers. Today, the largest number of incident reports filled out in a hospital concerns medication errors. This is not surprising, considering the large number of potent drugs that are administered daily by persons of varying background and experience. Medication errors involve two hazards: adverse reactions to drugs and inadvertent administration of a potent drug or dosage to a patient in a manner

---

[3] Sister Mary Virginia, "Transmitting Physicians' Orders with an Automated Writing Device," American Journal of Hospital Pharmacy, XXII (August, 1965), 464-67.

not intended by a physician.

One way of combatting this source of medication risk is for the pharmacist in the hospital to review the physician's order as does his colleague in community pharmacy practice. Where time and accuracy count, as in the international airports, automated writing devices have been installed to relay flight messages immediately; therefore, it is recommended that such devices be used in the hospital. Through the use of a transmitting and receiving device such as the Electrowriter, prescription orders are written by the physician on the nursing unit and relayed immediately and directly to the pharmacist in the dispensing laboratory.

Now drug orders do not have to wait to be translated knowingly or to be transcribed clerically. The pharmacist is able confidently to fill the physician's order without reservations as to its authenticity. Neither does the pharmacist spend hours trying to locate physicians on the premises, in their homes, or offices. As a result of this system, the nurse is now concerned about administering the drug, rather than ordering and retrieving.

Automatic drug dispensing.--Describes a device which automatically dispenses medicines on the ward while recording

each transaction.[4] To activate the machine, the nurse inserts three metal plates: a drug identification, patient identification, and a nurse identification plate. After the machine accepts the plates, it dispenses the drug. A mobile drug cart, containing 56 individual drawers, is then used by the nurse to distribute the medications to the patient.

Several hospitals throughout the United States have adopted this method of drug distribution since it first appeared on the market in early 1962. The majority of them are well satisfied with the system especially from the point of reducing pilferage and loss of drug revenues due to non-recording which commonly occurs with the manual drug-distribution systems.

Approach to the Problem

An investigation into the problem was conducted by physically observing the operation of the drug-distribution system at nursing stations throughout the hospital. The primary method of gathering data consisted of interviewing key personnel, including the administrator, pharmacy director,

---

[4] R. F. Hosford, "Automatic Drug Dispensing," Hospitals, XXXVII (January 16, 1963), 96-103.

chief nurse, and business manager. Nursing service personnel, pharmacy service personnel, and business office personnel were also interviewed. The interview phase was supplemented by attendance at staff meetings, review of hospital directives, and visits to other hospitals. In addition, an extensive examination of current literature in this field was conducted. Written inquiries requesting information concerning the drug-distribution system in use were also directed to selected hospitals.

CHAPTER III

DISCUSSION AND FINDINGS

General Discussion--Drug-distribution Systems

At the present time, there are three different systems of drug distribution in use in the United States. These systems may be categorized as follows: a complete drug floor stock system, an individual patient drug order system, and a combination of the two.[1] In the first system, the drugs required for use on the nursing unit are stored there in bulk. The nurse dispenses all medications on the basis of the physician's medication order. The exact opposite is the individual patient drug order system where the pharmacist dispenses all medications on the basis of an individual prescription. In this system, only emergency drugs and narcotics are kept on the nursing unit. The combination-type drug-distribution system involves both the nurse and the pharmacist in the drug-dispensing function. In this system, the commonly used

---

[1] Clifton J. Latiolais, "What Can be Done to Improve Drug Distribution?," Hospitals, XXXIX (November 16, 1965), 105.

medications are dispensed from the nursing unit while the rare, expensive, and controlled drugs are dispensed by the pharmacy on an individual patient drug order.

These systems have remained basically unchanged for over a generation. Possibly this is the reason why they are placed under the heading of the traditionalist systems.[2] Today, the complete drug floor stock system is becoming a thing of the past as more and more hospitals are required to obtain the services of registered pharmacists. This has come about as the result of measures taken by the American Hospital Association, Joint Commission on the Accreditation of Hospitals, and the American Society of Hospital Pharmacists. However, some progress is now becoming evident in the form of several innovations involving the field of drug-distribution systems (see Review of Literature). David F. Burkholder very aptly summarized the situation concerning drug-distribution systems when he said:

> A few pioneering hospitals are now using automatic data processing equipment for producing a record of individual doses of drug given, or to

---

[2] David F. Burkhold, "Pharmacy," Hospitals, XL (April 1, 1966), 125.

> be given to a patient according to schedule. Such systems undoubtedly will provide better drug control and more complete drug information and will give the pharmacist a role in programs of team patient care.[3]

A Typical Combination Drug-distribution System--Brackenridge Hospital

Brackenridge Hospital operates a combination-type drug-distribution system. The system is based on the use of a form entitled "Pharmacy Chart" (see Appendix A). This chart is used to record both the medications administered from the nursing unit floor stock and those obtained from the pharmacy because of nonavailability in the floor stock. The form contains sufficient space to permit the requesting of twenty-one individual patient orders. Both the medications administered and the appropriate charges for such are recorded on this form.

A description of the operation of the drug-distribution system in use at Brackenridge Hospital follows: The physician prescribes the medication and records it by means of an entry into the patient's record. The nurse or ward clerk transcribes the medication order to the Pharmacy Chart. If the item is available from floor stock, the ward clerk or nurse records the quantity administered and the date in the "charge

---

[3] Ibid.

drugs from floor stock" section of the form. However, if the item is not available from floor stock, it is requested in the individual order section of the Pharmacy Chart. In this instance, the chart is dispatched to the pharmacy via pneumatic tube. Upon receipt, the pharmacist reviews the drug order, fills and prices it, and dispatches the medication with the Pharmacy Chart back to the nursing unit via pneumatic tube.

The nurse receives the medication, checks it against the doctor's original order, prepares the drug for administration, and then administers it to the patient. The same identical procedure is followed with drugs obtained from floor stock. After the drug has been administered, the nurse returns to her station and records the data in the patient's clinical record.

In addition to the above, the nurse is responsible for periodically replenishing her floor drug stock. To accomplish this task, she must inventory her stock and determine requirements. The drugs required and their quantities are then transmitted to the pharmacy on a requisition form used for requesting bulk quantities of drugs. The order is filled by the pharmacy and delivered to the nursing unit at

which time the nurse must check the drugs and place them in their proper storage area.

It also is incumbent upon the nurse to send the complete Pharmacy Chart to pharmacy every seven days or upon discharge of the patient, whichever occurs first. The pharmacy, upon receiving the chart, computes the total drug charges, and transmits the chart to the business office. Also, upon the discharge of a patient, the nurse or ward clerk must transmit all unused capsules or tablets, obtained on an individual order with the Pharmacy Chart, to the pharmacy. This condition was brought about by the fact that a patient's account is credited for any tablets or capsules ordered but not consumed, costing over 50 cents per unit. (A sequence description of this system appears as Appendix A.)

Analysis of the Findings

An archaic holdover, that is fraught with danger as far as the patient is concerned, describes the drug-distribution system of Brackenridge Hospital. It also causes the business office problems in obtaining the correct drug charge per patient. This system is responsible for actually taking the nurse away from the bedside of the patient. The nurse is performing both a dispensing and administering

function while the pharmacist is only dispensing. In fact, under this system, the pharmacist does not even check the drug cabinets for the presence of overages.

As was mentioned previously, a definite danger exists in the operation of this system. The danger concerns the most important commodity in the hospital--the patient. Whenever the physician initiates a medication order, it is transcribed by the nurse or ward clerk to the Pharmacy Chart. At this point, an error in transcription could easily occur. There are many drugs available today that bear names that appear quite similar to the untrained eye. As an example, Dilantin,* a drug for the treatment of epilepsy, could easily be confused with Dialudid,* a narcotic. The ward clerks, since they are untrained in the area of medication administration, could very easily switch medications between patients, such as ordering the medication intended for a cardiac patient on the chart of a patient suffering from asthma.

---

*Registered trade names.

Referring back to the nurse and her removal from a patient's bedside, in this system she is actually fulfilling the functions of a pharmacist and business office agent. In the field of pharmacy, the nurse is required to interpret the physician's prescription since the pharmacist does not see it. She must inventory the drug cabinet, requisition drugs required, check them in, and store them. She also must mix and prepare injectables; prepare and add mixtures of drugs into intravenous solutions; combine mixtures of injectables; and change solid doses to liquid preparations, even flavoring the resultant mixtures.

However, her nonnursing duties do not end at this point. The nurse must also record all medication orders on a Pharmacy Chart which is primarily used by the business office in computing the drug charge for each patient. In addition, on the day of discharge, the nurse must return all unused drugs to the pharmacy for credit. It is no wonder that when Dr. Mark Blumberg conducted a survey to determine the amount of time the nurse devoted to the previously mentioned nonnursing duties, the accrued time spent came to 1.2 hours per eight-hour shift per nurse.[4] This represents

---

[4]Mark Blumberg, "Economic Feasibility of Automating Selected Hospital Activities," Final Progress Report, U. S. Public Health Service Grant No. W-111, 1961.

a terrible waste of nursing skill at a time when many hospitals are experiencing a drastic shortage of nurses. The proponents of this drug-distribution system, however, are still claiming that it is a money saver. This contention was recently shown to be fallacious by a hospital-consulting firm that surveyed this type of drug-distribution system in twenty different hospitals. This survey showed that the average annual revenue loss, due to failure by personnel to enter charges for drugs administered which procedurally should be charged to patients, is $128.30 per bed per year.[5] According to this figure, it is quite conceivable that Brackenridge Hospital, a 260-bed institution, is losing a total of $32,758 per year through the nonrecording of inpatient drug charges. These figures do not take into account the amount of money programmed for nursing care that has been funneled into the drug-distribution system by the use of the so-called "pharmaceutical" nurse.

The nurse in this function is compounding and dispensing a most dangerous procedure in her pharmaceutical role. The pharmacist, during the course of his education, spends a

---

[5] "Three Dimensional Drug Losses," Hospital Topics, XXXIX (April, 1961), 53.

major portion of his time concentrating on the individual action of drugs and the reactions that occur when drugs are mixed, both from an external and internal viewpoint: externally, according to what occurs when drugs are combined in preparation for administration to a patient; internally, referring to the action that occurs within the human body when two or more drugs are administered simultaneously. The pharmacist, by virtue of his position, is continually in contact with the latest information concerning drug therapy. This information consists of descriptive material involving the latest adverse drug reactions, incompatibilities, and changes in the composition of various drug combinations. The nurse, on the other hand, does not receive any such detailed training or exposure to the field of drug therapy. The courts have taken notice of this situation and have rendered the following decision in regard to the use of nurses in a pharmaceutical capacity: In a recent case,[6] a minor's death is alleged to have been caused by the negligent handling and administration of a drug by hospital employees. The plaintiff claimed

---

[6] "Hospital Law Manual Newsletter," Health Law Center (Pittsburgh: University of Pittsburgh), No. 20 (May, 1964).

that the hospital did not comply with standards established by the Joint Commission on Accreditation of Hospitals and the American Hospital Association in regard to (1) the operation of pharmacies and drug rooms; (2) the storage, safeguarding, preparation, and dispensing of drugs; (3) the competency of personnel; (4) the control of dangerous drugs, and (5) the medical staff committee on the formulation of drug policies. It was shown that a nurse and her assistant, neither of whom were trained or licensed pharmacists, operated the drug room, received large shipments of drugs, broke them down into smaller quantities, and dispensed them. In this case, the child died after having been given a medication which had come from the pharmacy. There was a question whether the label of the container indicated its true contents.

Hospitals with pharmacies or drug rooms are required to employ licensed pharmacists not only under the standards of the Joint Commission on Accreditation of Hospitals but also under most state laws. The combination of a failure to have a pharmacist in charge of the hospital pharmacy, and harm to a patient as a result of the administration of a drug, may give rise to liability despite the general rule of

charitable immunity. Whereas in Texas, there is an exception to the rule of immunity, the likelihood of liability is high when such failures can be shown.

One of the greatest dangers in this system lies in not giving the pharmacist the original medication order, or at least a direct copy of the order--a copy that could contain an erroneous order due to a mistake on the part of the transcriber. Another danger of the system lies in permitting the return of unused capsules and tablets to the pharmacy to be credited to the patient's account. Some objections to the use of this procedure are as follows:

1. When returned capsules and tablets are returned to opened containers in the pharmacy, a mixing of lot numbers and expiration dates occur.

2. Tablets or capsules being returned may belong to a lot number that has been withdrawn from use because of adverse reactions.

3. Item being returned may be in a state of degradation which could contaminate other items in a container.

4. Item being returned may have a formulation that is different than the item in the pharmacy stock bottle. This frequently occurs with vitamins.

From the standpoint of the business office operation, this system is causing some late charges and credits. Each morning at 0700 hours the ward clerk pulls all pharmacy charts that are seven days old, sends them to the pharmacy for pricing, and pharmacy then sends them to the business office. At 0800 hours, the doctor appears and decides to discharge the patient. The ward clerk cannot locate the patient's chart, so a new chart is initiated and dispatched to the pharmacy which causes nothing but confusion. Often, charts of discharged patients do not indicate credits for unused tablets or capsules. At times, these may come down two or three days after the patient has been discharged. Also charges for last-minute medications are frequently not recorded at time of discharge. In order to compensate for this problem, the business office delays third-party payments for two weeks. This is a most undesirable practice. From the evidence presented, one can certainly conclude that the present drug-distribution system is undesirable, both from the standpoint of financial gain and patient safety.

A Typical Individual Patient Drug-distribution System--Baptist Memorial Hospital

As a means of comparison, the drug-distribution system in operation at Baptist Memorial Hospital, San Antonio, Texas, will be examined. In this system, the nursing units are not permitted to stock quantities of drugs; the only exceptions being drugs of an emergency nature, narcotics, and ordinary use items such as disinfectants, castor oil, and rubbing alcohol. All drugs required for administering patient medication orders are ordered on an individual basis from the pharmacy. This is an example of the individual drug order system.

In this system, the nurse transcribes the medication order from the doctor's notes to an individual pharmacy order for each medication order. Orders for numerous medications for the same patient are never consolidated on one pharmacy order. The order is then sent to the pharmacy for filling. The pharmacist inspects the order, fills it, and sends medication to the nursing unit. There, the nurse checks the medication or medications received and places them in medication boxes. Each box contains the drugs that have been ordered for an individual patient. When the time for medication administration arrives, the nurse either mixes liquids,

crushes tablets, or injects additives into an intravenous solution. The foregoing represent all the procedures that are necessary to permit compliance with the physician's medication order.

Every 24 hours, the pharmacy prices and relays all inpatient drug orders to the business office for posting to individual patient ledgers. At discharge time, any unused capsules or tablets are sent back to the pharmacy for crediting. (A sequence description of this system appears as Appendix E.)

Analysis of the Findings

Upon analysis, this system shows the same drawbacks present in the combination drug-distribution system. First of all, the pharmacist does not see the original physician's order. Again, he receives nothing but a transcribed copy of the medication order. When the medication is administered, the nurse goes through her pharmaceutical role in preparing the medication for administration to the patient. The only worthwhile accomplishment of this system lies in the fact that all drugs are left in the pharmacy. As a result, the nurse is not burdened with being responsible for

the inventorying and requisitioning of drugs for the floor drug stock. This system, to a limited extent, is a step in the right direction, by virtue of the fact that it has eliminated the nursing unit drug floor stock. However, the pharmacist does not become acquainted with the whole patient.

Present Status of Traditional Drug-distribution System

The two drug-distribution systems described are prime examples of the traditional methods of drug distribution in the hospital. These systems emphasize the use of the nurse as both the dispenser and administrator of drugs while the pharmacist only dispenses. Unfortunately, many hospitals will accept these systems as being representative of the ultimate in providing medications for inpatients. However, they are laden with danger as far as the welfare and safety of the patient is concerned. The possibility of the commission of a medication error places the hospitals operating such systems in a dangerous position as far as legal implications are concerned. The doctrine of charitable immunity is only recognized by a few states; this insinuated that the hospitals were immune from legal suits brought by patients for injuries

sustained while being hospitalized.[7] Many courts now award damages to patients on the basis of Res Ipsa Loquitor (the thing speaks for itself). Therefore, a patient who is the victim of a medication error could most certainly be awarded damages under this criteria. Also, one is faced with the misuse of nursing personnel. Today, the public is aware of the fact that a severe shortage of nurses exists. The chief complaint voiced by the public through the news media is that a patient seldom, if ever, sees a nurse except for a few fleeting moments during the day. So, what do some hospitals do? They compound the shortage by forcing the nurse to spend approximately 25 per cent of her time performing pharmaceutical-type duties.[8] In the meantime, the patient suffers because the nurse is away from the bedside.

There are many administrators who, although admitting they recognize these systems as separate entities, still contend that this is the best that can be done in view of the limited operating funds available. They attempt to substantiate their stand by claiming that the pharmacy is the

---

[7] Kenna, op. cit., p. 58.

[8] Blumberg, op. cit.,

biggest "money-maker" in the hospital. However, with a little forethought and realignment, the pharmacy would be able to produce more revenue. An analysis of these systems will show that, primarily, professional personnel are not being properly utilized. Right here, one has a waste of a precious resource--manpower. The nurse who receives an average of two dollars an hour to provide nursing care is away from the patient's bedside one-quarter of the time. The pharmacist, the recognized expert in the field of medication therapy, draws at least three dollars per hour while sitting in the pharmacy dispensing medication and doing very little else. Here is a person who may have anywhere from a Bachelor of Science to a Ph.D degree in pharmacy. These degrees represent on the lower scale at least five years of training in basic science and medication study up to seven years on the Ph.D level. In contrast, there is the nurse who receives anywhere from eight months to two years of basic science and medication study, depending upon whether she has a diploma or Bachelor of Science in Nursing. The pharmacist spends his entire day in contact with drugs, thereby becoming familiar with dosage available, forms of medication, uses, possible dangers associated with the use of drugs, and

the most economical forms of drugs available. The nurse spends only a portion of her day with drugs. Therefore, it seems that the pharmacist is the most logical person for handling the dispensing of drugs throughout the hospital; yet, many institutions--in order to obtain their three dollars per hour from the pharmacist--use him in unrelated tasks such as purchasing and central supply. There is nothing wrong with a pharmacist performing in these areas. However, before placing him in these areas, assign him to work directly in patient care, by giving him the responsibility for the operation of the drug-distribution system.

Jack J. Fulton, a legal authority, very aptly described the role of the pharmacist when he said:

> There are no medication systems that will work and be 100 per cent safe for the patient. We must assume that the pharmacist will not make a mistake and that the formulary system will work perfectly.
>
> Statistics given in the past show that pharmacy is only responsible for about 3 per cent of our medication errors. The problem is with our personnel on the floor.[9]

Of the thousands of medication errors that have been reported

---

[9] Jack J. Fulton, "Medication Errors," Hospital Forum, VIII (June, 1965), 43.

in the past, a very small number resulted in death; regardless, the legal implications attending the death of a patient under these circumstances can destroy the image of the hospital, and it is usually at this point that the drug-distribution system is changed. At the present time, the average suit usually requests compensation in the area of $1 million. A hospital cannot afford to incur suits of this value.[10] Why wait until a catastrophe occurs? Change the drug-distribution system before such an occurrence takes place.

However, many hospitals are still attempting to sidestep the issue of drug-distribution systems by making suggestions that undoubtedly will not prevent medication errors from occurring. In fact, they may even assist in increasing the number. Among several of these proposals is a suggestion that hospitals adopt the unit dosage system. The unit dose has definite merits in reducing the possibility of occurrence of medication errors, as was pointed out in the article discussed in Review of the Literature. But it must be emphasized at this point that, so far, only the large drug manufacturers have released drug items in unit dose

---

[10] Ibid., p. 41.

packages for sale. In fact, the items released for distribution comprise only a complete line of narcotics plus several tranquilizers. Thus far, the drug manufacturers have not been prone to large-scale production of unit dose packages of medications. Apparently the manufacturers are concerned with the production costs involved, the demand, and margin of profit. As a result, suggestions have been made that the hospital pharmacies organize unit dose packaging sections. This can prove to be a costly venture.

There has been some talk of staffing the unit dose packaging sections with volunteers to hold down costs. This is an excellent proposal, providing volunteers with pharmaceutical backgrounds are available. This is highly unlikely. In most instances, one would have to rely on volunteers who have no medication training. Again, the hospital is in a danger zone; for instance, 30 mg. Phenobarbital tablets (a sedative) and 25 mg. Vitamin C tablets, are both white in color and very similar in size. Therefore, an untrained volunteer could easily package Phenobarbital tablets under the title of Vitamin C, or vice versa. The consequences could be disastrous, especially where a six-year-old child scheduled to receive 25 mg. of Vitamin C. is given

30 mg. of Phenobarbital because of an error in packaging. If any unit dose packing is to be carried out in the hospital, for the sake of accuracy and patient safety, the operation should be supervised by a registered pharmacist. Robert Leventhal concurred with this idea when he said:

> Some controversy has developed in utilizing volunteers in the pharmacy and other departments. The experience at Montefiore Hospital, however, indicates that volunteer help can be used very successfully in the operation of a packaging program provided there is constant supervision by a paid employee, preferably a pharmacist.[11]

Recent Developments in the Area of Drug-distribution Systems

Some hospitals are using a system based on the transmission of the physician's original medication order to the pharmacy via an automated writing device (see Review of Literature). The pharmacist in this case actually sees the physician's original order. This particular system has eliminated the use of the transcribed drug order. After the pharmacist fills the order, a copy is priced and sent to the business office. At least with this system, the commission

---

[11] Robert Leventhal, "Establishment of a Controlled Packaging Program for a Hospital Pharmacy," American Journal of Hospital Pharmacists, XXII (July, 1965), 376.

of a medication error through a mistake in transcription has been eliminated. Also, the pharmacist is acquainted with the physician who wrote the order; therefore, if a discrepancy exists, the physician sees only the immediate order that a physician writes for his patient.

As indicated by correspondence received from Mercy Hospital, the pioneer in this case, the system has not been fully exploited (see Appendix D). A sequence description of this system can be seen in Appendix E.

Perhaps one can go several steps further with this system to insure positive patient safety. This could be accomplished by requiring that the pharmacy affix its copy of the medication order to an individual patient chart which would be maintained in the pharmacy. All medication charges would be entered on the patient record and this would be kept in the pharmacy until the patient is discharged. The patient's medication record would also assist the pharmacist in determining the existence of the presence of any therapeutic incompatibilities and/or known allergies. When the time of discharge arrives, the nurse would simply transmit a notification via writing device to the pharmacy. At the same time, the nurse would send all medications not

used by the patient back to the pharmacy. The unused medications would be credited and the pharmacy inpatient chart with the total drug charges transmitted to the business office. In addition, all medication orders would be handled through the pharmacy. The nursing unit would stock only drugs of an emergency and narcotic nature. The advantages and disadvantages of this proposal are summarized below:

Advantages:

1. The pharmacist receives the physician's original medication order rather than a transcription. This prevents the commission of errors that commonly occur in transcribing.

2. Relieves the nurse of the responsibility of interpreting and transcribing the physician's medication order.

3. Totally eliminates the use of drug floor stock on nursing units.

4. Relieves the nurse of the responsibility for inventorying and requisitioning drugs.

5. Relieves the nurse of the task of compounding medications for administration.

6. Pharmacist is now acquainted with the patient's entire drug therapy program.

7. Insures a charge for each dose.

8. Reduces drug loss due to pilferage and deterioration.

9. Reduces time lag between writing of physician's order and administration of the drug.

Disadvantages:

1. Increases number of pharmacy personnel required to provide total pharmaceutical services.

2. Increases number of business office personnel required to provide record management services.

3. Increases the cost of pharmacy operations, since additional funds will be required for the rental or purchase of the transmitting equipment.

Another system which is beginning to take hold in some hospitals involves the dispensing of drugs by a machine (see Appendix I). The nurse is responsible for obtaining the drug required from the machine by inserting three metal plates. In carrying out this action, she assumes complete responsibility for interpreting the physician's order. According to the manufacturer's literature, the pharmacist needs only to be responsible for filling the machine; the nurse does the rest. This sounds very enticing, but the

procedure is fraught with legal implications. Kenna very wisely categorized the danger of using a drug-vending machine when he said:

> How often have nurses misread and confused Demerol[R] order for Dicumarol;[R] quinine for quinidine; digoxin for digitoxin, and many other similarly sounding names? How many nurses know that Deronil,[R] Decadron[R] and Gammacorten[R] are all proprietary names for dexamethasone? How many nurses are qualified to ascertain if the physician has ordered an overdose or smaller-than-effective dose of all medications? In these respects, the dispensing machine places too great a responsibility on nurses because they are not qualified to select and assign multiple-dose containers of medications to specific patients as a routine practice.[12]

In rebuttal to Kenna's comments, there are some administrators who contend that a good drug formulary is the answer. Harold J. Black, associate director of hospital pharmacy services at the University of Hospitals of the State University of Iowa, showed the ineffectiveness of a formulary when he said:

> The outpatient carries a written prescription to the pharmacist and has an opportunity to discuss side effects, dosage schedule or anything that may concern him in regard to his medication. But the inpatient ultimately receives his drugs

---

[12]Kenna, op. cit., p. 60.

> from a nurse who cannot possibly have time to be familiar with all drugs in use if she maintains her other duties and responsibilities.[13]

In line with Kenna's thoughts, the state of Kentucky has decided that hospitals in that state may legally use automatic drug machines only if a pharmacist operates the machine. The state Attorney General has ruled that a nurse is not legally qualified to select and withdraw drugs from the device. In addition, California and Michigan have passed laws restricting the use of the automatic drug-dispensing machines.[14]

An additional disadvantage in using this machine lies in the fact that it can only dispense a limited variety of drugs. The manufacturer contends that the machine is capable of dispensing 96 different types of drugs which supposedly represent 85 per cent of the drugs commonly used on a nursing unit. Kenna, a recognized authority in the field of pharmacy, takes exception to the manufacturer's statement. He says:

> Most hospital pharmacies have upwards of 1000 or more drugs in varying dosage forms; some have as high as 2000 or 3000. Thus, a dispensing machine handles less than 10 percent of the variety

---

[13] "Study of Patient Care Involving Unit Dose System Underway in Iowa," op. cit., p. 81.

[14] "Vending Machines," Texas Pharmacy, LXXXV (August, 1964), 17.

> of medications and dosage forms stocked in the pharmacy. Furthermore, a recent survey concluded that 325 drugs in varying dosage forms are required to handle 85 percent of the medication needs on an average medical and surgical nursing unit.[15]

Incidentally, an enquiry directed to Kenna regarding the possibility of operating the automated drug vendor in conjunction with an Automatic Data Processing System elicited a negative reply (see Appendix J).

Therefore, in the light of the above facts, it can be said that the use of dispensing machines is not the answer to improving drug-distribution systems. In actuality, by using this system, one has moved the pharmacy minus the pharmacist to the nursing unit.

The University of Arkansas Medical Center has taken the most enlightened approach to the problem by placing their drug-distribution system on electrical accounting machines (see Appendix B). However, this system is extremely costly in view of the equipment involved and the personnel required to operate the system. This system at the present time is operating under a $900,000 federal-type research grant. A

---

[15] Kenna, loc. cit.

description of the Arkansas system can be seen in Appendixes B and K.

The Veterans' Administration is also operating a study on automated medication systems.[16] In this system, information regarding therapeutic incompatibilities, maximum allowable dosages, patient's complete medical history, and prior medications are inserted into the computer. The nurse, by means of an input device, then relays the doctor's medication order to the computer. The computer automatically scrutinizes the order for the possible presence of an incompatibility, allergic manifestations, and overdoses. If the computer accepts the order, it relays the order back to the nurse at medication time. Perhaps one can combine the Arkansas and VA system into one consolidated drug-distribution system, which would operate in the following manner:

1. Nurse relays the doctor's medication order to the computer.

2. Computer scrutinizes order for accuracy and possible dangers such as overdosage, allergic manifestations, or incompatibility.

---

[16] Marcus Rosenthal, "The VA's New Automated Hospital," Hospitals, LX (June 16, 1966), 54.

3. If order is acceptable, it is relayed to the pharmacy for filling.

4. Pharmacy fills order and delivers medication to nursing unit.

5. At appropriate time, computer informs nurse that medication is to be administered.

6. Nurse administers medication and acknowledges same to the computer.

7. On day of discharge, computer updates patient medication record, makes necessary credits, and relays total drug charge to the business office.

Comparison of Present Brackenridge System with a Proposed Modified Drug-distribution System

It is recognized that it is not financially feasible for Brackenridge Hospital to adopt a completely different dug-distribution system; however, with little effort, one can certainly modify the present procedure of distributing drugs. A meeting with the director of nurses disclosed that her thoughts were in the same vein.[17] The Nursing Director

---

[17] Interview with the Nursing Director, Brackenridge Hospital, February 1, 1966.

requested the implementation of a system that would prevent the nurse from performing duties considered to be of a pharmaceutical nature, her contention being that the nurse should only administer medications to patients and record the results in the patient clinical records. The pharmacist would assume the responsibility for interpreting the physician's medication order, processing unused medications, and pricing medication orders. A meeting with the Pharmacy Director and Pharmacy Resident revealed that they concurred with the Nursing Director's request.[18] As a result of several meetings with the pharmacy staff, a modified drug-distribution system was devised which conforms to the Nursing Director's criteria.

The operation of the new system will revolve around a patient's medication history card to be known as the Patient's Profile Card (see Appendix H). The biographical information will be addressographed in the upper left-hand corner at time of admission by the business office. The chart is then placed in the patient's clinical record and is sent to the nursing unit. At the nursing unit, the nurse

---

[18]Interview with Pharmacy Director and Pharmacy Resident, Brackenridge Hospital, May 5, 1966.

enters the diagnosis and the patient's known allergies and sends the chart to the pharmacy where it is kept until the patient is discharged. The pharmacy will file the Profile Charts alphabetically by name.

As far as the medication order is concerned, it originates with the physician's original order. A two-part form with a carbon interleaf and divided into four perforated sections will be used for this purpose (see Appendix I). Each perforated section will contain a block on the right-hand side. Each block will be addressographed before the form is placed in the patient's clinical record chart. When the physician writes an order, a carbon is immediately produced. The carbon copy is transmitted via pneumatic tube to the pharmacy. The pharmacist, upon receiving the order, immediately withdraws the respective Patient's Profile Card. The order received is compared with information contained on the card; namely, diagnosis, known allergies, and previous medication orders. In conducting this procedure, the pharmacist is searching for the existence of the following conditions:

1. Is the patient allergic to the item being prescribed? i.e., Cremosuxidine, a chocolate-base sulfa

preparation should not be administered to a child who is allergic to chocolate.

2. Has the medication been previously dispensed to the same patient under another trade name?

3. Does a therapeutic incompatibility exist? i.e., Aluminum Hydroxide Gel (Amphojel)* is capable of deactivating tetracycline (an antibiotic); therefore, these two drugs cannot be administered simultaneously.

4. Is the prescribed item compatible with the physician's diagnosis? i.e., Phenylephrine (Neo-Synephrine)* Nose Drops--1/2% are capable of causing a rise in blood pressure. Therefore, it would be considered dangerous to administer this medication to a patient with a diagnosis of hypertension (high blood pressure). If none of the above conditions exist, the pharmacist dispenses a three-day supply of the item prescribed. He also enters on the physician's order the manufacturer's lot number for the medication dispensed, and initials the order. On the label, prepared by a clerk-typist, is entered the patient's name, room number, date, contents, physician's name, and manufacturer's lot number. Medication is sent to the nursing unit, and the Patient's Profile Card and the physician's

---

*Registered trade name.

order are given to a Medication Drug Clerk. On the Profile Card, the drug clerk enters date, name of drug dispensed, quantity issued, unit of dose, manufacturers' lot number, and initials of pharmacist dispensing the order. The physician's medication order is placed in the patient's medication file folder where it is retained as reference material for the Profile Card.

When the nurse administers the medication, she records it in a Nursing Medication Chart which simultaneously produces a total itemized medication record (see Appendix J). This form shows the drugs remaining on the nursing unit at time of dismissal, and it also enables the pharmacy to charge by the given dose. At the end of three days and, upon dismissal, the carbons of the Nursing Medication Record are sent to the pharmacy via pneumatic tube for pricing. If discharge is involved, drugs remaining on the nursing unit are placed in a paper bag stapled to the Nursing Medication Chart and relayed to the pharmacy. After processing by the pharmacy, the Patient Profile Chart and Nursing Medication Charts are relayed to the business office.

Nightly, the pharmacy refill clerk goes to each nursing unit and removes discontinued medications. The discontinued drugs will be placed in a box set aside for that

purpose by the nurse. At the pharmacy, the refill clerk posts the discontinued drugs to the Profile Cards of the patients involved. At the same time, a refund slip is prepared for the discontinued medications, then the clerk withdraws all Profile Cards where a refill is indicated. These cards are given to the pharmacist who dispenses the medication. The clerk-typist prepares a label in the same manner as for a new order. The refill clerk then enters the refill date, quantity dispensed, manufacturer's lot number, and initials of pharmacist in the Patient Profile Card.

Under this system, the nursing units will stock only drugs of an emergency or narcotic nature. This will be supplemented by a stock of convenience items which will consist of some use items such as rubbing alcohol, castor oil, mineral oil, aspirin, and antiseptics. The convenience item stock will be replenished on an automatic basis by pharmacy students. Convenience items will be regarded as "free stock" since the cost will be included in the basic room and board charge. (A sequence description of this system appears as Appendix K.) A detailed discussion of the various factors involved in implementing the proposed modified drug-distribution system follows:

A. Additional personnel required:

1. 1.5 Clerk-typist

2. 1.5 Medicine Charge Clerks

3. 0.5 Refill and discontinued drug clerk

4. 1.0 Registered pharmacist

B. The additional personnel would function in the following manner:

1. One person 8-5, five days per week as a clerk-typist.

2. One person 8-12 and 5-8 Saturdays and Sundays as a clerk-typist.

3. Two individuals would be required from 8-5, five days per week to perform the duties of medicine charge clerks. An additional medicine charge clerk will be needed from 8-12 and 5-8 Saturdays and Sundays. This individual would also pick up discontinued drugs and refill orders.

4. The present pharmacy clerk will be designated as a full-time supervisor of the clerical operation.

5. The registered pharmacist position could be staffed by pharmacy residents on a rotating basis.

6. The pharmacy residents on a rotating basis will also provide service when the pharmacy is officially closed.

C. Duties of the clerks are as follows:

1. Clerk-Typist--Types labels, brings stock packages to pharmacist, returns packages after pharmacist has filled orders, deducts quantities dispensed from inventory cards, and withdraws inventory cards when levels indicate drugs have to be reordered for stock.

2. Medication Charge Clerk--Maintains patient's medication file folder. This file will contain direct copies of physician's orders, refund slips for discontinued drugs and carbon copies of the nurse's medication notes. Compares the documents in the patient's medication file with the Patient Profile Card and Nurse's Medication Notes. At dismissal time, the clerk checks to see that all unused drugs are returned to the pharmacy and computes the total drug charge. Notifies nurse that patient can be dismissed and relays drug charge to business office, after calling to give last charge.

3. Pharmacy Refill Clerk--Removes discontinued drugs from nursing units; prepares refund slip for same and files in patient's medication file; deletes discontinued drugs from Patient's Profile Card; withdraws Profile Cards for the pharmacist requiring refilling, and posts Profile Cards after refills have been completed. Also checks for

lot numbers that have been reported to have caused adverse reactions (see Appendix K).

D. Cost of implementing new Drug-distribution System (based on first twelve months of operation).

Personnel Costs--$12,443.84 (Based on a 40-hour week, each clerk will receive a total weekly wage of $55.20 or $2,870.40 a year. Social Security calculated at the present rate of 4.4 per cent will cost the hospital $126.30 for each clerk (based on a one-year period). Hospitalization insurance will amount to $10 monthly for one clerk, or $120 a year. Taking the above data into consideration, the total personnel cost is computed as follows:

Wages for four clerks	$11,481.60
Social Security costs for four clerks	505.20
Hospitalization Insurance for four clerks	480.00
Total Personnel--Costs	$12,466.80

Drug Order Form Costs--$928.40 (It is estimated that each patient will require two such forms during his stay. Last Year, Brackenridge Hospital recorded a total of 11,644 admissions. Taking Medicare into account, it was estimated that the total admissions for this year may come to 19,000. Therefore, on the basis of two forms per admission, the total number required is 38,000. One vendor has agreed to supply the forms at a cost of $23.21 per 1,000 in lots of 10,000.)

Patient Profile Card--$570 (One card per admission. On the basis of 19,000 admissions for this year, a like number of cards will be required. The hospital print shop may be able to handle this requirement at 3 cents per card.)

Nurse's Medication Notes--$3,800 (It is estimated that the patient stay for this year will average six days. On the basis of one form every three days, two such forms will be needed

per patient. Since we are anticipating 19,000 admissions for this year, a total of 38,000 such forms will be required. One vendor estimates that he can provide this form at a cost of 10 cents per copy.)

Total Cost--$17,765.20

E. Contrast of disadvantages of present system with advantages offered by proposed modified system:

Present System	Proposed Modified System
1. Nurse is responsible for interpretation and transcription of physician's medication order.	1. Pharmacist receives a direct copy of the physician's medication order. Nurse is relieved of responsibility for interpretation and transcription of medication order.
2. Nurse is responsible for maintaining a floor drug stock. This entails conducting periodic inventories and requesting replacements from pharmacy.	2. Only narcotics, emergency drugs, and convenience items such as aspirin, rubbing alcohol, and castor oil will be kept as floor stock. Convenience item stock will be automatically replaced when needed by pharmacy. Nurse is no longer

	responsible for maintaining floor drug stock.
3. Nurse is required to enter all drugs administered from floor stock and requested from pharmacy in the individual patient's Pharmacy Chart.	3. When pharmacy receives a medication order, it will be entered in the Profile Card of the patient concerned by the pharmacist. In this manner, the pharmacist has a complete medication history on each patient. Nurse is no longer required to maintain a Pharmacy Chart.
4. Nurse is required to enter in the Pharmacy Chart all requests for nonfloor stock medications. Chart is then dispatched to pharmacy for filling. Frequently, when chart is in transit, physician requests another nonfloor drug for the same patient. As a result, chart must be located by nurse.	4. All medications will be requested by relaying a direct copy of the physician's order to pharmacy. Medication orders will be posted to Patient Profile Cards in pharmacy. The direct copy of the physician's order remains in the pharmacy. As a result, the nurse is no longer required to maintain a a Pharmacy Chart for each patient.

5. At time of dismissal of a patient, nurse must return all unused drugs to pharmacy for crediting.	5. Each time the nurse gives a patient a dose of medication, the amount given is recorded in the Nurse's Medication Notes. The pharmacy then uses this record to charge by dose administered. This procedure eliminates the crediting problem.
6. Nurse is responsible for ordering refills on medication obtained from the pharmacy.	6. Pharmacy will automatically refill medication orders when required. This procedure will be conducted on the basis of information present on the Patient Profile Card.
7. Nurse is required to mix, dilute, or prepare most drugs for administration, a serious violation of the nursing practice statutes which specifically restrict the nurse to administering	7. Nurse will only be required to inject drugs into solutions required for intravenous use.

medication.	
8. Nursing units are incurring drug losses due to pilferage and deterioration.	8. The entire hospital drug supply will be handled through the pharmacy.
9. Hospital is losing drug revenue because of non-recording of drugs administered from floor drug stock.	9. Elimination of charge floor stock will erase this condition.
10. Physician prescribes a medication from floor drug stock after a dismissal notice has been received by pharmacy. This results in a late charge.	10. Patient will not be dismissed from nursing unit until pharmacy notifies nurse that a final drug charge has been computed.
11. By receiving a transcribed copy of the physician's medication order, the pharmacist has limited contact with the physician.	11. Encourages closer liaison among the pharmacist, nurse, and physician. This is a factor in reducing medication errors.

12. Since the pharmacy does not maintain a medication history on each patient, the pharmacist is not closely associated with the patient's drug therapy program.	12. Pharmacy maintains a medication history card on each patient. This enables the pharmacist to become associated with the patient's total drug therapy program.

It is apparent from the evidence presented that the advantages of the proposed drug-distribution system virtually eliminates the defects of the present system. Additional personnel will be required, but this cost would be offset by the generation of additional drug revenue previously lost through nonrecording of drug charges. The increase in medication safety for the patient would more than adequately compensate the hospital for adopting a modified drug-distribution system. Under this system, the hospital pharmacist is assuming the same responsibilities that are given his counterpart--the community pharmacist; namely, receiving the physician's original prescription and dispensing the drug to the individual patient--not in bulk to a group of patients. By doing this, each individual patient receives the benefit of the pharmacist's years of training and experience in the field of drug therapy.

From a legal standpoint, under this system the hospital is complying with the latest court decisions concerning the practice of hospital pharmacy. The nurse will be functioning exclusively in the area of drug administration--her rightful position. This will entail receiving the drug or drugs prescribed for the patient from the pharmacy and administering them.

The pharmacist has been given his rightful position by law--that of drug dispensing. Under this system, he will identify, compound, package, dispense, label, and preserve drugs. However, the pharmacist will not administer the drugs prescribed for a patient. This will be in keeping with the statutes governing the practice of pharmacy and nursing, since, according to these statutes, dispensing is a pharmaceutical function while administration is a nursing function. Therefore, the proposed system will permit the nurse to devote her full-time energies towards the art of patient care; the dispensing of medications and consultation on pharmacy matters will be the responsibility of the pharmacist.

Areas for Future Study

1. A Computer-based Drug Therapy Program

Brackenridge Hospital should investigate the possibility of processing all medication orders through a computer. Programmed as input into the computer would be a set of known therapeutic incompatibilities plus a set of standard medication doses for all drugs used in the hospital. These two sets of data would comprise a set of drug standards, then the nurse would type each individual patient medication order into the computer. The computer, upon receiving the order, compares it with the drug reference standards for correct dosage, and the presence of a therapeutic incompatibility if two or more drugs are being administered to the same patient. If an error exists, the computer will inform the nurse through a printout device of the existence and type of error present. If an error does not exist, the computer will relay the order to pharmacy for processing.

At the appropriate time, the computer will inform the nurse via a printout device that the medication is to be administered. The nurse will administer the medication and acknowledge same to the computer. The computer now records a billing to the patient's account for the medication

received. If a drug is discontinued, the nurse informs the computer which deletes the medication from the individual patient medication card.

In addition, the computer would be programmed to provide the following information:

a. A complete and current drug therapy program for each inpatient, showing all deletions and additions.

b. A current total drug charge for each inpatient.

c. The latest pharmacy stock inventory balances.

d. A set of purchase orders to cover areas where inventory balances are at the minimum desired level.

e. The latest drug prescribing trend for the hospital. This figure should be based on a 90-day period. It would be utilized by the hospital drug therapeutics committee in determining whether a drug should be deleted from the hospital drug list.

The advantages of using a computer-based medication system are two-fold in number. First, this system will virtually eliminate medication errors. Secondly, it will assist hospitals in coping with the present storage of nurses and pharmacists.

2. A Centralized Intravenous Additive Service

Consideration should be given to conducting a study to determine the feasibility of establishing a centralized intravenous additive service in the pharmacy. This section would prepare all nonemergency intravenous solutions in a sterile area, twenty-four hours a day, seven days a week. This would entail acquiring the services of four registered pharmacists, since one must have coverage for 168 hours per week. Four pharmacists, each working a forty-hour week, would provide coverage for 160 hours. The remaining eight hours could be apportioned among the pharmacy residents. Also, this operation would necessitate the procurement of a SteriLab-type assembly. This is a specially equipped, self-contained sterile room. The assembly would occupy a 4' x 6' space and cost approximately $10,000. Orders would be telephoned directly into the SteriLab and followed by a direct copy of the physician's order for control purposes. All orders would be delivered to the requesting nursing unit by pharmacy messenger service. The messenger service would be staffed by pharmacy students.

CHAPTER IV

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

The purpose of this study was to determine if the drug-distribution system in use at Brackenridge Hospital could be improved in order that patient safety and nursing efficiency might be increased. The combination drug-distribution system is the system currently being used by Brackenridge Hospital. A detailed analysis was made of this system, and the results were compared with several other systems used throughout the United States. A review of the literature has indicated that many hospitals utilize the combination drug-distribution system. To these hospitals, this type of system is a very economical method of distributing drugs to the inpatient units. However, the literature indicates that experience has shown that this system is causing hospitals to lose thousands of dollars in unrecorded drug charges. In addition, many nurses are performing as both pharmacists and business office agents during at least 25 per cent of their duty time. The patient is the one who

suffers in this case. Because of financial pressures, it is realized that many hospitals cannot adopt a completely different drug-distribution system; however, in most cases the current systems can be modified. Therefore, it is imperative that hospitals adopt a drug-distribution system within their financial means that is capable of returning the nurse to the patient's bedside, and increasing both drug revenue and patient safety.

Conclusion

The use of a modified manual drug-distribution system at Brackenridge Hospital which permits the pharmacist to receive a direct copy of the physician's original order should be considered. Upon receipt of the physician's order, the pharmacist would record the medication on the patient's medication history card along with any other medication previously ordered. This procedure permits the pharmacist to review the patient's entire drug therapy program. Other factors associated with implementing this new system, such as increased personnel costs and procurement of new forms will offset any increase in drug revenue during the initial implementation. However, the beneficial factors associated with the use of a pharmacy-based drug-distribution system

will offset this increased expense. These factors are:

1. Elimination of interpretation and transcription of physician's medication orders by the nurse.

2. Reordering medication by the pharmacist rather than the nurse.

3. Reduction in the possibility of committing medication errors.

4. Elimination of drug inventory on nursing units.

5. A charge for each dose administered is assured.

6. Reduction in drug loss through pilferage and deterioration.

7. Encourages closer liaison among the pharmacist, nurse, and physician.

The use of this system permits the patient to receive the benefit of the pharmacist's many years of training in the area of medication therapy, which prepares him to make pharmaceutical decisions. In addition, the nurse is now able to spend more time at the patient's bedside observing him after administering the medication; whereas, previously, she was expending equal time in procuring the necessary medications.

Recommendations

Based upon the foregoing conclusion and information contained elsewhere in the report, the following recommendations are that:

1. Brackenridge Hospital consider the use of a direct copy of the physician's inpatient medication order by the pharmacy.

2. All medication orders will be posted to a Patient Profile Card.

3. Nursing service be required to record all medication administered on a graphic-type medication chart.

4. The physician's inpatient medication order and Patient Profile Card be used to establish a pharmacy-based drug-distribution system.

5. Four clerks be hired at a total cost of $12,443.84 to implement the system.

6. A future study be conducted to determine the feasibility of establishing a centralized intravenous additive section in the pharmacy.

7. A computer-based drug therapy program be considered for future study.

APPENDIX A

PHARMACY CHART, BRACKENRIDGE HOSPITAL, AUSTIN, TEXAS

74

BRACKENRIDGE HOSPITAL

AUSTIN, TEXAS

PHARMACY CHART

SSION DIAGNOSIS

AGE

SEX

E ADDRESS

CHART NO.

PREVIOUS CHART FILED:

DISMISSED

INTERIM BILLS	
DATE	AMOUNT

NOTE IN SPACES BELOW B NUMBER OF DRUG OR REFILL

CREDIT B

CREDIT TOTAL $

HOME B $

TOTAL CHARGES $

CHARGE DRUGS FROM FLOOR STOCK	DATE	AMT.	CHG.	DATE	AMT.	CHG.	DATE	AMT.	CHG.	CR.	TOTAL CHGS.
charges, indicate letter and quantity in amount column.											
method of administration of medication here											
icillin 400,000 u./cc.											
icillin 400,000 u./cc. Streptomycin 0.5 Gm/2cc.											
ptomycin 0.5 Gm/cc.											
pirin #2 or #3											
merol Inj. (100 mg. or less)											
lin per units											

Oral ☐
Inj- ☐
Local ☐ Directions:

Oral ☐
Inj- ☐
Local ☐ Directions:

Oral ☐
Inj- ☐
Local ☐ Directions:

Oral ☐
Inj- ☐
Local ☐ Directions:

PLEASE CHECK OTHER SIDE

NAME: ROOM:

	DATE	AMT.	CHG.	DATE	AMT.	CHG.	DATE	AMT.	CHG.	CR.	TOTAL CHG
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											
Oral ☐ Inj- ☐ Local ☐ Directions:											

APPENDIX B

BRACKENRIDGE DRUG-DISTRIBUTION SYSTEM SEQUENCE

BRACKENRIDGE DRUG-DISTRIBUTION

SYSTEM SEQUENCE

1. Nurse inventories floor stock drug cabinet.
2. Determines items that require replenishment.
3. Prepares requisition for pharmacy.
4. Dispatches requisition to pharmacy.
5. Pharmacist fills request.
6. Sends drugs to nursing unit.
7. Nurse checks items delivered.
8. Stores them in drug cabinet.
9. Doctor prescribes drug.
10. Nurse checks floor stock for drug.
11. Nurse enters amount prescribed on pharmacy chart.
12. Nurse prepares drug for administration.
13. Administers drug to patient.
14. Enters data in patient record.
15. If drug is not available from stock, nurse or ward clerk transcribes medication request to pharmacy chart.
16. Pharmacist fills request.
17. Sends drug back to the nursing unit.
18. Nurse inspects item.
19. Prepares drug for administration.
20. Administers to patient.
21. Enters data in patient record.

APPENDIX C

BAPTIST MEMORIAL DRUG-DISTRIBUTION

SYSTEM SEQUENCE

BAPTIST MEMORIAL DRUG-DISTRIBUTION

SYSTEM SEQUENCE

1. Physician writes medication order into the patient's record.
2. Nurse transcribes medication order to a pharmacy order form (only one order per form).
3. Order is dispatched to pharmacy.
4. Pharmacy fills order and sends it to the nursing unit.
5. Nurse inspects item.
6. Prepares it for administration.
7. Administers to patient and records it in the patient's record.
8. Every twenty-four hours, pharmacy--after pricing all drug orders filled during the period--sends them to the business office.

APPENDIX D

LETTER FROM MERCY HOSPITAL

516 RO 4-4400

Mercy Hospital

1000 NORTH VILLAGE AVENUE
ROCKVILLE CENTRE, NEW YORK 11570

May 3, 1966

Captain Dante A. Chiei
Box 599, Class F#2
Medical Field Service School
Fort Sam Houston, Texas 78234

Dear Captain Chiei:

Thank you for your letter of April 20th regarding the use of an automated device for receiving physicians' original prescriptions.

Your paper on drug distribution systems is a most timely one which I am sure will be of interest to many persons. I might refer you to an article on the same subject by Mr. Charles Nightingale which appeared in a recent issue of Nursing Forum. You might find some enlightening points. *

In reference to the specific questions you asked regarding the article in the Journal, I would comment as follows:

1. The use of the automated writing device has not eliminated the necessity of floor drug stock in this particular hospital. We continue to maintain the stock of standard drugs. The doctor's order for stock drugs is, however, significant for the nurse, and only significant to the pharmacist for information purposes. We continue to maintain a system of automatic stock replacement which is done by one of the Pharmacy technicians.

2. The billing procedure has not changed at this time. We must continue to make a charge slip each day for each patient who requires special medications. However, it is easy to image a system wherein an order in duplicate could come to the Pharmacy and the duplicate be used as a charge voucher for the accounting department. At present the Victor Company has not been able to incorporate this duplicate into our system.

3. The Electro Writers are available on a lease basis, and this is the way we presently use them. The approximate rental charge is $25.00 per month per machine. We feel this is a bargain since communications are directly between the pharmacist and the physician, thus eliminating prescription records, nursing and pharmacy messenger service, as well as the frequent phone calls that must be placed outside the hospital after a physician has written an order that must be clarified and leaves the hospital before he can be contacted.

* Nursing Forum, Volume IV, No. 2, 1965: DISTRIBUTION OF DRUGS ON THE NURSING UNIT

May 3, 1966

Captain Dante A. Chici:

Enclosed you will find an article which might be of interest. We distributed this at a Medical Staff meeting. Its purpose was hopefully to overcome some of the inherent resistance which we are meeting in this new system. We have been working with the Electro Writer system for a year here at Mercy Hospital and are gradually implementing it in additional nursing units. Presently our three busiest units are operating on this system and the new Intensive Care Unit will initiate a new Electro Writer system within a month.

If I can be of any further help to you, please do not hesitate to contact me. If you are ever in the area, we should be most happy to meet you. I wish you every success in your graduate studies and especially on the research you are doing on drug distribution systems, which is indeed a timely subject in hospital pharmacy circles.

Sincerely,

Sister Mary Virginia
Director of Pharmacy Service

SMV/kk

The Electrowriter has been in use at Mercy since March on the Second Pavilion and since July on the Third Pavilion. At this time we would like to review our purposes.

Our primary objectives for installing this system are:

1. To assure greater drug accuracy
   a. Questionable orders are promptly verified.
   b. Interpretation of orders carried out by, or under direct supervision of, a registered pharmacist
   c. Re-copying and transcribing errors are eliminated.
2. To lessen time gap between order time and administration of drugs.
   a. Orders come to attention of a pharmacist as they are written.
   b. Telephone requests for drug lift, or messenger service to Pharmacy are not needed for placing orders. This factor will become more significant as physical distance is extended in the new wing between Nursing Units and Pharmacy Department.
   c. Orders that need further verification are attended to, for the most part, while the physician is still at the desk or at least in the building. This cuts down on disturbance during other hours.
3. To assist the Nurse
   a. The nurses have expressed appreciation for the fact that the pharmacist is now responsible for interpreting, dispensing and delivering drugs to her for administration.
   b. Drugs on 2nd and 3rd Pavilion are automatically refilled by pharmacist from physician's original order. This saves the night nurse from 2-3 hours per shift.
   c. Day nurses are infrequently confronted with the need to re-order a drug during the day shift.
   d. Emergency drugs are automatically replaced to Unit without the need for further orders, thus assuring a standard supply of emergency drugs.

Negatively speaking:

1. We all by nature resist change.
2. The Electrowriter admittedly is awkward, cumbersome, and inconvenient to use.
3. Medication orders must now be kept together as a unit in thought and in writing.

4. Due to a Forms problem, an undue delay has resulted in makeshift prescription forms with problems in ejection and untidy charts. This is a temporary situation. Gummed prescription forms should soon be available again.

5. Orders have on occasion been missed. A light or a bell signal is to be installed in the Pharmacy to alert pharmacist.

6. Service is required 1-3 times per month for defective mechanical operation. As time progresses, we anticipate a lessening of this need.

7. Poor, light writing must at times be compared to floor original.

To emphasize:

1. It is necessary to write medication orders only in one place, namely on the prescription form in the Electrowriter.

2. The nurses, by far and large, consider the Electrowriter an asset to better patient care.

3. Economically, it will be on the credit side, since nurses', Nurses Aids', messengers' and telephone time are saved.

APPENDIX E

AUTOMATED WRITING DEVICE DRUG-DISTRIBUTION SYSTEM SEQUENCE

AUTOMATED WRITING DEVICE DRUG-

DISTRIBUTION SYSTEM SEQUENCE

1. Physician writes order on the writing device.
2. This action causes a red light attached to writing device to turn on.
3. After physician completes writing order, he activates the ejector mechanism.
4. Order is now transmitted to a receiver in the pharmacy.
5. Pharmacy edits order for accuracy.
6. Order is filled and dispatched to nursing unit.
7. Nurse receives order and affixes her copy of the medication order to the patient's medication chart.
8. Medication is administered and a notation is made by the nurse in the patient's record.

APPENDIX F

LETTER FROM THE UNIVERSITY OF CHICAGO HOSPITALS AND CLINICS

THE UNIVERSITY OF CHICAGO HOSPITALS AND CLINICS
950 EAST 59TH STREET
CHICAGO • ILLINOIS 60637
MUSEUM 4-6100

May 4, 1966

Dante A. Chiei
Captain US Army
Box 599 Class F#2
Medical Field Service School
Ft. Sam Houston, Texas 78234

Dear Dante:

In reply to your letter dated April 20, 1966, this is to extend permission for you to quote information from my article published in Hospitals, February 1, 1963.

I have attended a few meetings at the manufacturing facilities of the Brewer Pharmacal Engineering Company during the past two years. They are attempting to develop units with electronic data processing attachments, but to the best of my knowledge these are not operational. An installation has not been attempted to date.

Please advise if I can assist you further.

Yours respectfully,

F. Regis Kenna
Administrative Assistant
Pharmacy-Central Material Service

FRK/ab

Good luck!

APPENDIX G

UNIVERSITY OF ARKANSAS DRUG-DISTRIBUTION SYSTEM SEQUENCE

UNIVERSITY OF ARKANSAS DRUG-DISTRIBUTION

SYSTEM SEQUENCE

1. Carbon copy of physicians order to the pharmacy.
2. Edited by pharmacist.
3. Order is keypunched by operator into an IBM card.
4. Pharmacist checks IBM card for accuracy.
5. New order is compared with existing orders for each patient, for presence of possible drug allergies or incompatabilities.
6. New cards are combined with existing cards for each patient.
7. Cards are then placed in a print device which prepares a cumulative list of all medications prescribed for each patient. This listing is transmitted via a print-out device to each individual nursing unit.
8. At certain predetermined intervals during the day, all punch cards are placed in an electronic sorter. This device sorts out cards for patients requiring medications at a particular time.
9. Cards removed are duplicated.
10. Original cards are returned to file.
11. Duplicates are used as individual requisitions for a unit dose and then to accounting for charge purposes.
12. Dosages are delivered to each nursing unit by pharmacy messenger service.

APPENDIX H

BRACKENRIDGE HOSPITAL PATIENT

PROFILE CARD

BRACKENRIDGE HOSPITAL, AUSTIN, TEXAS
PATIENT PROFILE CARD

Patient's Identification

Diagnosis--
Allergies and/or Insulin Type

Date	Drug	Quantity	Dosage	Lot No.	Int.	R. Date	Lot No.	Int.	R. Date	Lot No.	Int.

8"

Reverse of Form will be lined.

APPENDIX I

BRACKENRIDGE HOSPITAL INPATIENT

DRUG ORDER FORM

BRACKENRIDGE HOSPITAL
AUSTIN, TEXAS
INPATIENT
DRUG ORDER FORM

Date | Drug and Directions | Patient's Identification

Length of Therapy

_____
Physician's Signature

Date | Drug and Directions | Patient's Identification

Length of Therapy

_____
Physician's Signature

Date | Drug and Directions | Patient's Identification

Length of Therapy

_____
Physician's Signature

Date | Drug and Directions | Patient's Identification

Length of Therapy

_____
Physician's Signature

APPENDIX J

BRACKENRIDGE HOSPITAL NURSING

MEDICATION CHART

BRACKENRIDGE HOSPITAL, AUSTIN, TEXAS
NURSING MEDICATION CHART

Medication	Dose	How Adm.	Date	Date	Date	Date	Date	Pharmacy Use
								Total Adm. X Unit Cost
								Total Charge
								Total Adm. X Unit Cost
								Total Charge

Signature of Nurses Administering Medication							
7-3							
3-11							
11-7							

Code: O--Oral IV--Intravenous L--Local H-Hypo IM--Intramuscular DC--Discontinued
Send all carbons to pharmacy at end of third day.
Note: Inform pharmacist immediately of any unusual drug reactions, or change in diagnosis.

Patient Identification

APPENDIX K

PROPOSED DRUG-DISTRIBUTION SYSTEM FOR BRACKENRIDGE HOSPITAL

PROPOSED DRUG-DISTRIBUTION SYSTEM FOR

BRACKENRIDGE HOSPITAL

At time of admission, business office Addressographs: two Drug Order Forms, one Patient Profile Card, and two Nursing Medication Notes. These are then sent to the nursing unit.

At nursing unit, nurse enters diagnosis and any known drug allergies on the Patient Profile Card. Card is then sent to pharmacy.

Pharmacy maintains Patient Profile Card on file until patient is dismissed from the hospital. At dismissal, card is sent to Business Office.

Physician prescribes medication on a drug order form. Pharmacist receives a direct copy of the order.

Pharmacist interprets the order and compares the item being prescribed against the information contained on the Patient's Profile Card.

If inconsistencies are not present, pharmacist fills the order.

Clerk-typist then types out a label, affixes it to drug container under supervision of pharmacist, and sends medication to the nursing unit.

Medication Drug Clerk then enters the information

from the physician's order onto the Patient's Profile Card, and files the order in the Patient's Medication File Folder.

Nurse administers medication and records it in the Nursing Medication Notes.

At the end of the third day or upon dismissal, all carbons are sent to the pharmacy for pricing. If dismissal is involved, nurse also sends all unused medication along with the carbon copy of Nurses' Medication Notes.

At the end of the third day or upon dismissal, all carbons are sent to the pharmacy for pricing. If dismissal is involved, nurse also sends all unused medication along with the carbon copy of Nurses' Medication Notes.

Nightly, Pharmacy Refill Clerk goes to each nursing unit and removes discontinued drugs.

Initiates a refund slip for each discontinued drug and places slip in the Patient's Medication File Folder. The discontinued drug is then deleted from the Patient's Profile Card.

Nightly, Pharmacy Refill Clerk also withdraws from file all Profile Cards where a refill is indicated. Cards are given to the pharmacist for filling.

After pharmacist has finished refilling operation, the Pharmacy Refill Clerk posts the Involved Patient Profile Cards.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

MacEachern, Malcolm T. Hospital Organization and Management. Berwyn, Ill.: Physicians' Record Co., 1962.

Martin, Eric W. Remington's Pharmaceutical Sciences. Easton, Pa.: Mack Publishing Co., 1965.

Articles and Periodicals

Barker, Kenneth N. "Interim Report of Committee on Drug Distribution Systems in Hospitals." American Journal of Hospital Pharmacy, XX (August, 1962), 405+.

_____, and Heller, W. "The Development of a Centralized Unit-Dose Dispensing System, Part I; Description of the U.A.M.C. Experimental System." American Journal of Hospital Pharmacy, XX (November, 1963), 568-79.

_____, and McConnell, Warren E. "The Problems of Detecting Medication Errors in Hospitals." American Journal of Hospital Pharmacy, XIX (August, 1962), 444-52.

Bogash, Robert C. "Drug Packaging and Distribution as Seen by a Hospital Pharmacist." Hospital Topics, XLII (June, 1964), 79-81.

Burkhold, David F. "Pharmacy." Hospitals, XL (April 1, 1966), 125+.

Cassell, Sister M. "A Nurse Views the Trends in Pharmaceutical Dispensing Practices." Hospital Management, XCV (June, 1963), 80-84.

Fulton, Jack J. "Medication Errors." Hospital Forum, VIII (June, 1965), 40-43.

Henderson, Cynthia. "The Dispensing Trilemma." American Journal of Nursing, LXV (December, 1965), 58-62.

Holysko, Sister Mary Naomi, and Ravin, Robert L. "A Pharmacy Centralized Additive Service." American Journal of Hospital Pharmacy, XXII (May, 1965), 267-70.

Hosford, R. F. "Automatic Drug Dispensing." Hospitals, XXXVII (January 16, 1963), 96-103.

"Hospital Law Manual Newsletter." Health Law Center. Pittsburgh: University of Pittsburgh, No. 20 (May, 1964).

Kenna, F. Regis. "A Pharmacist Looks at Drug Dispensing Machines." Hospitals, XXXVII (February 1, 1963), 58-60.

Latiolais, Clifton J. "What Can be Done to Improve Drug Distribution?" Hospitals, XXXIX (November 16, 1965), 105+.

Leventhal, Robert. "Establishment of a Controlled Packaging Program for a Hospital Pharmacy." American Journal of Hospital Pharmacy, XXII (July, 1965), 376.

Minger, Richard. "Compatibilities and Incompatibilities of Some Intravenous Solution Admixtures." American Journal of Hospital Pharmacy, XXII (February, 1965), 92-94.

Moravec, David F. "Legal Aspects of Drug Distribution and Administration." Hospital Management, CII (November, 1966), 52+.

Rosenthal, Marcus. "The VA's New Automated Hospital." Hospitals, LX (June 16, 1966), 54.

"Study of Patient Care Involving Unit Dose System Underway in Iowa." Hospital Topics, XLII (June, 1964), 81-82.

"Three Dimensional Drug Losses." Hospital Topics, XXXIX (April, 1961), 53.

Toft, Audrey E. "Pharmacist and Nurse Integral Part of Team in Total Patient Care." Southern Hospitals, XXXII (November, 1964), 52+.

"Vending Machines." Texas Pharmacy, LXXXV (August, 1964), 17.

Virginia, Sister Mary. "Transmitting Physicians' Orders with an Automated Writing Device." American Journal of Hospital Pharmacy, XXII (August, 1965), 464-67.

Webb, John W. "Mosaics." American Journal of Nursing, LXV (January, 1965), 105-108.

Reports

Blumberg, Mark. "Economic Feasibility of Automating Selected Hospital Activities." Final Progress Report, U. S. Public Health Service Grant No. W-111, 1961.

Interviews

Brackenridge Hospital, Austin, Texas. Interview with Administrator. January 31, 1966.

_____. Interview with Nursing Director. February 1, 1966.

_____. Interview with Pharmacy Director. February 1, 1966.

_____. Interview with Pharmacy Director and Pharmacy Resident. May 5, 1966.

BIOGRAPHICAL SKETCH

Major Dante A. Chiei [redacted]. He attended schools in New York and was graduated from high school in January, 1947. In September, 1947, he entered Fordham University College of Pharmacy from which he graduated in June, 1951, with a Bachelor of Science in Pharmacy.

In July, 1951, Major Chiei was inducted into the U. S. Army and underwent basic infantry training at Fort Dix, New Jersey. In December, 1956, while stationed at the U. S. Army Hospital located at Ft. Monmouth, New Jersey, the writer received a direct commission in the MSC in the grade of Second Lieutenant with concurrent call to active duty. Immediately thereafter, he was assigned as pharmacy officer to the U. S. Army Dispensary located at Ft. Sheridan, Illinois.

In January, 1959, Major Chiei was assigned as Administrator and Supply Officer at the Armed Services Medical Equipment Laboratory located at Ft. Totten, New York. He held this position until September, 1961, when he was reassigned to the Medical Field Service School, Ft. Sam Houston, Texas, for the purpose of attending the Army Medical Service

Officers' Career Course. Upon completion of this course in May, 1962, the writer was assigned to Korea for a period of thirteen months.

In August, 1963, Major Chiei returned to the Zone of the Interior and was assigned as Chief, Supply Branch of the Walter Reed Army Institute of Research, Washington, D. C. In February, 1965, he was transferred to the Walter Reed General Hospital where he assumed the duties of Chief of the Plans and Project Branch of the Supply and Service Division. Further assignment was made as a student to the Hospital Administration Course beginning September, 1965. This course of instruction was completed in June, 1966, with subsequent assignment to Walson Army Hospital, Ft. Dix, New Jersey, to complete the required one-year residency program to qualify for the degree of Master of Hospital Administration.