A ROLE FOR A CLINICAL PHARMACIST IN THE TREATMENT OF
PEdiATRIC EMERGENCY CARE PATIENTS

by

Terry Lee Rittmeyer

A Thesis Submitted to the Faculty of the
DEPARTMENT OF PHARMACEUTICAL SCIENCES
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
WITH A MAJOR IN PHARMACY
In the Graduate College
THE UNIVERSITY OF ARIZONA

1975
STATEMENT BY AUTHOR

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: Jerry L. Rittmeyer

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Henry W. Winship III
Professor of Pharmaceutical Sciences

Date
ACKNOWLEDGMENTS

The author wishes to thank Dr. Henry W. Winship III for his sincere interest and guidance throughout this study, and the Department of the Navy, Bureau of Medicine and Surgery, for making this study program possible.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>v</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>vi</td>
</tr>
<tr>
<td><strong>CHAPTER</strong></td>
<td></td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Purpose</td>
<td>4</td>
</tr>
<tr>
<td>Assumption</td>
<td>4</td>
</tr>
<tr>
<td>Limitations</td>
<td>4</td>
</tr>
<tr>
<td>Definitions</td>
<td>4</td>
</tr>
<tr>
<td>2. RELATED LITERATURE</td>
<td>7</td>
</tr>
<tr>
<td>3. DESIGN OF STUDY</td>
<td>14</td>
</tr>
<tr>
<td>Introduction</td>
<td>14</td>
</tr>
<tr>
<td>Methodology</td>
<td>16</td>
</tr>
<tr>
<td>4. RESULTS AND DISCUSSION OF DATA</td>
<td>19</td>
</tr>
<tr>
<td>5. SUMMARY AND RECOMMENDATIONS</td>
<td>34</td>
</tr>
<tr>
<td>Summary</td>
<td>34</td>
</tr>
<tr>
<td>Recommendations</td>
<td>37</td>
</tr>
<tr>
<td>APPENDIX A: CONSENT FORM</td>
<td>40</td>
</tr>
<tr>
<td>APPENDIX B: PEDIATRIC EMERGENCY CARE PATIENT FOLLOWUP INTERVIEW FORM</td>
<td>42</td>
</tr>
<tr>
<td>APPENDIX C: PHARMACY/PHARMACOLOGY CONSULT RECORD</td>
<td>44</td>
</tr>
<tr>
<td>APPENDIX D: PEDIATRIC EMERGENCY CARE PATIENT MEDICATION INSTRUCTION INTERVIEW FORM</td>
<td>46</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>47</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prime and alternate source of information for drug-related questions asked by physicians, nurses and parents.</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>The frequencies with which the physician utilized the pharmacist's recommendations for drug therapy</td>
<td>22</td>
</tr>
<tr>
<td>3.</td>
<td>Combined number and percent of medications prescribed by therapeutic class for the instructed and uninstructed pediatric population (N = 80)</td>
<td>23</td>
</tr>
<tr>
<td>4.</td>
<td>The frequencies with which the instructed and uninstructed pediatric patients had their prescriptions filled</td>
<td>25</td>
</tr>
<tr>
<td>5.</td>
<td>Number and percent of medications correctly administered by instructed and uninstructed patients</td>
<td>26</td>
</tr>
<tr>
<td>6.</td>
<td>Number and percent of instructed and uninstructed pediatric patients or parents who correctly administered medications</td>
<td>27</td>
</tr>
<tr>
<td>7.</td>
<td>Number and percent of instructed and uninstructed parents who reported possible medication side effects</td>
<td>28</td>
</tr>
<tr>
<td>8.</td>
<td>Number and percent of instructed and uninstructed parents' opinions concerning medication effectiveness</td>
<td>29</td>
</tr>
<tr>
<td>9.</td>
<td>Number and percent of instructed and uninstructed parents' opinions concerning the quality of care their child received</td>
<td>30</td>
</tr>
<tr>
<td>10.</td>
<td>Number and percent of the instructed parents' opinions of patient medication instruction by the clinical pharmacist (N = 40)</td>
<td>31</td>
</tr>
<tr>
<td>11.</td>
<td>Number and percent of instructed and uninstructed parents willing to pay for the services of a clinical pharmacist</td>
<td>32</td>
</tr>
</tbody>
</table>
ABSTRACT

A study of 80 pediatric patients was conducted to determine a role for a clinical pharmacist in the treatment of pediatric emergency care patients through drug monitoring, patient medication instruction and followup interview. Fifty percent of the patients were given medication instruction by the clinical pharmacist.

The clinical pharmacist answered 21 questions concerning drug information from physicians, nurses and parents. Eleven of 24 recommendations for drug therapy by the clinical pharmacist were utilized by the physicians and occurred more frequently as the study progressed.

Using the chi-square for statistical analysis, it was determined that the patients and/or parents who were instructed by the clinical pharmacist received better over-all emergency care and expressed favor with the instructions given by the clinical pharmacist and their willingness to pay for such a service.

It was recommended that the role of the clinical pharmacist described in the study be adapted to the treatment of all age groups in the emergency room and/or all patients seen in the pediatric outpatient clinic. Five additional recommendations were also made.
CHAPTER 1
INTRODUCTION

Among the various health care facilities in the United States, the utilization of the hospital emergency room has developed into a major source of medical care (Hernandez and Boutet 1972). The paucity of available physicians in the community, the increase in insurance coverage of patients for hospital emergency room visits and the constant availability of emergency services at any hour of the day are a few of the suggested explanations for this increased use (Torrens and Yedvab 1966).

To the physician, the emergency room represents an acute care facility for conditions requiring prompt or immediate treatment. The physician believes additional diagnostic procedures and treatment should be provided in other patient care facilities. On the other hand, the patient or parent considers the emergency room available for any kind of care at any time (Kahn, Anderson and Perkoff 1973).

The pediatric patient accounts for approximately 34 percent of all emergency room visits (Roghmann and Haggerty 1974). The emergency room physician serves as a pediatrician to many patients but 75 percent of those treated said they had a family physician unavailable or they felt the emergency room was better equipped to handle their problems (Neikirk 1970). Regardless of the reason for the eventual selection of
emergency room for pediatric care, all patients are entitled to the maximum of quality care.

The traditional role of the hospital pharmacist in patient care has been primarily concerned with medication preparation, delivery and control from within the confines of the hospital pharmacy. Today, with the expanding role of the hospital pharmacist and emergence of the clinical pharmacist, the quality and safety of inpatient care has been improved (McCarron 1975). McCarron thinks these improvements are a result of unit dose distribution, intravenous admixture service, drug monitoring, taking medication histories and conducting patient consultations. Most of the emphasis of clinical pharmacy practice has been toward inpatient care but, with the increasing utilization of the emergency room as a type of "outpatient clinic," the clinical pharmacist may also become involved with medication therapy provided through the emergency service of the hospital (Leshafft 1970). An even more definitive approach is the monitoring of pediatric drug therapy in an emergency room by a clinical pharmacist (Klotz 1972).

The specialty of pediatric clinical pharmacy has developed for numerous reasons including (1) the accelerating trend toward specialization in health professions, (2) the endless amount of knowledge required to discuss total therapeutics that apply to all clinical services and patient populations, and (3) the unique nature of the pediatric patient (Chudzik and Yaffe 1972). The uniqueness of the pediatric patient is characterized by (a) physiologic differences, (b) variation in the
maturation of organ systems, (c) variance in disease and response, and (d) toxicities specific to children (Masaki 1975).

The practicing pediatrician, much less the emergency room physician, cannot be expected to be continuously aware of all current information or rational therapy, adverse drug reactions and drug interactions (Lawson et al. 1972). He, therefore, needs a therapeutic consultant to provide useful drug information and act as a guide to better rational drug therapy. A well-trained, highly motivated, pediatric-oriented clinical pharmacist may provide a key source of therapeutic information, which leads to improved pediatric care (Chudzik and Yaffe 1972).

The role of the pediatric pharmacist in the emergency room extends beyond the outpatient visit. All of the combined expertise of diagnostics, therapeutics, and pharmacology in selecting the proper medication for a given illness is nullified when the patient fails to follow the prescribed medication regimen. Compliance in pediatric clinic populations has been especially poor. Elling, Whittemore and Green (1960) found that 45 percent of the children studied took less than half their penicillin prescribed. Davis (1966) found that compliance with prescription instructions varied from 7 to 85 percent. An increase from 5 to 51 percent of full compliance was achieved in a pediatric ambulatory setting after detailed instructions and intense counseling of the parent were provided by hospital pharmacists (Mattar, Markello and Yaffe 1975).
Purpose

The purpose of this research was to determine a role of a clinical pharmacist in the treatment of pediatric emergency care patients through drug monitoring and patient medication instruction. Drug monitoring was conducted during emergency care treatment and continued with a subsequent telephone or personal followup interview.

Assumption

The only assumption made for this study was that the patients and/or parents responded to interview questions truthfully.

Limitations

This study was limited to the pediatric emergency care facilities of The University of Arizona Medical Center with 24-hour physician coverage. Only consenting pediatric patients or consenting parents of pediatric patients given emergency care and not admitted to the hospital as inpatients and who subsequently received prescriptions from the physician providing emergency care were studied.

Definitions

1. **Adverse Drug Reactions** are any undesired or unintended responses to a medication which may require treatment or alteration of medication therapy.

2. **Clinical Pharmacist** is a registered pharmacist with additional education and training having direct contact on a day-to-day basis with patients and health professionals within a health care facility. The clinical pharmacist takes drug histories,
develops and monitors patient drug profiles, provides drug information, instructs patients on the proper use of medications, monitors adverse drug reactions and drug utilization and applies the tools of pharmacology, toxicology, biopharmaceutics and pharmacokinetics as they apply to rational drug therapy.

3. **Compliance** is the faithful administration and adherence to physician prescribed medication regimens and medical instructions without significant deviation.

4. **Drug Monitoring** is observing the course of medication therapy on a continuous basis, looking for drug interactions, adverse reactions, checking for proper dosage and administration and examining for rational drug therapy. Drug surveillance and drug monitoring will be used interchangeably in this study.

5. **Emergency Care** is the immediate treatment of medically urgent and non-urgent patients who present themselves to an emergency facility without an appointment.

6. **Emergency Room** is that ancillary service of the hospital that provides both urgent and non-urgent emergency care, but does not conduct any type of outpatient followup.

7. **Followup Interview** is the questioning of the patient or parent seven to ten days after treatment utilizing a prepared questionnaire to establish the impact of the clinical pharmacist's presence in the emergency care area during treatment.

8. **Hospital Pharmacist** is a registered pharmacist engaged in the practice of pharmacy primarily within the confines of the
hospital pharmacy and whose principal interests are compounding, drug distribution and control, intravenous admixtures and drug monitoring from patient profiles in the pharmacy.

9. **Pediatric Patient** is any person who requires medical attention and is 16 years of age or under.

10. **Rational Drug Therapy** is the proper selection of a clinically effective medication, that is clearly indicated for use in a given illness and provides relative safety to the patient.
CHAPTER 2

RELATED LITERATURE

There have been numerous articles published recently about the changing role of the pharmacist in health care delivery. The journals are replete with subjects on clinical pharmacy, drug distribution, intravenous admixtures and hyperalimentation, rational drug therapy and patient compliance. An examination of the literature using Index Medicus, International Pharmaceutical Abstracts, and Science Citation Index disclosed many references to the development of a clinical role for the pharmacist in inpatient care areas. A few references were descriptive of the clinical pharmacists involvement in ambulatory care but only Klotz (1972) spoke of the potential role of clinical pharmacy in a hospital emergency room.

The literature does suggest the need for greater study of the role of clinical pharmacists in ambulatory care. Francke (1972) pointed out there are roughly ten times the number of ambulatory patients seen in hospitals, as contrasted with the number of inpatients. Lesshafft (1970) and McLeod and Allen (1970) similarly pointed out that if clinical pharmacy can benefit hospitalized patients, it can benefit the ambulatory patient as well; the only health professional missing in the outpatient clinic is the pharmacist.
The services reportedly provided by clinical pharmacists in an outpatient setting seem to be disparate and many times stray from the area of drug expertise. McCarron (1975) described many of the clinical pharmacists as physician assistants performing routine tasks the physician does not want to do. She was referring to the Public Health Service pharmacists who were providing routine followup treatment for patients with diabetes or pernicious anemia, giving routine immunizations or diagnosing and treating simple skin disorders.

Ellinoy et al. (1973) and Anderson and Taryle (1974) reported the management of patients with medical problems requiring the chronic use of medications. The pharmacist interviewed the patient, ordered appropriate laboratory tests, evaluated the data and made a decision regarding a refill of the medication. Previously established protocols were utilized. Mattei et al. (1973) also advocated management of long-term illnesses by a clinical pharmacist in cooperation with the physician.

The clinical pharmacist was also found to be involved in the care of ambulatory mental health patients and hypertensive patients. The services provided by the mental health clinic pharmacist included traditional dispensing functions and clinical activities. These included medication group sessions with a nurse and a pharmacist reviewing patient profiles. Recommendations were made to the physician regarding any changes in medication therapy (Ivey 1973). Mattei et al. (1973) reported the pharmacists' involvement in evaluating the severity of hypertension and selecting the drug therapy according to the established guidelines for outpatients, after the physician has diagnosed essential hypertension.
Another concept of clinical pharmacy at the outpatient level is the establishment of a group practice which includes a clinical pharmacist and one or two family physicians. A model clinic, comprised of such a practice, was studied by Juhl et al. (1974) but further research is needed to determine the influence of the pharmacist on the physician workload.

Allen and Eckel (1972) proposed a role for the clinical pharmacist in ambulatory patient care by initiating an Ambulatory Clinical Pharmacy Service. The pharmacists' function in a medical-surgical screening clinic included patient and professional drug education, drug surveillance service, taking medication histories, fitting ostomy appliances, drug identification and liaison between the clinic and the pharmacy department.

Clinical pharmacy practice was studied by Levin (1972) in a decentralized pharmacy serving a pediatric clinic. Pharmacists, in addition to dispensing medication, conducted interviews with parents of each child before and after receiving medications, noted adverse drug reactions and monitored the therapy of the patient.

Klotz (1972) suggested providing clinical pharmacy services in pediatric outpatient areas which included the outpatient clinic and emergency room. Clinic responsibilities of the pharmacist were maintaining a patient profile and patient/parent consultation. Klotz's impression of the pharmacist's role in emergency room care was preparing unit dose medication, intravenous additives and providing poison control information.
At the present time, most of the references describing drug monitoring depict such a service during the patient's stay in the hospital (Jick et al. 1970). A report from the Boston Collaborative Drug Surveillance Program not only stressed inpatient monitoring but also mentioned the importance of outpatient monitoring in providing valuable drug information in adult and pediatric populations (Lawson et al. 1972).

Compliance is one of the most perplexing and significant problems in the care of ambulatory pediatric patients and, many times, determines the effectiveness of medical care. Non-compliance in pediatric populations averaged 82 percent in a clinic population studied by Bergman and Werner (1963). They discovered that by the ninth day of a ten-day regimen, only 18 percent of the pediatric patients were still receiving penicillin. Charney et al. (1967) demonstrated rates of 34 percent non-compliance in several private practice groups. A study of compliance conducted by Wilson (1973) revealed that approximately 25 percent of the pediatric patients studied were non-compliers. Non-compliance in the study seemed to be related to the number of medications taken daily.

Patient or parent comprehension about a medication regimen is an important factor in determining compliance. Of 134 patients receiving 380 prescriptions, only 22 percent of the prescriptions studied were being used properly and 31 percent were being misused in a manner that posed a serious threat to the patient's health. A major contributing factor to the defaulting was a lack of complete and comprehensive
directions from either the pharmacist or the physician (Boyd et al., 1974).

There is evidence that patient interviews prior to discharge or release from health care facilities reduced the incidence and degree of non-compliance (Mattar et al., 1975). The effects of instruction and labeling on the number of medication errors were studied in a sample of 40 outpatients. Of the total sample, 90 percent made errors and the most frequent type of error was timing. Educating these patients about their medications did not significantly decrease the number of medication errors and the more medications taken, the more likely the error (Malahy, 1966). Chubb and Winship (1974) reported medication errors were fewer in outpatients receiving medication instructions by pharmacists. Throughout the literature there seems to be agreement on at least one aspect of the clinical pharmacist's role in outpatient care. The lack of medication compliance has allowed the pharmacist to pursue a new role of consulting with and educating the patient in the proper use of his medications.

The methods utilized to objectively measure the degree of compliance varies and investigators differ in their operational definition of compliance. The most frequently used technique for measuring compliance has been a test for detecting excretion of a prescribed medication. Iron appearing in the stool of pregnant women was used to follow adherence to a ferrous sulfate regimen (Bonnar, Goldberg and Smith, 1969).
Dawson and Jamison (1971) monitored anticonvulsant blood levels and urine samples were tested for antibiotic content by Becker, Drachman and Kirscht (1972), in an attempt to determine degree of compliance. Riboflavin was added to a drug preparation and monitored in the urine as an indirect estimate of compliance with drug consumption orders (Melmon and Morrelli 1972).

Nonchemical methods of measuring compliance such as tablet count and patient reporting are somewhat less objective. Tablet or liquid medication count on return visits to the clinic and followup visits in the patient's home did not necessarily reflect the degree of compliance or non-compliance (Marston 1970). Interview techniques have met with little success. Denial of missed penicillin doses was noted in 83 percent of the patients, 82 percent of whom were later found not to be taking the drug as prescribed (Bergman and Werner 1963). Six out of ten mothers denied any failure to comply with penicillin regimens for their children, but in all six cases no penicillin was detected in the urine (Charney et al. 1967).

Many variables prevent direct comparison of different drug administration studies, as the criteria for determining compliance is diverse. Leistyna and Macauley (1966), who reported the highest rate of cooperation, allowed a 30-percent error in the amount of medication taken. When up to 50 percent of the urine specimens were negative for isoniazid, Morrow and Rabin (1966) classified their patients as non-compliant. If 50 percent or more of the tests were positive the patients were classified as compliant. Non-compliance with penicillin
prophylaxis was predicted with 90.2 percent probability by noting a negative urine test for the antibiotic on three initial specimens (Gordis, Markowitz and Lilienfeld 1969).

Numerous factors have been investigated that attempt to characterize a compliant or non-compliant patient. Factors such as age, sex, socioeconomic status, education, marital status and race have been studied but because they were not consistently reported in each study it is difficult to draw any decisive conclusions.

The uniqueness of the pediatric patient and the special problems of treatment described by Chudzik and Yaffe (1973) and Libert (1974) cautioned against the indiscriminate prescribing of medications for the young. The clinical pharmacist's involvement in pediatric care was supported by Jusko (1972), who stressed the importance of pharmacokinetics in pediatric pharmacology. The clinical significance of drug interactions in pediatric therapy was emphasized by Chudzik and Yaffe (1972).

A comprehensive review of the literature has revealed the need for study of pediatric drug monitoring by a clinical pharmacist in emergency care facilities. In addition, this investigation studied the influence of instruction given to the patient and/or parent by the clinical pharmacist. The effects of the instruction were measured by followup interviews by the clinical pharmacist.
CHAPTER 3

DESIGN OF STUDY

Introduction

A study of a role for the clinical pharmacist in the treatment of pediatric emergency care patients was conducted at the University of Arizona Medical Center, in cooperation with the Pediatric and Emergency Services of the hospital. In order to utilize the emergency care facilities as the base for the study, the necessary clearance was granted by the medical staff and full approval was received from the hospital administration and University Human Subjects Committee.

Pediatric emergency care services are provided in the emergency room and pediatric outpatient clinic of the hospital. All sampling and collection of data was done in these two areas of the hospital. Monday through Friday pediatric emergency care patients without appointments, who were referred to the pediatric clinic for emergency care, were monitored by the clinical pharmacist. The pediatric clinic was closed on Saturdays and Sundays; therefore, during the weekends, the emergency room served as the base for studying pediatric emergency care patients. The same pediatric staff of physicians treated pediatric patients in the pediatric clinic and emergency room.

The sample was limited to consenting parents of and/or pediatric patients (Appendix A) who came to the hospital for emergency care and
received one or more prescriptions from the physician upon release. Pediatric patients who did not receive prescriptions or who were admitted to the hospital for inpatient care were not considered in the study. A random sample of 88 pediatric patients was drawn from a population of children requesting emergency care. Only 80 of these pediatric patients were interviewed, monitored for drug therapy and followed up by the clinical pharmacist seven to ten days after treatment. One-half of the patients were instructed by the clinical pharmacist before leaving the hospital. The followup interview (Appendix B) was designed to retrieve information concerning the impact of the instruction by the clinical pharmacist on the patients' medication therapy.

In determining the effects of the clinical pharmacist's role in pediatric drug monitoring and instruction the following comparisons were made utilizing Appendix B and Appendix C.

1. The frequency with which the clinical pharmacist provided drug information upon request from health professionals (i.e., physicians, nursing staff) compared to where they might otherwise have requested the information or not have requested it at all.

2. The frequency with which rational drug therapy recommended by the clinical pharmacist was utilized compared to the frequency with which the recommendation was not utilized by the physician.

3. The frequency with which possible adverse drug reactions were avoided by the intervention of the clinical pharmacist or other health professionals.
4. The number of prescriptions that were filled or remained un­filled among the instructed and uninstructed patient groups.

5. The frequency with which correct or incorrect medication ad­ministration occurred among the instructed and uninstructed patient groups.

6. The frequency with which possible medication side effects were reported to the clinical pharmacist by the instructed and unin­structed parents.

7. The various therapeutic classes of drugs prescribed for the pediatric emergency care patients in the sample was determined.

8. The frequency with which patients and/or parents expressed favor with the medication instruction by the clinical pharmacist.

Methodology

The sample was divided into two groups of 40 patients. Group I pediatric patients were instructed by the clinical pharmacist regarding the proper administration and storage of the prescribed medication.

Group II pediatric patients were the control and did not receive medication instructions from the clinical pharmacist. Both groups received followup interviews seven to ten days after treatment.

Pediatric patients were alternately assigned to Group I or Group II as they presented themselves for emergency care, provided they met all the requirements set forth in the study.

Group I (40 pediatric patients) were managed as follows:

1. The first portion of the initial interview between the patient or parent and the clinical pharmacist was designed to collect
specific information concerning the medical history of the patient and recent medication therapy. Information collected included the patient's name, age, sex, known previous drug reactions and medications administered to the patient for up to three months prior to the interview.

2. Based upon the initial interview, the clinical pharmacist advised the physicians and nursing staff when drug-related problems occurred and made recommendations for their solutions. The clinical pharmacist recorded the number of times he was consulted for drug information, the type of information requested and by whom. The above information was tabulated on the Consult Record (Appendix C) and was utilized to determine the over-all contribution made by the clinical pharmacist in pediatric drug monitoring.

3. Following treatment by the physician, the pediatric patient and/or parent were given a detailed instructive interview by the clinical pharmacist regarding the administration, storage and precautions in the use of the medications prescribed. The pharmacist instructed the patient and/or parent about each medication and also provided them with written instructions for further clarification (Appendix D).

4. Approximately seven to ten days after treatment, a telephone or personal followup interview was conducted by the clinical pharmacist (Appendix B). All patients without telephones were interviewed at their residence or during a return appointment in the clinic.
The protocol for managing Group II (40 pediatric patients) was the same except these patients did not receive any instructions from the clinical pharmacist concerning the use of their prescribed medication.

Statistical analysis was applied to all the appropriate data using the chi-square test of independence. The Pirie-Hamden correction was used for chi-square when degrees of freedom was one and expected frequencies were less than ten (Downie and Heath 1974).
CHAPTER 4

RESULTS AND DISCUSSION OF DATA

A study was conducted in order to determine a role for the clinical pharmacist in the treatment of pediatric emergency care patients through drug monitoring, patient medication instruction and followup interview. It is estimated that 460 man hours was devoted to the study, which began on March 22, 1975, and was concluded June 18, 1975.

A random sample of 88 pediatric patients was drawn from a population of children requesting emergency care from either the hospital's emergency room or pediatric clinic. Complete data were collected on only 80 patients as 8 of the 88 pediatric patients and/or parents did not receive a followup interview because of unknown relocations, incorrect telephone numbers or the inability to contact anyone at the residence. The eight pediatric patients who did not receive followup interviews were not included in the following data.

During this study, the clinical pharmacist received 21 drug-related questions from physicians, nurses and parents. After answering the question, the clinical pharmacist asked the questioner where the individual might have otherwise obtained the information. The alternate source of information for the 21 drug-related questions answered by the clinical pharmacist is presented in Table 1. The Physicians' Desk Reference was quoted as the alternate source of drug information for
Table 1. Prime and alternate source of information for drug-related questions asked by physicians, nurses and parents.

<table>
<thead>
<tr>
<th>Prime Source of Answers:</th>
<th>Number of Questions Presented by Questioners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physicians</td>
</tr>
<tr>
<td>Clinical Pharmacist</td>
<td>14</td>
</tr>
<tr>
<td>Alternate Source of Answers:</td>
<td></td>
</tr>
<tr>
<td>Physicians' Desk Reference</td>
<td>5</td>
</tr>
<tr>
<td>Other Health Professionals</td>
<td>1</td>
</tr>
<tr>
<td>Wouldn't Have Requested at all</td>
<td>3</td>
</tr>
<tr>
<td>Hospital Formulary</td>
<td>4</td>
</tr>
<tr>
<td>Medical Library</td>
<td>1</td>
</tr>
</tbody>
</table>

Six of the 21 questions. Other health professionals would have been used five times as an alternate source and five other questions would not have been asked if the clinical pharmacist was not present. Of the 21 questions asked, nine involved pharmaceutics, eight pertained to therapeutics, three concerned pharmacology and there was one drug identification. Two of the questions, both from physicians, required medical library research.
The clinical pharmacist also volunteered drug information without request a total of 12 times, when he considered the information to be of significant importance to physicians and nurses. Physicians were provided unsolicited drug information seven times and members of the nursing staff five times.

The clinical pharmacist recommended drug therapy to the physicians 24 times for 24 of the 80 pediatric emergency care patients in the study. Table 2 represents the frequencies with which the physicians utilized the pharmacist's recommendations for drug therapy. Of the 11 (45.8 percent) recommendations that were utilized by the physicians, six were dosage recommendations, one was a drug recommendation, and four were recommendations that were a combination of the two. The 13 (54.2 percent) recommendations by the clinical pharmacist not utilized by the physicians were five recommendations concerning dosage, five concerning drugs and three concerning both dose and drug therapy. The clinical pharmacist's recommendations were used more frequently as the study progressed.

Written prescriptions errors made by the physicians were detected on several occasions by the clinical pharmacist and corrected by the physician before the patient left the hospital. The errors included improper units of measurement, insufficient number of doses prescribed, incomplete directions for use and the incorrect medication was prescribed.

The clinical pharmacist prevented five possible adverse drug reactions. On three occasions the clinical pharmacist recommended to
Table 2. The frequencies with which the physician utilized the pharmacist's recommendations for drug therapy.

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Dose</th>
<th>Drug</th>
<th>Both</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilized</td>
<td>6 (54.6%)</td>
<td>1 (9.0%)</td>
<td>4 (36.4%)</td>
<td>11 (100.0%)</td>
</tr>
<tr>
<td>Not Utilized</td>
<td>5 (38.5%)</td>
<td>5 (38.5%)</td>
<td>3 (23.0%)</td>
<td>13 (100.0%)</td>
</tr>
</tbody>
</table>

the physicians that a smaller medication dosage of aminophylline as advised by the manufacturer be prescribed. A less irritating and weaker strength ophthalmic solution was also recommended on two occasions that may have otherwise produced adverse reactions. Adverse reactions averted by other health professionals was not observed.

A total of 120 medications were prescribed for the 80 pediatric emergency care patients studied, for an average of 1.5 medications per patient. Table 3 illustrates the number and percent of medications prescribed by therapeutic class for pediatric emergency care patients. The three most commonly prescribed therapeutic classes were antibiotics, antihistamine/decongestant combinations and antipyretics. There were 44 oral antibiotics prescribed, accounting for 36.7 percent of the total medications prescribed and 55.0 percent of the pediatric patients studied. Antihistamine/decongestant combinations were prescribed 34 times, which was 28.3 percent of the medications and 42.5 percent of the patients.
Table 3. Combined number and percent of medications prescribed by therapeutic class for the instructed and uninstructed pediatric population (N = 80).

<table>
<thead>
<tr>
<th>Therapeutic Class</th>
<th>Number of Prescriptions (N = 120)</th>
<th>Percent of Prescriptions</th>
<th>Percent of Patients Receiving Prescriptions*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotics</td>
<td>44</td>
<td>36.7</td>
<td>55.0</td>
</tr>
<tr>
<td>Antihistamines/Decongestants</td>
<td>34</td>
<td>28.3</td>
<td>42.5</td>
</tr>
<tr>
<td>Antipyretics</td>
<td>13</td>
<td>10.8</td>
<td>16.3</td>
</tr>
<tr>
<td>Ophthalmics</td>
<td>9</td>
<td>7.5</td>
<td>11.3</td>
</tr>
<tr>
<td>Antiasthmatics</td>
<td>7</td>
<td>5.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Sedatives</td>
<td>4</td>
<td>3.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Parasiticides</td>
<td>3</td>
<td>2.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Nose Drops</td>
<td>2</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Otics</td>
<td>2</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>1</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Estrogen Vaginal Creams</td>
<td>1</td>
<td>0.8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

* Total percentage exceeds 100.0 percent because some patients received multiple medications.
Antipyretics were the third most frequently prescribed medications (13 times), accounting for 10.8 percent and 16.3 percent of the pediatric patients.

Due to the limitations of the study, only those pediatric emergency care patients who were not admitted to the hospital and received a prescription from the physician were included in the collection of data. These limitations precluded the clinical pharmacist from becoming involved in many cases of pediatric clinical toxicology, as most of these patients were admitted. There was one instance in which the clinical pharmacist assisted in the recommendations for treatment of an antiasthmatic ingestion.

The sample of 80 pediatric patients was divided into two groups of 40 patients. One group was given medication instruction by the clinical pharmacist and the other group was not instructed by the clinical pharmacist.

A comparison of the frequencies with which the instructed and uninstructed pediatric patients had their prescriptions filled is presented in Table 4. Of the 66 medications prescribed in the instructed group, 61 (92.5 percent) were filled and five (7.5 percent) remained unfilled. In the uninstructed group, 50 (92.6 percent) of the 54 medications prescribed were filled. There were five pediatric patients (12.5 percent in the instructed group and four (10.0 percent) in the uninstructed group who did not have one of their prescriptions filled. Two medications in the instructed group and one in the uninstructed group were not filled due to a sufficient supply from a previous purchase.
Table 4. The frequencies with which the instructed and uninstructed pediatric patients had their prescriptions filled.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Prescriptions Filled</th>
<th>Prescriptions Unfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructed</td>
<td>61 (92.5%)</td>
<td>5 (7.5%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>50 (92.6%)</td>
<td>4 (7.4%)</td>
</tr>
<tr>
<td>Combined</td>
<td>111 (92.5%)</td>
<td>9 (7.5%)</td>
</tr>
</tbody>
</table>

Other prescriptions remained unfilled because of economics, the parents felt the medication was worthless, the child's illness improved or the pharmacy did not carry the medication.

A 2 x 2 chi-square test was made and the results showed no dependence of the number of prescriptions filled and instruction by the clinical pharmacist at the .05 level.

The number of medications that were correctly or incorrectly administered in the prescribed manner and for the specified period of time is presented in Table 5. In the instructed group, 57 (90.5 percent) of 63 medications were administered correctly, while 48 (94.1 percent) of 51 medications in the uninstructed group were taken correctly. Of the 114 medications administered, 105 (92.1 percent) were correctly given among the two groups. Three medications that were not filled but administered from a previously purchased prescription were included in the totals.
Table 5. Number and percent of medications correctly administered by instructed and uninstructed patients.

<table>
<thead>
<tr>
<th></th>
<th>Number of Medications Administered</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correctly</td>
<td>Incorrectly</td>
</tr>
<tr>
<td>Instructed</td>
<td>57 (90.5%)</td>
<td>6 (9.5%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>48 (94.1%)</td>
<td>3 (5.9%)</td>
</tr>
<tr>
<td>Combined</td>
<td>105 (92.1%)</td>
<td>9 (7.9%)</td>
</tr>
</tbody>
</table>

Incorrectly administered medications included three medications not given the prescribed number of times per day, four medications not given the correct number of days and two medications were administered with the wrong dose.

The number of pediatric patients or their parents who correctly administered medications was also tabulated. Table 6 shows that 72 (90.0 percent) of the patients received correctly administered medications. There were 35 (87.5 percent) pediatric patients in the instructed group and 37 (92.5 percent) pediatric patients in the uninstructed group who correctly received all of their medications.

A chi-square test, using the Pirie-Hamden correction, was applied to the data in Tables 5 and 6. The results were not significant at the .05 level, indicating correct medication administration was independent of medication instruction.
Table 6. Number and percent of instructed and uninstructed pediatric patients or parents who correctly administered medications.

<table>
<thead>
<tr>
<th></th>
<th>Number of Patients or Parents Who Administered Medications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correctly</td>
<td>Incorrectly</td>
</tr>
<tr>
<td>Instructed</td>
<td>35 (87.5%)</td>
<td>5 (12.5%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>37 (92.5%)</td>
<td>3 (7.5%)</td>
</tr>
<tr>
<td>Combined</td>
<td>72 (90.0%)</td>
<td>8 (10.0%)</td>
</tr>
</tbody>
</table>

Table 7 represents the total number of parents who reported possible medication side effects, based upon the judgment of the clinical pharmacist. Of the 80 parents in the study, 11 (13.8 percent) reported possible medication side effects. There were two (5.0 percent) parents reporting possible side effects among the instructed group and nine (22.5 percent) in the uninstructed group.

The nine possible side effects reported by the uninstructed group were six reports of diarrhea from ampicillin, two reports of irritability and excitation from the antihistamine/decongestant combinations and one report of a rash from the parasiticide. The two possible side effects reported by the instructed group were one diarrhea from ampicillin and one extreme eye irritation from 30 percent sulfacetamide eye drops.
Table 7. Number and percent of instructed and uninstructed parents who reported possible medication side effects.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number of Parents Reporting Possible Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Instructed</td>
<td>2 (5.0%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>9 (22.5%)</td>
</tr>
<tr>
<td>Combined</td>
<td>11 (13.8%)</td>
</tr>
</tbody>
</table>

A chi-square test of independence for the instructed and uninstructed groups and the number of possible medication side effects was calculated. Results indicated that possible medication side effects reported by the parents were independent of medication instruction at the .05 level.

During the followup interview, parents of the pediatric patients were asked their opinion of the medication's effectiveness in relieving their child's illness. Medications were considered effective by 36 (90.0 percent) of the instructed parents and 29 (72.5 percent) of the uninstructed parents (Table 8). Combined, a positive opinion of medication effectiveness was expressed by 65 (81.3 percent) parents. There were seven (8.7 percent) ineffective opinions expressed, one (2.5 percent) from the instructed group and six (15.0 percent) from the uninstructed group. No opinion was recorded three times (7.5 percent).
Table 8. Number and percent of instructed and uninstructed parents' opinions concerning medication effectiveness.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Effective</th>
<th>Ineffective</th>
<th>No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructed</td>
<td>36 (90.0%)</td>
<td>1 (2.5%)</td>
<td>3 (7.5%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>29 (72.5%)</td>
<td>6 (15.0%)</td>
<td>5 (12.5%)</td>
</tr>
<tr>
<td>Combined</td>
<td>65 (81.0%)</td>
<td>7 (8.7%)</td>
<td>8 (10.0%)</td>
</tr>
</tbody>
</table>

in the instructed group and five times (12.5 percent) in the uninstructed group.

The basis for considering the medication to be ineffective varied among parents. On three occasions the child's condition became worse clinically and had to return to the clinic for additional treatment or was admitted to the hospital. One mother reported that while the child was on the medication, there was no improvement in his health, but after discontinuing the medication the child became well. No opinion was expressed when the medication was still being given to the patient and/or the patient had not fully recovered from the illness.

A chi-square test of independence was calculated which indicated that reports of medication effectiveness was independent of medication instruction by the clinical pharmacist, at the .05 level.

During the followup interview parents of the pediatric were asked their opinion of the quality of emergency care their child received
during treatment at the hospital (Table 9). Opinions were expressed as excellent, good, fair and poor. There were 50 (62.5 percent) parents in the sample who reported that excellent care was received by their children. Thirty-one (77.5 percent) of the instructed parents reported excellent care, while only 19 (47.5 percent) parents in the uninstructed group stated the care was excellent. Treatment rated as good was reported 20 (25 percent) times, with the instructed and uninstructed parents reporting seven (17.5 percent) and 13 (32.5 percent) times respectively. There was one (2.5 percent) fair and one (2.5 percent) poor response in the instructed group and four (10.0 percent) fair and four (10.0 percent) poor responses in the uninstructed group.

Table 9. Number and percent of instructed and uninstructed parents' opinions concerning the quality of care their child received.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructed</td>
<td>31 (77.5%)</td>
<td>7 (17.5%)</td>
<td>1 (2.5%)</td>
<td>1 (2.5%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>19 (47.5%)</td>
<td>13 (32.5%)</td>
<td>4 (10.0%)</td>
<td>4 (10.0%)</td>
</tr>
<tr>
<td>Combined</td>
<td>50 (62.5%)</td>
<td>20 (25.0%)</td>
<td>5 (6.25%)</td>
<td>5 (6.25%)</td>
</tr>
</tbody>
</table>
Unfavorable opinions expressed by the parents were accompanied by reports of the physicians' unprofessional appearance, poor bedside manner, incomplete examination and the habit of prescribing expensive medications that were ineffective. Other complaints concerned a long waiting period before treatment was begun and seeing a different doctor each time the patient came to the hospital.

A chi-square test of independence was calculated and the results indicated that the parents' favorable opinions of the quality of care their child received was dependent on whether they were instructed or not instructed by the clinical pharmacist. The test was significant at the .05 level.

Only the parents of the pediatric emergency care patients in the instructed group were asked their opinion of the medication instruction by the clinical pharmacist. Their responses were expressed as beneficial, nonbeneficial and no opinion (Table 10). There were 36 (90.0 percent) beneficial responses, two (5.0 percent) nonbeneficial opinions and two (5.0 percent) no opinions.

Table 10. Number and percent of the instructed parents' opinions of patient medication instruction by the clinical pharmacist (N = 40).

<table>
<thead>
<tr>
<th>Group</th>
<th>Beneficial</th>
<th>Nonbeneficial</th>
<th>No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructed</td>
<td>36 (90.0%)</td>
<td>2 (5.0%)</td>
<td>2 (5.0%)</td>
</tr>
</tbody>
</table>
The unbeneficial and no opinion responses stated that the doctor had explained the use of the medication and felt the pharmacist added little to the instruction. Beneficial responses stated the pharmacist was more thorough with the instructions by furnishing written instructions for the parent and generally provided a very useful service.

Parents in both groups were asked if they favored the service of a clinical pharmacist even though it might mean higher costs for medical care. Table 11 shows that 40 (50.0 percent) of the 80 respondents favored the service of the clinical pharmacist. There were 27 (67.5 percent) favorable responses in the instructed group and 13 (32.5 percent) in the uninstructed group. Unfavorable responses totaled 26 (32.5 percent), nine (22.5 percent) from the instructed group and 17 (42.5 percent) from the uninstructed group. No opinion was expressed 14 times (17.5 percent) with four (10.0 percent) coming from the instructed group and ten (25.0 percent) from the uninstructed group.

Table 11. Number and percent of instructed and uninstructed parents willing to pay for the services of a clinical pharmacist.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Yes</th>
<th>No</th>
<th>No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructed</td>
<td>27 (67.5%)</td>
<td>9 (22.5%)</td>
<td>4 (10.0%)</td>
</tr>
<tr>
<td>Uninstructed</td>
<td>13 (32.5%)</td>
<td>17 (42.5%)</td>
<td>10 (25.0%)</td>
</tr>
<tr>
<td>Combined</td>
<td>40 (50.0%)</td>
<td>26 (32.5%)</td>
<td>14 (17.5%)</td>
</tr>
</tbody>
</table>
Parents opposed to the extra charge for the service said it was the physician's responsibility and medical costs were high enough. Parents who favored the clinical pharmacist's service despite increased costs expressed a feeling of candidness when speaking with the pharmacist. They stated this enabled them to ask many more questions about their medications they might not otherwise have asked the physician. They also felt the clinical pharmacist knew more drug information than the physician, especially about new drugs. Another patient stated that the pharmacist served as a safety check against any inadvertent errors the physician may have committed in prescribing the medications.

A statistical analysis was conducted to test if the responses by the parents who were willing to pay for the services of a clinical pharmacist were independent or dependent of the medication instruction received by the clinical pharmacist. At the .01 level, a chi-square test of independence showed the favorable responses were dependent upon instruction.
CHAPTER 5

SUMMARY AND RECOMMENDATIONS

Summary

Clinical research was conducted to determine a role for the clinical pharmacist in the treatment of pediatric emergency care patients through drug monitoring, medication instruction and subsequent followup interviews by the clinical pharmacist.

The study was performed in the emergency room and pediatric outpatient clinic of a university hospital. The clinical pharmacist interviewed, monitored the drug therapy and performed a followup interview for 80 pediatric emergency care patients. Half of these patients also received medication instruction from the clinical pharmacist as part of their emergency care treatment.

Upon request the clinical pharmacist answered 21 drug-related questions from 14 physicians, three nurses and four parents. Each questioner was asked where the individual would have obtained the answer if the clinical pharmacist was not present. The first and second alternate sources for drug information were the Physicians' Desk Reference (six times) and other health professionals (five times). Unsolicited drug information was also provided to physicians and nurses by the clinical pharmacist on 12 other occasions.
The clinical pharmacist recommended drug therapy to the physicians 24 times for 24 different patients. The physicians utilized 11 (45.8 percent) of the 24 recommendations. The frequency of utilization increased as the study progressed.

The clinical pharmacist prevented five possible adverse drug reactions by advising physicians not to prescribe potentially hazardous doses of medications.

Of the 120 medications prescribed, 44 (36.7 percent) were antibiotics, 34 (28.3 percent) antihistamine/decongestant combinations and 13 (10.8 percent) antipyretics. Antibiotics were prescribed for 55.0 percent of the patients and 42.5 percent received an antihistamine/decongestant combination.

The sample of 80 pediatric patients was divided into two groups of 40 patients. One group was given medication instruction by the clinical pharmacist and the other group was not instructed by the clinical pharmacist.

The instructed pediatric patients or their parents were educated on the proper medication administration and storage and provided written instructions for additional clarification. There were 61 (92.5 percent) of 66 prescriptions filled in the instructed group and 50 (92.6 percent) of the 54 filled in the uninstructed group. Five (12.5 percent) and four (10.0 percent) of the patients in the instructed and uninstructed groups respectively did not have one of their prescriptions filled. Administration was correct for 57 (90.5 percent) of 63 medications in the instructed group and 48 (94.1 percent) of 51 medications administered in
the uninstructed group. Patients or their parents who correctly administered medications was recorded as 35 (87.5 percent) in the instructed group and 37 (92.5 percent) in the uninstructed group. The number of patients or their parents reporting possible medication side effects was two (5.0 percent) in the instructed group and nine (22.5 percent) among the uninstructed group. Opinions of medication effectiveness was 36 (90.0 percent) positive replies in the instructed group and 29 (72.5 percent) by the uninstructed group. A chi-square test of independence was calculated at the .05 level and the results indicated the medication instruction was independent of all the above-mentioned categories.

The parents were asked their opinion of the quality of care their child received during emergency treatment at the hospital. Excellent emergency care was reported by 31 (77.5 percent) of the instructed parents and 19 (47.5 percent) of the uninstructed parents. Statistical analysis using chi-square was calculated and the results indicated that the opinion of parents regarding the quality of care their child received was dependent on medication instruction at the .05 level.

Thirty-six of the 40 instructed patients or their parents thought the clinical pharmacist's instruction was beneficial. The instructed and uninstructed groups were asked if they would favor the clinical pharmacist's services even if the additional service might increase the cost of medical care. Favorable response from the instructed group totaled 27 (67.5 percent) and 13 (32.5 percent) from the uninstructed group. A chi-square test of independence resulted in a significant finding at the .01 level indicating the parents' willingness to pay for
the services of a clinical pharmacist was dependent on the medication instruction by the clinical pharmacist.

In this study, the clinical pharmacist conducted medication histories, provided drug information, recommended drug therapy, provided medication instruction to the patient and followed up patients after treatment. Statistically, patient instruction by the clinical pharmacist had a minimal effect on whether the medications were filled, were administered properly, produced side effects or were thought to be effective. Even though these critical measurements were non-significant, the patients or their parents who were instructed overwhelmingly favored the clinical pharmacist's instructions and were willing to pay for such services. The clinical pharmacist can provide many useful health care services benefitting pediatric emergency care.

Recommendations

The data and findings of this study contain many positive points concerning a role for a clinical pharmacist in the treatment of pediatric emergency care patients. Because the role is so extremely specialized, it is unlikely that any health care facility could feasibly institute such a service. Therefore, it is recommended that the role of the clinical pharmacist described in this study be adapted to the treatment of all patient age groups in the emergency room and/or all pediatric patients in the pediatric outpatient clinic.

It is further recommended that the clinical pharmacist take a thorough medication history of each pediatric patient seen in the clinic and place the history in the patient's outpatient record. As a permanent
The medication history may be readily available for review by the physician in order to acquaint him with the medications previously prescribed for the patient.

In order to provide useful drug information and make intelligent recommendations for drug therapy of pediatric patients, it is recommended that the clinical pharmacist keep current with the literature about the latest in pharmacology, medicine, therapeutics and pharmaceutics.

It is recommended that following the treatment by the physician, the clinical pharmacist thoroughly instruct the patient or parent about proper administration and storage of the prescribed medications. He may also inform the patient or parent about the more common side effects that may be elicited by the drug. Providing written supplemental medication instructions to help clarify the medication administration should also be included.

It is recommended that the clinical pharmacist become involved in pediatric clinical toxicology, whether it be in the emergency room or the pediatric outpatient clinic. Many drug toxicities and their recommended treatments are specific for pediatric patients. Knowledge of such invaluable information can be applied by the expertise of a well-trained clinical pharmacist.

The final recommendation is that the clinical pharmacist conduct a followup interview, via the telephone or personal interview with the patient or parent, approximately seven to ten days following treatment. The clinical pharmacist could check on whether the prescription was filled, properly labeled and administered and if any side effects or
problems have occurred. After completion of the followup interview, the pharmacist would then report his findings to the physician responsible for the patient's care. This would save the physician valuable clinic time which otherwise would be spent following up his patients.
APPENDIX A

CONSENT FORM

I, ____________________, understand that I am being asked to participate in a study of what happens when drugs are taken by pregnant mothers or children themselves.

I understand that at this time we do not know how many (if any) bad things happen when drugs are used by mothers or children even if we do know a lot about the good that can happen if an illness is treated with the right drugs. In order to find out how safe normal drug therapy is, patients and children will be asked questions about themselves (such as about age, allergies, pregnancy and delivery) and drug use (by prescription or not) and what happens to their children during or after this use. These questions will be asked by pharmacists and doctors.

Parents and patients will all be asked the same questions the first time, but most patients will be asked questions again at least once (in person, by phone, or by letter) after a drug has been given either at home or in the hospital.

I understand that my medical chart and my child's chart will be read by the pharmacists and doctors doing this study and that information about my child and me will be written down and kept. I also understand that all such information will be kept confidential and will be
available only to my doctors and the people involved in this study. This information will never identify me or my child by name.

I understand that I myself may not gain anything from this information personally but that by looking at this kind of information the people doing this study may be able to find out how often (and with which drugs) bad effects happen. The study has been explained to me and I have had a chance to ask any further questions I might have.

I understand that I may at any time refuse to answer questions or in any other way participate in this study and that such refusal will in no way change my medical care.

I understand that this study will be done without charge to me or my child.

My child also understands the study as much as possible for his/her age and has also agreed to this.

SIGNATURE: __________________________________________ DATE: ______________________

WITNESS: __________________________________________
APPENDIX B.

PEDIATRIC EMERGENCY CARE PATIENT FOLLOWUP INTERVIEW FORM

Patient's Name: ____________________________ Date: ____________________

My name is Terry Rittmeyer, a graduate pharmacy student at The University of Arizona. You may recall I recently spoke with you and your child during treatment at The Arizona Medical Center. At this time, I would like to ask you a few questions concerning that treatment.

1. When did you have the prescriptions filled?
   (a) ____________________________ (b) ____________________________
   (c) ____________________________ (d) ____________________________

2. Please read the labeled instructions on each container. (Correct or Incorrect)
   (a) ____________________________ (b) ____________________________
   (c) ____________________________ (d) ____________________________

3. Is the medication still being given at this time?
   (a) ____________________________ (b) ____________________________
   (c) ____________________________ (d) ____________________________

4. Did you notice any unusual effects from the medications?
   (a) ____________________________ (b) ____________________________
   (c) ____________________________ (d) ____________________________

5. What is your opinion of the care your child received during treatment in the emergency room or clinic?
   Excellent __ Good __ Fair __ Poor __ No Opinion __

6. Do you think the medication has been effective or ineffective in relieving your child's illness?
   Effective _____ Ineffective _____ No Opinion _____
7. What is your opinion of the medication instruction by the pharmacist after treatment?

Beneficial_____ Not Beneficial_____ No Opinion_____ 

8. Would you be willing to pay for such a service if it were included in the total cost of health care?

Yes_____ No_____ No Opinion_____ 

*Question asked only of those patients receiving medication instructions.

THANK YOU.
APPENDIX C

PHARMACY/PHARMACOLOGY CONSULT RECORD
<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
<th>SOURCE OF CONSULT</th>
<th>AR</th>
<th>CONSULT</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>RPh  MD  RN  Other</td>
<td></td>
<td>Written  Oral  Document</td>
<td></td>
</tr>
</tbody>
</table>

**ADVERSE REACTION (AR) OR RECOMMENDATIONS FOR THERAPY (RT)**

**Adverse Reaction--**
- Avoided by contact with Rph
  - 011 definite
  - 012 probable
  - 013 doubtful
- Occurred
  - 021 definite
  - 022 probable
  - 023 doubtful
- Brought to attention by RPh
  - 031 definite
  - 032 probable
  - 033 doubtful
- Information Only
  - 040
- Other
  - 050

**Recommendations for Therapy--**
- Made by RPh and advice taken by physician
  - 061 dose
  - 062 drug
  - 063 both
- Made by RPh and advice not taken by physician
  - 071 dose
  - 072 drug
  - 073 both
APPENDIX D

PEDEATRIC EMERGENCY CARE PATIENT MEDICATION INSTRUCTION INTERVIEW FORM

Patient's Name:________________________ Date:________________________

1. Medication identified by name and purpose.
   (a)________________________________ (b)
   (c)________________________________ (d)

2. Physician's directions for use explained (dose and admin.).
   (a)________________________________ (b)
   (c)________________________________ (d)

3. Proper storage instructions.
   (a)________________________________ (b)
   (c)________________________________ (d)

4. Precautions (i.e., side effects, drug/food interaction).
   (a)________________________________ (b)
   (c)________________________________ (d)

Patient's Copy of Instructions:

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>____________________</td>
</tr>
<tr>
<td>b)</td>
<td>____________________</td>
</tr>
<tr>
<td>c)</td>
<td>____________________</td>
</tr>
<tr>
<td>d)</td>
<td>____________________</td>
</tr>
</tbody>
</table>
REFERENCES

Allen, Robert J. and Fred M. Eckel. "The Pharmacist's Role in a Hospital-Based Outpatient Clinic." Drug Intelligence and Clinical Pharmacy, 6:278-284, August 1972.


