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Evaluation of a Special Teaching Program with Ambulatory Cardiac Patients

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Abstract

EVALUATION OF A SPECIAL TEACHING PROGRAM WITH AMBULATORY CARDIAC PATIENTS

by Mary L. (McGregor) Minns

This study was designed to test the hypotheses that ambulatory cardiac patients given a special teaching program would have increased understanding about their medication, make fewer medication errors, and know more about undesirable effects and how to handle them than patients not included in the special teaching program. Forty-one ambulatory cardiac patients were, after a random start, alternately assigned to an experimental or to a control group. All the patients were taking one or more of three different medications before hospitalization, during their hospital stay, and after their discharge. Three medications, digoxin (lanoxin), lasix, and nitroglycerin, were studied. The program for the experimental group included planned instruction and practice in self-administered medication while the patients were hospitalized.

The program, planned by the investigator, was implemented by three hospital staff medicine nurses. The investigator administered the pretests before the program and the post-tests 8 to 15 days after the patients were discharged. She also made a tablet count as one way of identifying medication errors.

Findings were in the direction supporting the hypotheses (no statistical procedures were performed). Pretest to post-test differences between the control and experimental groups were higher in most

instances for the experimental group; i.e., 7 of 9 questions on understanding of medication, 3 of 6 questions on medication errors, and 9 of 9 questions on knowledge of undesirable effects. The experimental group had no errors as determined by tablet count, whereas the control group had 23 out of a possible 31.

The data suggest that the special teaching program was effective in helping cardiac patients comply with their medication regimen insofar as compliance can be measured.

LOMA LINDA UNIVERSITY

Graduate School

EVALUATION OF A SPECIAL TEACHING PROGRAM WITH AMBULATORY CARDIAC PATIENTS

by

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Each person whose signature appears below certifies that he has read this thesis and that in his opinion it is adequate, in scope and quality, as a thesis for the degree of Master of Science.

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Chapter 1

INTRODUCTION

Nurses and physicians often assume that patients discharged from the hospital on oral medications follow their instructions, but experience has shown that often they do not. Obviously, the patient will not benefit from medication unless he follows the prescribed regimen. To do this effectively, the patient should know what the medication is, why he takes it, and what he should do if undesired effects occur. This study was designed to find out whether a special teaching program regarding medications would help patients to understand and to adhere to their program.

NEED FOR THE STUDY

Many studies have been done indicating that medications are misunderstood, directions misinterpreted, and errors made. Evidently, medication teaching is currently insufficient to motivate patients to adhere to a regimen. Clinic patients over sixty years of age were studied by Neely and Patrick (1968) using a questionnaire. They found that 32 percent were serious error-makers, 27 percent made no potentially serious medication errors, and 41 percent made no medication errors. The authors suggested that nurses in hospitals should teach older patients about their medication before they were discharged and initiate self-administered medication during their hospitalization.

In a review of over 50 studies, Blackwell (1973) found that one-quarter to one-half of all outpatients failed to take their prescribed medication. Many who did take it made errors in dosage or in sequence or timing. Some took medication for the wrong reasons. Several authors stated that it was a mistake to assume that all patients could go from total dependence on others for administering medication to self-administration in one day. Others recommended that the action of the medication and the possible undesirable effects be explained to patients.

A study by Marks and Clarke (1972) in a hospital found that, in general, patients had little information about the medications they were taking and were unaware of possible undesirable effects. They also had no concept of the importance of taking medication at the specified frequency. Patients who wanted information did not ask for it.

One of the findings of Cockerham's (1970) experimental program in self-administered medication by rehabilitation patients was the need for nurses to reduce their nonpatient care activities and to spend time in teaching and supervising the patient.

The teaching of patients has long been considered a component of nursing practice (Monteiro, 1964) because nurses are in a strategic position for implementing the teaching of self-administered medication. The teaching should include the action and the possible undesirable effects of the medication. If the patient understood how and why the medication acted and how to use it properly, he might comply better.

This study was designed to involve the ambulatory cardiac

patient with the responsibility for self-administered medication while he was still in the hospital and to teach him about his medications in order to find out whether this would increase his compliance with a medication program.

PURPOSE OF STUDY

The purpose of this study was to formulate a special teaching program and test its effectiveness with a group of ambulatory cardiac patients. It was hoped that the teaching program would help the patient to:

1. Understand his medication.
2. Reduce his medication errors.
3. Recognize the undesirable effects of medication and take appropriate action.

STATEMENT OF PROBLEM

The specific problem for this study was: Will ambulatory cardiac patients exposed to a special teaching program while they are hospitalized comply with the self-administered medication regimen better than those who receive only routine care? The three areas of compliance measured were:

1. Patient understanding of medication.
2. Errors in administration.
3. Recognition and management of undesirable effects.

Patients who received the same medication prior to, during, and following hospitalization were studied to find out if a special teaching

program made a difference in understanding medications and compliance.

Hypotheses

Ambulatory cardiac patients given a special teaching program will have (1) increased understanding about their medication, (2) fewer medication errors, and (3) more knowledge of undesirable effects than patients not included in the special teaching program.

Definition of Terms

Special Teaching Program (STP). A program devised by the investigator to help ambulatory cardiac patients before their discharge to understand and to follow their prescribed medication regimen. This program included self-administration of medicines.

Self-Administered Medication Program (SAMP). A program in which the patient, while still hospitalized, was responsible for coming to the nursing station at appropriate times to request his prescribed medication by name.

Routine Medication Program (RMP). The ordinary routine in which the patient's medication was brought to him by the nurse. It included no planned teaching but questions about his medication were answered.

Ambulatory Cardiac Patients. Patients on the cardiology unit of the selected medical center who were recuperating from a cardiac problem and were willing and able to go to the nurses' station for their medication.

Compliance. The patient adheres to the physician's orders and directions and is knowledgeable about the purpose, dosage, and undesirable

effects of his medication(s).

Pretest. Structured questions read to the patient by the investigator when they entered the study. Answers were recorded at the time of the interview.

Post-Test. Structured questions read to the patient by the investigator 8 to 15 days following discharge from the hospital. Answers were recorded at the time of the interview.

Medication Error. Any of the following five types of errors a patient might make in administering his own medication (Schwartz, 1964):

1. Taken by the patient but not ordered by the physician.
2. Ordered by the physician but not taken by the patient.
3. Ordered by the physician but taken in incorrect doses.
4. Ordered by the physician but taken at the wrong time.
5. Ordered by the physician but taken with insufficient or inaccurate knowledge of the purpose and/or possible undesirable effects of the medication.

Limitations of the Study

The sample size was a convenience sample in which patients were alternately placed in the control or experimental group after a random start.

The limited patient population that met the study criteria made it impracticable to include cultural, educational, and socioeconomic factors in criteria for selection of patients.

Even though the instruction and material for the three participating nurses were identical, the quality of their patient teaching

was uncontrolled.

Overview of Method

The investigator prepared a set of teaching guidelines to use (Appendix G) for commonly prescribed cardiac medications. Three staff nurses regularly assigned to dispense medications were instructed in the use of the guidelines and in the self-administered medication program. The charge nurse randomly selected the first patient and then placed the remaining qualified patients for the study into the control or the experimental group. The investigator gave each patient a pretest (Appendix E) without knowing to which group he was assigned. The experimental group received the special teaching program and participated in the self-administered medication program prior to discharge from the hospital. Eight to 15 days after a patient was discharged, the investigator visited him in his home and gave the post-test (Appendix F) and did a tablet count. Findings from the post-test were compared to those from the pretest.

THE CONCEPTUAL FRAMEWORK

Basic principles provided a framework for this study to develop a special teaching program and to prepare for self-administration of medication.

1. Compliance is essential. No medication can be effective unless it is administered properly.

2. Knowledge and understanding are necessary. Self-administration of medication requires that the patient must know not only what

medication or treatment he should take, but also why he should take it and what results he may expect from following the prescribed regime. Blackwell (1973) indicated that "it is especially important to explain the expected actions and possible side effects (undesirable effects) of medication and to distinguish between those that are frequent or of little concern and those that merit immediate or serious attention" (p. 252).

3. The nurse is the logical one to teach the patient. Teaching is an important component of nursing practice.

4. Selection and impartation of essential knowledge should be planned as carefully as any other aspect of nursing care. Vincent (1971), as a result of her study, believed that nurses could help increase compliance by carefully evaluating the kinds of information that would be most helpful, most meaningful, and least ambiguous for each patient. In this study, I have attempted to design a definite plan (STP) that would be helpful in teaching these kinds of information to the patient.

5. Active participation facilitates learning. Hilgard (1966) suggested that "the learner should be active, rather than a passive listener or viewer" (p. 562). Thus, to learn effectively, the patient must become actively involved in administering his medication. The nurse as a part of his instruction plan would implement and direct this participation. The investigator hypothesized that knowledge and practice of the prescribed regimen would result in the patient's improved compliance to the program prescribed by his physician.

6. Interaction between the nurse and the patient reaffirms the basic concepts necessary for effective self-medication.

7. The personal interest of the nurse in the patient is supportive and encouraging. The investigator believed that the planned follow-up, even though it was a post-test, would indicate a caring and a personal interest.

To accomplish what has been discussed, this investigator included a self-administered medication program with a teaching-learning program involving ambulatory cardiac patients. It was assumed that the teaching done by physicians remained constant for all patients in the study and that the teaching by the three nurses was consistent for the experimental group. The investigator conducted the interviews (pre- and post-tests). It was assumed that bias was reduced by the investigator's not knowing whether the patient was in the control or experimental group until after all data were collected. The investigator did not participate in patient teaching. The ultimate goal was to discover how to improve the quality and effectiveness of one aspect of nursing care.

Chapter 2

LITERATURE REVIEW

The literature was reviewed to discover the extent of the problem of noncompliance and possible nursing interventions that might increase compliance and thereby facilitate the effectiveness of a prescribed medication regimen.

Most of the studies regarding patients and their medication indicated that patients were not aware of the importance of taking prescribed drugs with a specific frequency and on time. Also, they did not understand their medication; that is, the action and possible undesirable effects. Previous studies have included the elderly patient, the psychiatric patient, the tuberculosis patient, the diabetic patient, and patients in self-medication programs, particularly outpatients.

PROBLEM OF NONCOMPLIANCE

According to a report from the Department of Health Behavior and Health Education, School of Public Health, the University of Michigan, Ann Arbor (Rosenstock, 1975), nearly half of all patients do not follow prescribed regimens for the taking of relatively simple medications. It was felt that the medical profession makes it difficult for patients to ask questions, and instructions are often given in situations that maximize failure to understand. Patients have rarely been given a test of knowledge and understanding to see if instructions were learned.

In his review of over 50 studies, Blackwell (1973) indicated that little attention is given to whether or not patients take medication as directed. Complete failure to take medication often occurred in between one-fourth and over one-half of all outpatients. Poor compliance consisted of taking medications for the wrong reason, making errors in dosage, and making mistakes in timing or sequence. However, the cardiac patient was less likely to deviate from the medication regimen. The occurrence of side effects or undesirable effects could be expected to discourage compliance. Blackwell indicated that:

> The setting in which a medication is prescribed and the extent to which it is supervised will influence compliance. Some part of failure among outpatients to take medication might be corrected by teaching of self-medication before the patient leaves the hospital. It is a mistake to assume that all patients can graduate from total dependence to complete independence overnight (p. 251).

He also felt that:

> It is especially important to explain the expected actions and possible side effects of medication and to distinguish between those that are frequent or of little concern and those that merit immediate or serious attention (p. 252).

To assure that patients took their medication, Blackwell advised knowing the circumstances associated with poor compliance and recognizing the physician's part in planning and explaining treatment.

A study of 26 patients, mean age of 74 years, on a home care program, showed that 16 of the patients failed to follow the medication regimen prescribed for them. Twelve of the 26 patients had a reasonably accurate idea of the purposes of all their medication. Those who knew what action their medication had were tempted to alter the dosage when symptoms changed (Curtis, 1961).

Neely and Patrick's (1968) study of 59 persons, aged 60 years and over, was done to determine whether they took their medication at home as prescribed. Open-ended questions were used about the medication taken, the names of the drugs, the dosage taken, and the reason for taking medication as the respondent understood it. The number of prescribed medicines for the participating patients ranged from 1 to 6, and all were responsible for taking their own medication. Forty-one percent made no medication error. Forty-eight percent of all errors were errors of omission, and 34 percent were errors of inaccurate knowledge. No significant differences were found between error-free and error-making patients in relation to age, sex, marital status, household composition, education, birthplace, employment status, or duration of illness. It was suggested that nurses in hospitals teach older patients prior to discharge and initiate self-administered medication during hospitalization.

Marsh and Perlman (1972) did a study to find out whether an understanding of congestive heart failure was related to the reliability of self-administration of digoxin in patients with the disease. Sixty patients at the general outpatient medical clinic at the Milwaukee County Hospital were selected at random and studied by the interview method. Fifty-seven percent did not understand their disease or medication. Thirty-four of the sixty took their digoxin as often as prescribed. Patients who did not understand their disease took their digoxin less frequently. The average number of hospitalizations per year was higher for those who did not understand their disease--2.53 as

compared to 1.8 for those who understood their disease. This study suggested that patient teaching should be an integral part of medical care because lack of understanding was significantly correlated with failure to take medications and with an increased rate of hospitalization.

At the University of Florida, many of the patients were admitted to the medical service with adverse drug reactions resulting, not from the inherent toxic property or an idiosyncratic reaction, but from improper use of the drug (Stewart and Cluff, 1972). These authors indicated that patients usually received their discharge medications shortly before going home. Often the physician had time only for some hasty directions. In addition to this, the patient received diet instructions, advice on activity limitations, information concerning his disease, and his hospital bill. It was recommended that self-administered medication by patients prior to discharge should be encouraged, and patients should receive more complete instruction concerning the proper use of medication.

Twenty patients were interviewed regarding their nitroglycerin (Allendorf and Keegan, 1975), and the majority of them did not know enough about nitroglycerin to use it safely and effectively. Fourteen of them had been taught by a physician, 2 by a nurse, and 4 by a physician-nurse team. Those patients who were instructed by the nurse alone or the physician alone gave more inaccurate responses than the patients who received instruction from a physician-nurse team.

WAYS OF IMPROVING NONCOMPLIANCE

Tagliacozzo and others (1974) studied the value of nurse-patient teaching and guidance for 192 black patients in an outpatient clinic. They found that the effectiveness of teaching depended upon psychosocial and attitudinal variables. They concluded that "patients who reveal concern at the start respond to the teaching situation with greater compliance than both those who reveal less concern and those who do not receive instructions" (p. 603).

A study of an established self-administered medication program in a rehabilitation unit (Reibel, 1969) was done to evaluate it. A physician instructed the 27 patients on the use of any medication ordered for self-administration. Data were collected by means of structured interviews with the patients and questionnaires completed by the resident physician, pharmacist, and five nurses. Fourteen of the 27 patients committed errors. Eighty-five percent of the errors were errors of omission.

A recent study (Deberry, Jefferies, and Light, 1975) on evaluating a teaching program indicated that the 29 outpatient participants showed improvement from the pretest to the post-test. Each patient was used as his own control. This study suggested that teaching should be expanded to include self-administration of medications by the patient several days prior to discharge. Self-administration of medicines was used as a reward for patients for successful learning and uncovered any remaining difficulties with dosage and administration.

In 1970, Roth and others reported on the adequacy of bottle

count for assessing patients' intake of antacids. A bottle count was evaluated in this 2-year follow-up of 105 patients with peptic ulcers at a Veterans' Hospital. A trace of sodium bromide added to a liquid antacid was used to measure intake of the medication. The blood bromide levels were then used as a justification of the empty bottles that the patients turned in for the count. It was found that there was a close correspondence between bottle counts and the blood bromide levels when values for the entire 24-month period were pooled. The results of this study indicated that the bottle count was reasonably accurate.

At the outpatient department of the Children's Hospital, Buffalo, N.Y., three pharmacists (Dickey, Mattar, and Chudzik, 1975) conducted a two-part study of 100 children between one and twelve years old with otitis media. The study was designed to evaluate compliance to a drug regimen. The first phase involved no instruction of the patient, only evaluation. Five of the 100 patients completed all the antibiotics in the prescribed time, and 59 of them took less than one-half. The second phase of this study involved 34 children who received their medication from the same outpatient pharmacy as the children in the first phase did. These were compared with 200 control children using community pharmacies. The hospital pharmacy followed this routine:

1. Each parent received detailed verbal instructions and an instruction sheet.

2. An accurate administration device was issued.

3. An illustrated calendar was given to help the parents remember how many doses had been given during the day and to show when

the next dose would be due.

4. The parent was instructed to tape these to the refrigerator in which the antibiotic was stored.

Results of this second phase showed that 50 percent of the 34 patients in the experimental group complied completely while 8.5 percent of the control group of 200 did. Forty percent of the parents using the hospital pharmacy regimen could give the names and functions of the medications they were giving to their children, but only 25 percent of the control parents could. The authors concluded that hospital outpatient pharmacies were ideally suited to provide patients with specific information which would increase compliance.

Another rehabilitation self-administered medication program study (Johnson, Roberts, and Goodwin, 1970) offered three options: (1) self-administered medication, (2) nurse-monitored self-administered medication, or (3) nurse-administered medications. At the time of admission, the attending physician assigned patients to one of three groups. Between 70 and 80 percent of the patients, whose age ranged from 18 to 64 years, were assigned to participate in the first or second group. This program demonstrated that it was both possible and practical to encourage patients on a rehabilitation unit to take their own medicines, and it also saved time for the physician and nurse.

A self-administered medication program (Kelly, 1972) at a Canadian hospital proved to be of both medical and psychological benefit to elderly patients. The program was initiated at a 52-bed rehabilitation hospital in 1970 and was evaluated one year later. The nurses

instructed the patients about their medications, times of administration, and dangers to be avoided. They supervised the patients closely until they were certain that proper self-administered medication was accomplished. This experience gave the elderly patients a sense of pride, confidence, and self-worth. It was found that the patients needed smaller amounts of analgesics than was expected. Also, the nurses were able to see what hazards were involved in discharging patients without proper practice in administering their own medication. At first, mildly confused patients seemed incapable of organizing their medicines, but after a short period of supervision were found to be complying well.

Of interest was an evaluation of an educational program on digitalis therapy (Ogilvie and Ruedy, 1972). A survey was conducted of 2,334 patients from 1967 to 1968. Of these, 22.9 percent had received digitalis and 21.4 percent of these digitalis courses resulted in intoxication. After this survey, an educational program on digitalis use was initiated. A repeat survey was done from 1969 to 1970. Only 12.3 percent of 578 digitalis courses resulted in intoxication. The results in this study showed a marked reduction in the overall incidence of digitalis intoxication and a marked reduction in deaths of toxic patients. There was no published educational program with this study. There was only the report that an educational program had been used.

A small pilot study involved a group of 20 elderly long-term hospital patients (Libow and Mehl, 1970) to discover their abilities regarding self-administration of medications during the convalescent

phase of their illness. The participants were given placebos in standard pharmacy vials with typical labels and definite times for taking the "medicine." The physician gave verbal instructions and visited the patients every 1 to 2 days to count the remaining medication in each vial. Of the 20 patients, 5 made errors. The authors concluded that self-administration of medications offered a chance to "teach" patients and to tailor their medication schedule realistically to their limitations. They believed the results of this study indicated an expectation of a high rate of compliance and a reduction of post-hospital morbidity through increased accuracy of drug administration.

A study (Leary, Vessella, and Yeaw, 1971) of 267 patients, both outpatients and hospitalized patients, was conducted in 6 New England hospitals in which routine nurse-hospital teaching about their medication was evaluated. The patients interviewed came from a variety of socioeconomic backgrounds and averaged 58 years in age. The patients were divided into 3 groups, (1) least informed, (2) less informed, and (3) informed about 3 life-sustaining medications: oral digitalis derivations, oral anticoagulants, and nitroglycerin. Forty-nine and four-tenths percent scored in the least informed category. The greatest deficiency existed in the patients' knowledge of side effects, which was 72.1 percent. This study indicated that knowledge about medications was associated with age, employment status, and previous exposure to illness. As age increased, knowledge increased; and those who had heard about their illnesses before being placed on a medication regimen were significantly more informed. The findings of the study indicated that

it was important for nurses, as health teachers, to assume responsibility for evaluating patient's knowledge about medications and to coordinate nursing and medical teaching of patients to ensure higher quality and effectiveness.

Schwartz (1975) made a plea for planned self-administration of medication while patients were still hospitalized in order to prepare them for discharge. Her study in 1961 indicated that the patients wanted to be included in the plans that were made; they wanted to be planned with, not for. In her review of medication studies, Schwartz categorized types of error and found that errors followed a similar pattern. The most frequent errors were of omission. Inappropriate self-administered medication occurred about one-third to one-half as often as omission errors. Incorrect dosage, improper timing, and inaccurate knowledge of purpose were three additional errors which occurred with varying frequency. These types of errors were never so numerous as the first two categories. She believed that supervising medication taking, teaching others to do such supervision, and finding ways to prevent patients from making errors are part of a nurse's responsibility.

Programmed instruction was evaluated as a teaching tool on a long-term anticoagulant therapy with 45 participants (Clark and Bayley, 1972). They were divided into 3 groups: (1) those who received programmed instruction booklets; (2) those who received a two-page handout information sheet; and (3) those who received no specific printed or verbal instruction from the investigators. The analysis of this study

indicated that those who used the programmed instruction booklet about anticoagulants learned more than the other two groups. Interestingly enough, it was pointed out that programmed instruction should be intended as an adjunct to teaching, not a replacement for the teacher.

Another type of study involving 30 men was conducted by two pharmacists (Clinite and Kabat, 1969) using tablet and capsule count along with an interview for medication accuracy. At the time of dispensing, precise counts were made of each of their prescription drugs, and the directions for use were reviewed with each patient by a pharmacist. Six to 8 days following the patient's discharge, home interviews were conducted, and medications were counted again. Any deviation in the count was considered a medication error. Over 25 percent had medication errors. It was discovered that 20 percent had resumed therapy with drugs that had been prescribed for them prior to hospital admission. Coincidently, the authors suggested that verbal instruction imparted in a quiet area has far more impact and opportunity for understanding than the same instruction given in a noisy, distracting environment. It was also recommended that the instruction should be given in such a way that the patient is an active participant in the education process.

SUMMARY

The review of literature supported the fact that noncompliance with medication regimens was a common problem. Various kinds of teaching programs, methods of teaching, and self-administration of medication under supervision have been studied for their effects on compliance. In

general, the special programs improved compliance but did not completely solve the problem of noncompliance.

Chapter 3

METHODOLOGY

The experimental method of research was selected as the technique of investigation for this study. The control group was exposed to the routine teaching program regarding medication while the experimental group received a special teaching program which included self-administration of medication while the patients were still hospitalized. Both groups were evaluated for compliance with their prescribed regimen.

PERMISSION TO CONDUCT THE STUDY

Permission to conduct the study was granted by the Loma Linda University Research Advisory Committee for Human Experimentation and the Graduate Committee in the School of Nursing (Appendix A). The Director of Nursing Service at Loma Linda University Medical Center gave written consent for the study (Appendix A). Verbal approval was given by the cardiology staff for the participation of their patients.

The study and criteria for patient selection were explained to the nursing staff on the nursing unit where the program was conducted. The charge nurse participated in the study by selecting the patients, assigning them to control or experimental groups, and notifying the investigator of the qualified patients. After the patients were given an explanation of the study, they gave their written consent (Appendix B).

CRITERIA FOR THE SELECTION OF PATIENTS

The sample was composed of 41 ambulatory cardiac patients for whom selected oral medications (digoxin (lanoxin), nitroglycerin, lasix, coumadin, and/or isordil) were prescribed (1) previous to hospitalization, (2) during hospitalization, and (3) following discharge from the hospital. Additional criteria for inclusion in the study were (1) residence within a 50-mile radius of Loma Linda, (2) English speaking, (3) no previous participation in a teaching program regarding medication, and (4) willingness to participate in the study.

PROCEDURE

This study involved the ambulatory cardiac patient in self-administration of medication and in learning about his medicine while he was in the hospital. Three staff medicine nurses, following a teaching guide (Appendix F), instructed the experimental group individually.

Special Teaching Program

A special teaching program developed by the investigator included information on separate cards (Appendix I) for each drug, guidelines (Appendixes H and J) for the nurses to use in teaching, and written instructions (Appendixes I and K) for patients to take home.

Preliminary preparation for the medicine nurses consisted of three 1-hour teaching sessions conducted by the investigator. In these sessions, the investigator assigned text reading regarding the

medications involved in the study and discussed with the nurses how to handle verbal questions, approaches to teaching the patient, and the medications. The prepared teaching materials (Appendix H) were reviewed with the three nurses. With the help of these sessions and the materials provided, the three nurses assumed responsibility for teaching each patient in the experimental group and for implementing the self-administered medication program.

Data Collecting Instrument

A semi-structured interview schedule was developed to ascertain the patient's medication-taking behavior, his knowledge about his drugs, various attitudes and beliefs about the taking of medicines, and certain biographical data.

The words pre interview (Appendix E) and post interview (Appendix F) were used on the test sheets instead of pretest and post-test because of the negative connotations often associated with tests. The first 15 questions of the two tests were identical.

The first four questions of the two tests concerned the patient's understanding of his medication. They asked what medications the patient was taking before coming to the hospital, the names he usually used for them, other names for the same medication, and the purpose of the medications. Questions 5 through 8 explored the patient's ability to be aware of, recognize, and manage possible undesirable effects. They asked the patient to mention any such effects that might occur, whether any of these ever happened to him and what he did about them, and what he would have done if they had happened.

Questions 9 and 10 applied to proper administration. They asked how often the patient took his medication and how much he took each time. Questions 11 through 14 asked whether and how the patient varied the way he took his medication, how he remembered to take it, and whether he had ever forgotten to take it. Question 15 asked, "What were you told to avoid or include while taking this medication?"

There were nine additional questions in the post-test. Questions 16 to 21 were cross checks to substantiate the answers to other questions about administration of the medications. They asked when the patient last took his medication, what time change occurred while he was taking it (and if so, the reason for it), what amount and dosage change had occurred (and the reason for it), and whether the patient had forgotten to take his medication at any time. Question 22 asked what nonprescription medication the patient was taking. Questions 23 and 24 asked who had discussed his medication with him and what more he would like to know about his medication.

Pilot Study

A pilot study was conducted by the investigator to test the feasibility of the teaching program for the participants, staff, and patients. During the pilot study, the pretest and post-test were evaluated for clarity of the questions and for the relevancy of the questions and answers. The first 15 questions of the pre- and post-tests were identical, the only difference was the time at which they were used. The investigator also refined her approach to the patient and developed an improved interviewing technique. These patients were

not used in the study. During the pilot study, it was realized that three medicine nurses were needed to conduct the teaching program instead of the planned use of one. Some questions were deleted and others reworded.

Implementation of Design

Upon completion of the preparatory phase of the study, the first patient who met the criteria for inclusion in the study was randomly placed in one group. Thereafter, patients were placed alternately in the control and experimental group. The assignments to groups was made approximately 8 days after admission and the investigator was notified that the patient had been entered into the study (Appendix C). The charge nurse did not put a control patient in the same room with an experimental patient.

Then the investigator administered the pretest and completed the biographical data. Within 8 to 15 days after a patient in the study was discharged, he was visited in his home, given the post-test, and had his medication tablets counted. This procedure was used on all the patients in this study. Until after all the data were collected, the investigator did not know to which group a patient had been assigned.

Each patient in the experimental group was taught individually as soon as the acute phase of his illness was over. The medicine nurse who did the initial teaching recorded it on a special card (Appendix L). Then as each of the three medicine nurses worked with that patient, they too recorded the teaching on a card. The teaching just before discharge was also indicated.

When the experimental patients were ambulatory--usually 6 to 8 days after admission--they participated in the self-administration medication program. They were instructed how to obtain their medicine from one of the three selected nurses and then assumed the responsibility for taking it at the right time. An individualized medication sheet that included the name, the dosage, and the time of their medication for each day (Appendix K) was given to them to follow. Upon discharge, these patients were instructed once again and given special medication information cards (Appendix I) and a medication schedule sheet with the name, dosage, and time of their prescribed medication.

The control group followed the normal unit procedure. This involved routine nurse-administered medication and answers to their questions.

It was assumed that the three selected nurses were attuned to the need for patient teaching and accepted teaching as part of their role. The entire study was attempted with normal staffing conditions, and no procedures or unit operations were interrupted.

DATA COLLECTION

Since the investigator did not know the group distinction, the two groups were considered as one for collecting data. Approximately 8 days after the patient's admission to the hospital, the investigator compiled the biographical data (Appendix D) and the pretest was given (Appendix E) to evaluate the patient's knowledge about his medication prior to hospitalization. Eight to 10 days after the selected patients

were discharged from the hospital, they were visited in their homes by the investigator. It was at this time that the post-test (Appendix F) was given and a tablet count of their medication was done.

Data were collected for a period of 4 months.

DATA ANALYSIS

Information from the pre- and post-tests was tabulated, and the results were observed for change in the direction of the hypotheses. No statistical computations were used.

Chapter 4

FINDINGS AND DISCUSSION

FINDINGS

When the patients who met the criteria were asked to participate in the study, they were willing to be included. Even though patients were given the option of participation in the study, none declined.

A total of 45 patients participated in the study. Of this number, four were removed. In the control group, one went blind, another became very emotional and was dependent on his wife, and the third one died. One was removed from the experimental group because he suffered memory loss and became dependent on his wife.

The desired goal of 100 patients for the study was not reached for various reasons. It took longer than was anticipated to obtain the patients to meet the criteria for this study, and the three medicine nurses involved were due for vacations. The study was terminated with a total of 41 patients, 20 in the control group, and 21 in the experimental group.

Group Characteristics

Ages in both groups ranged from 38 to 88 years, the average age being 65.2 years. Patients in the control group ranged in age from 38 to 88, the average being 62.2 years. Of these, 14 were female and 6 male. In the experimental group, the ages ranged from 48 to 80, with

an average of 68.1 years. Thirteen in this group were female and 8 male. Of the total number in the study, 27 were female and 14 male (Table 1).

Medications Tested

Because it was not possible to predict which medications would be prescribed upon discharge, teaching involved all the medication that was prescribed for the patient during hospitalization and those prescribed when he was discharged to go home. A special information card (Appendix I) about the medication he was to take at home was given to the patient when he was discharged.

One of the criteria for selection of patients was that they must have used the same medication before entering the hospital as was prescribed for them while they were there and when they were discharged. As a result, only three medications were prescribed often enough to be compared or tested in this study. They were digoxin (lanoxin), lasix, and nitroglycerin. All 41 patients used digoxin (lanoxin), while 25 used lasix, and 28 nitroglycerin (Table 2). All three medicines were included in the pretest and post-test, but only digoxin and lasix were checked by a tablet count to see how well the patient had complied because the nitroglycerin was prescribed only on a take-as-needed basis (Tables 3, 4, 5, and 6).

Understanding of Medication

The purpose of the study was to find out whether a teaching program would improve compliance to the prescribed regimen. One area

Table 1

Age and Sex Characteristics of Patients in a Special Teaching Study for Cardiac Patients

Sex	Control (N=20)	Experimental (N=21)
Female	14	13
Male	6	8
Age		
30-39	1	0
40-49	3	1
50-59	4	4
60-69	6	5
70-79	3	10
80-89	3	1
Average Age	62.2	68.1

Table 2

Types of Medication Prescribed for Cardiac Patients in a Special Teaching Study--Before, During, and After Hospitalization

Medication	Control (N=20)	Experimental (N=21)	Total (N=41)
Digoxin (Lanoxin)	20	21	41
Lasix	11	14	25
Nitroglycerin	16	12	28

Table 3

A Comparison of Expected Numbers of Digoxin Tablets and Actual Tablets Taken by Control Group in a Special Teaching Study--Post Hospitalization

Patient	Expected Number of Tablets Taken-Day of Home Visit	Actual Number of Tablets Taken	Error
1	9	9	0
2	9	9	0
3	9	7	2
4	9	8	1
5	12	12	0
6	10	9	1
7	10	8	2
8	10	8	2
9	10	9	1
10	8	8	0
11	10	8	2
12	9	9	0
13	10	8	2
14	11	11	0
15	9	7	2
16	10	7	3
17	10	9	1
18	10	7	3
19	10	10	0
20	8	7	1

Digoxin Errors: 13 out of 20 therefore 65% errored.

Table 4

A Comparison of Expected Numbers of Lasix Tablets and Actual Tablets Taken by Control Group in a Special Teaching Study--Post Hospitalization

Patient	Expected Number of Tablets Taken-Day of Home Visit	Actual Number of Tablets Taken	Error
4	9	7	2
5	12	12	0
6	10	8	2
7	10	7	3
8	10	8	2
9	10	8	2
12	9	7	2
13	10	7	3
14	11	8	3
15	9	6	3
16	10	6	4

Lasix Errors: 10 out of 11 therefore 91% errored.

Table 5

A Comparison of Expected Numbers of Digoxin Tablets and Actual Tablets Taken by Experimental Group in a Special Teaching Study--Post Hospitalization

Patient	Expected Number of Tablets Taken-Day of Home Visit	Actual Number of Tablets Taken	Error
1	10	10	0
2	9	9	0
3	15	15	0
4	10	10	0
5	8	8	0
6	9	9	0
7	9	9	0
8	10	10	0
9	8	8	0
10	9	9	0
11	9	9	0
12	8	8	0
13	10	10	0
14	9	9	0
15	9	9	0
16	9	9	0
17	10	10	0
18	9	9	0
19	10	10	0
20	10	10	0
21	8	8	0

Table 6

A Comparison of Expected Numbers of Lasix Tablets and Actual Tablets Taken by Experimental Group in a Special Teaching Study--Post Hospitalization

Patient	Expected Number of Tablets Taken-Day of Home Visit	Actual Number of Tablets Taken	Error
1	10	10	0
2	9	9	0
3	15	15	0
4	10	10	0
6	9	9	0
7	9	9	0
10	9	9	0
11	9	9	0
12	8	8	0
13	10	10	0
14	9	9	0
16	9	9	0
17	10	10	0
18	9	9	0

of compliance to be measured was the patient's increased understanding of his medication. Both before the teaching began and after the patient had been home a week or more, he was asked the name of his medication, a possible second name for it, and the purpose of taking it. In order to be counted correct, the answers to these three questions on the post-test had to be very similar to what the patients had been taught in the special teaching program and to the material given them. All 20 of the control group were error-makers in this area and 2 out of the 21 in the experimental group (Table 7).

When the pretest and post-test questions were considered individually, progress was shown in both groups of patients. Even though every patient in the control group was lacking in knowledge of his medication; as a group, after their hospital experiences, they showed some improvement in their information about digoxin (lanoxin), a medication everyone in both groups was taking. There was a 10- to 15-percent improvement in their information.

Pretest scores for the experimental group were slightly higher than the control group to begin with. The improvement shown on the post-test ranged from 9 to 57 percent.

There were differences in post-test responses between the control group and the experimental group. In the control group, 75 percent knew the name of their medication, while 100 percent of the experimental group knew it. On knowing a second name, the percentages were 45 and 95; and on understanding the purpose of the medication, 50 and 95 percent.

Table 7

Types of Medication Errors Made by Cardiac Patients
in a Special Teaching Study--Post Hospitalization

Type of Error	Control (N=20)				Experimental (N=21)			
	Errors		Error-Making Patients		Errors		Error-Making Patients	
	*Number	Percent	Number	Percent	Number	Percent	Number	Percent
Omission (N=31, 34)	23	74	15	75	0	0	0	0
Self-Medication	12	60	12	60	0	0	0	0
Inaccurate Knowledge (N=47, 47)	47	100	20	100	2	4	2	10
Timing (N=31, 34)	4	13	2	10	0	0	0	0

*Numbers exceed the group N's because some patients took more than one medication.

There were 11 lasix users in the control group and 14 in the experimental group. Here again, the experimental group showed more knowledge to start with but also made more improvement after their STP.

Changes from the pretest to post-test scores for the control group showed a 19- to 27-percent improvement.

For the experimental group, the change in pretest to post-test scores ranged from 14 to 57 percent.

The control group scores for the post-test improved 12 percent on one question with no change in the other two.

In the experimental group, there was an improvement of 17 and 33 percent for two questions and for the third responses were all correct in both pretest and post-test.

The findings regarding knowledge of medications showed that a change occurred in the direction supporting the hypothesis that a special teaching program would result in increased knowledge of medication (Table 8).

Part of the STP dealt with hazards of using nonprescription drugs. Question 22 of the post-test elicited information regarding the use of nonprescription drugs. The experimental group took only what was prescribed. One member did call her physician to get permission to take Bufferin. Twelve of the 21 in the control group were error-makers here. One took a bottle of Certo every day for his joint pains. He never told his physician because he said it worked and he was afraid that the "doctor would stop it." Other medication taken consisted of

Table 8

Correct Responses to Questions Regarding Understanding of Medication Before and After Hospitalization of Cardiac Patients in a Special Teaching Study

Drug	Question	Control (N=20)				Experimental (N=21)			
		Pre		Post		Pre		Post	
		Number Correct	Percent	Number Correct	Percent	Number Correct	Percent	Number Correct	Percent
Digoxin (Lanoxin)	2	12	60	15	75	19	91	21	100
	3	7	35	9	45	8	38	20	95
	4	7	35	10	50	9	43	20	95
Lasix	2	5	46	8	73	12	86	14	100
	3	3	27	5	46	6	43	14	100
	4	4	36	6	55	6	43	14	100
Nitroglycerin	2	13	81	14	88	10	83	12	100
	3	8	50	8	50	12	100	12	100
	4	6	38	8	50	8	67	12	100

aspirin; Vitamins E, C, B Complex, and B_{12}; calcium (bonemeal); Maalox; Darvon; Tylenol; Caroid and Bile Salts; and "my wife's heart medicine."

Errors in Administration

Omission. When the investigator visited the patients in their homes, she counted the tablets left in their medication containers. Since she could determine how many should be left if the prescription had been followed, she could ascertain how well the patients had complied. Tables 3, 4, 5, and 6 tabulate the results of these counts for digoxin (lanoxin) and lasix. It can be seen that the control group made a higher percentage of errors than the experimental group.

When all three medications were included (Table 7), the control group committed 23 errors of omission while the experimental group made none. Of interest were some of the reasons given for errors of omission. Some omitted prescribed medication knowingly because they "felt so much better" and "the less medication that I can get by on, the better off I'll be." Others were forgetful, for instance, one was "away for the weekend and I forgot to take my medication with me." One "had company for the weekend and simply forgot to take my medication."

Timing. When it came to taking their medication at the right time, the members of both groups were accurate before the study began. In fact, all of the control group reported taking their medication at the proper time both at the beginning of the study and after they were discharged from the hospital (Tables 8, 9, and 10).

In the experimental group, 19 of the 21 digoxin users, 12 of the 14 lasix users, and 11 of the 12 nitroglycerin users took their

Table 9

Correct Responses to Questions Regarding Medication Errors
Before and After Hospitalization of Cardiac Patients
in a Special Teaching Study

Drug	Question	Control (N=20)				Experimental (N=21)			
		Pre		Post		Pre		Post	
		Number Correct	Percent	Number Correct	Percent	Number Correct	Percent	Number Correct	Percent
Digoxin (Lanoxin)	9	20	100	20	100	19	91	21	100
	10	1	5	3	15	2	10	19	91
Lasix	9	11	100	11	100	12	86	14	100
	10	1	9	2	18	1	7	11	79
Nitroglycerin	9	16	100	16	100	11	92	12	100
	10	0	0	0	0	0	0	8	67

Table 10

Correct Responses to Questions Regarding Knowledge of Undesirable Effects Before and After Hospitalization of Cardiac Patients in a Special Teaching Study

Drug	Question	Control (N=20)				Experimental (N=21)			
		Pre		Post		Pre		Post	
		Number Correct	Percent	Number Correct	Percent	Number Correct	Percent	Number Correct	Percent
Digoxin (Lanoxin)	5	0	0	0	0	1	5	20	95
	7 or 8	0	0	0	0	3	14	20	95
	15	0	0	0	0	0	0	20	95
Lasix	5	1	9	1	9	1	7	14	100
	7 or 8	0	0	0	0	3	21	14	100
	15	0	0	0	0	0	0	13	93
Nitroglycerin	5	0	0	0	0	0	0	12	100
	7 or 8	0	0	0	0	0	0	12	100
	15	0	0	0	0	0	0	12	100

medication at the right time before they started the special program. But after these experimental patients were discharged, they all reported taking their medication at the right time (Tables 8, 9, and 10).

Dosage. Very few patients from either group knew the exact dosage of any of their medications, according to the results of the pretest. Only 1 of the 20 digoxin users in the control group and 2 of the 21 in the experimental group knew their dosages. After their hospital experience, 3 from the control group and 19 from the experimental group responded correctly to the question in the post-test about how much they should take each time. The control group improved from 5 percent to 15 percent, but the experimental group improved from a 10-percent beginning to 91-percent correct performance after the STP. The lasix users presented a similar picture.

Nitroglycerin presented a little different picture, probably because the tablets usually came in only one size and it was taken only as needed. None of the patients knew their dosage when they were admitted to the hospital, and none of the control group knew it after discharge. However, after discharge, 8 of the 12 (67 percent) in the experimental group responded correctly to the question, "How much did you take each time?"

The findings regarding medication errors show that a change occurred in the direction supporting the hypothesis that a STP would result in fewer medication errors (Table 9).

Possible Undesirable Effects

Questions 5, 7, and 8 of the pretest and post-test dealt with knowledge of possible undesirable side effects of medication, how to recognize them, and what to do about them. Question 15 was, "What were you told to avoid or include while taking this medication?" These questions represented the third problem area in which the study was designed to effect improvement by the STP.

All but one of the members of the control group knew nothing of undesirable effects either before or after hospitalization. Some did remark, "The doctor told me, but I don't remember those things; after all, he knows what he is doing."

In the experimental group, one of the digoxin users and one of the lasix users knew what might occur, and three of each knew what to do about it at the time of the pretest. None knew what to avoid or include while taking his medications. After the special teaching program of this study, 20 of the 21 digoxin users in the experimental group responded correctly to these four questions and all of the nitroglycerin users. All of the 14 lasix users knew what effects might occur and what to do about them, and all but one knew what to avoid or include while taking lasix. The difference between pretest and post-test was in the direction of the hypothesis that the STP would result in more knowledge of undesirable effects (Table 10).

Characteristics of Error-Makers

It would have been interesting to learn whether patients who made different types of medication errors also differed in their

personal characteristics, but the relatively small number of cases in the sample precluded this sort of complex analysis. However, it was possible to compare some error-making behavior. Sex and age appeared to be factors. The females of the control group averaged 4 errors per person, while the males averaged 5.2 each as shown in Table 11. According to Table 9, the 50-59 age group averaged 12.5 errors per person, the 60-69 group 5.6 errors per person, and the 80-89 group 12 errors per person. It appeared that advancing age does not necessarily mean more medication errors (Table 11).

DISCUSSION

The growing recognition of the fact that many patients fail to take their medication as directed presented a challenge to the nursing profession in its role as a teacher of patients. A logical question which arose was, "Would patients comply better if the nurses in the hospital made definite specific plans to teach each patient during his hospital stay things he should know about his medication and then to give him guided practice in administering his own medication?"

In an attempt to answer this question, this study was designed to compare patients who had routine hospital care with those who were subjected to planned instruction and self-administration program while they were hospitalized.

The review of literature showed that from one-fourth to one-half of patients on medication were error-makers, mostly errors of omission. More than 50 percent of the control group (N=20) in my study were

Table 11

A Comparison by Sex and Age of *Errors Made by Cardiac Patients in the Control Group of a Special Teaching Study

Sex	Number of Errors	Number of Patients	Average Number of Errors
Female	56	14	4
Male	31	6	5.2
Age			
30-39	3	1	3
40-49	13	3	8.5
50-59	25	4	12.5
60-69	17	6	5.6
70-79	12	3	4
80-89	17	3	12

*Number of possible errors for one patient with one medication = 5.

error-makers. When considering all types of errors except timing, more than 60 percent of my control group made errors whereas 10 percent of my experimental group made errors of inaccurate knowledge and none made errors of omission or self-medication. Errors of omission were made by 74 percent of my control group and none of my experimental group. The high number of error-makers in the control group may have been due to the broad definition of medication error used in my study.

Curtis's study (1961) showed that 16 of 26 patients on a home care program failed to follow the medication regimen prescribed for them whereas my study showed 15 from a control group of 20 failed to do so. All of those in the experimental group followed their medication regimen as it was measured in my study.

My control group made more errors of omission and inaccurate knowledge than the group studied by Neely and Patrick (1968). Neely and Patrick reported 48-percent omission errors and 34-percent inaccurate knowledge errors while my control group showed 74-percent omission errors and 100-percent inaccurate knowledge errors. My experimental group made no errors of omission and 10 percent made errors of inaccurate knowledge. Differences in data collection and definitions of acceptable answers to questions could account for some of the higher scores in my study. The degree of compliance in the experimental group could be due to the effect of the STP.

Marsh and Perlman (1972) found that 57 percent of their subjects did not understand digoxin. Findings in my control group were almost identical. During hospitalization the control group scored 43-percent

correct responses to questions about digoxin and 57-percent correct after hospitalization. My experimental group scored 57-percent correct responses to questions about digoxin during hospitalization and 97-percent correct after the STP and post hospitalization. Marsh and Perlman recommended better patient education and patient teaching as an integral part of medical care.

In a study of an established self-administered medication program on a rehabilitation unit (Reibel, 1969), 14 of the 27 patients committed errors, 85 percent being errors of omission. My study, combining a teaching program with a self-administration program, of 21 experimental patients showed 2 of them committing errors with none committing omission errors. The combination of a teaching program and practice in self-administration of medication used in my study could account for some of the differences in Reibel's and my findings. Differences in methods of study and evaluation of findings also could be a factor.

Leary, Vessella, and Yeaw (1971) indicated that their greatest deficiency (72 percent) regarding medication existed in the patient's knowledge of undesirable effects. My control group and the experimental group prior to the STP also had very little knowledge of undesirable effects of their medications (0-3 correct responses out of a possible 20-21). Following the STP, my experimental group had 93- to 100-percent correct answers. Part of the STP focused on helping patients understand the undesirable effects of the medication and what to do if the undesirable effects occurred. This aspect of teaching was not included in some

of the programs reviewed.

No studies were found involving hospitalized patients in a teaching program combined with a self-administered medication program. It would seem that the combination could produce greater compliance than either of the two alone. The combination of a teaching program and a self-administered medication program probably accounted for the results in my study favoring the experimental group.

Chapter V

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

SUMMARY

Though nurses and physicians often assume that patients follow their instructions for taking prescribed medication, many studies have discovered that this is not necessarily so. Some of these studies have suggested that perhaps the patients would comply with their regimen better if they understood their medication, its purpose, and possible undesirable effects, or if they had supervised practice in self-administration of their medication. The literature was replete in studies which reported the prevalence of general noncompliance to prescribed regimen. Some seemed to indicate that instruction made little difference. Others concluded that it was effective if it was given properly. While some suggested instruction was up to the physician, others stressed the responsibility of the nursing profession to teach patients what they needed to know. There were studies which reported successful self-administration programs, and others which suggested helpful methods of instruction.

The purpose of this study was to discover whether a special teaching program implemented during an ambulatory cardiac patient's hospital stay would be effective in helping the patient to understand his medication, to self-administer it correctly, and to recognize and manage any undesirable effects.

The investigator prepared a special teaching program that involved self-administration of medication. The whole plan was implemented by the three staff medicine nurses on the unit. These nurses instructed each member of the experimental group individually and supervised them two to four days before discharge in the self-administration of their medication. The control group received regular routine hospital care.

To test the hypothesis that such a program would be effective, 41 patients--20 in the control group and 21 in the experimental group--were selected from patients admitted to a cardiac unit of a university medical center. To minimize bias, the patients were selected according to the stipulated criteria and assigned to one of the two groups by the charge nurse. The investigator did not know to which group a patient belonged until after the data were collected.

Similar tests were administered to the patient at the beginning of his placement in the study and one to two weeks after he was discharged. The test questions were designed to determine whether he understood his medication, administered it properly, could recognize possible undesirable effects and know how to manage them. A tablet count also checked accuracy of administration.

The three medications studied were digoxin (lanoxin), lasix, and nitroglycerin. The patients in the study were all taking one or more of these medications when they entered the hospital, while they were there, and after they were discharged.

CONCLUSION

Analysis of the data showed that the differences between the test scores of the experimental and control groups and the pre- and post-test scores of the teaching group tended to support the hypotheses. The ambulatory cardiac patients who were given a special teaching program had (1) increased understanding about their medication, (2) fewer medication errors, and (3) more knowledge of undesirable effects than patients who were not included in the special teaching program.

Emerging from the interpretation of the data collected was the realization not only that an organized, conscious teaching program was effective, but also that casual, opportunistic teaching on the hospital unit often does not result in adequate learning by the patient.

After the data were tabulated, it was found that differences between the control and experimental groups were present in terms of each hypothesis. In seven of nine questions on understanding of medication, the experimental group was higher than the control group. In all nine of the questions on knowledge of undesirable effects, the experimental group was higher. Regarding medication errors, the experimental group was higher on half of the questions, but they had no errors as determined by tablet count while about three-fourths of control group had inaccurate tablet counts.

It was not within the scope of this study to determine which part of the special teaching program was more effective--the planned instructions or the medication self-administration practice provided for the patients before they were discharged. Perhaps the combination was the

factor promoting the high rate of compliance found in this study.

RECOMMENDATIONS

Recommendations are suggested which might be useful to nursing practice and for research.

Nursing Practice

It was recommended that:

1. Patients be informed about the purposes and effects of their medications while they are hospitalized.

2. Patients be encouraged to take responsibility for administering their own medication prior to discharge from the hospital.

3. All patients who will be on medication post-hospitalization have the benefit of a teaching and self-administration program prior to discharge.

Research

Additional studies were recommended:

1. To see if more than one home visit by the nurse post-hospitalization improves compliance.

2. To repeat the methodology of this study using pre- and post-tests more suitable to statistical analysis.

3. To compare a teaching program or a self-administration program to a combination of the two as they affect compliance with a medication regimen.

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APPENDIX A

LOMA LINDA UNIVERSITY

LOMA LINDA, CALIFORNIA 92354

DIVISION OF RELIGION

February 14, 1973

Mrs. Mary McGregor
School of Nursing
Loma Linda University
Loma Linda, CA 92354

Dear Mrs. McGregor:

Your research proposal "Evaluation of Teaching-Learning of Self-medication with Cardiac Patients" has been reviewed by the Research Advisory Committee on Human Experimentation and has been approved with the following qualification. Some place in your research proposal a statement should be included that indicates that only patients will be selected for this study who are competent in various ways to be involved in self-medication. If you will send a note indicating that revision of your proposal so it can be placed in our files, you may proceed with your investigation.

Best wishes for its success.

Sincerely yours,

Jack W. Provonsha

Jack W. Provonsha, Chairman
Research Advisory Committee
on Human Experimentation

JWP:mn

P.O. Box 3088
San Bernardino, Ca. 92413
January 29, 1973

Miss Gertrude Haussler
Associate Dean
Director of Nursing Service
Loma Linda University Medical Center
Loma Linda, Ca. 92354

Dear Miss Haussler:

According to a recent news item, digitalis toxicity has been found in 23% of hospitalized patients who received the drug before admission. Recently there was one such patient at Loma Linda University Hospital who was seen by two different physicians, each prescribed digitalis and each used a different brand name. In order to prevent medication errors by patients such as this, a program of teaching patients about their medications is being implemented on unit 4100. I would like to compare the knowledge and practice of patients on this program to similar patients who have not had special teaching. This study is to meet part of the requirements for a master's degree in nursing at Loma Linda University.

With your permission, selected patients on unit 4100 will be evaluated by an interview-questionnaire prior to formal teaching and again ten to twelve days after their discharge from the hospital. The two medication nurses will carry on with their teaching of the patient as they are now doing. This study will not detract from the normal activity and time of the medicine nurses. I will be working closely with Mary Kirkpatrick and Dr. R. B. Crawford. I am seeking approval from the University Committee on Human Experimentation.

May I have permission to conduct this study in your nursing service? I will be happy to share the results with you. A stamped card is enclosed for your convenience.

I look forward to hearing from you soon.

Yours sincerely,

Mary McGregor

Mary McGregor, R.N.
Graduate Student

You have my permission to proceed in making the contact you need to gather data for your study ____/____.

I would like to have more information about your study. Please call to make an appointment _____.

Gertrude Haussler

APPENDIX B

PATIENT'S CONSENT

A study is being conducted to find better ways of serving and caring for patients who come to Loma Linda University Medical Center. We are attempting to see if our patient teaching is helping patients. Participation in the study involves a short interview while in the hospital and later a short interview in the home. Information that patients have to offer is valuable in helping us give better care to others who come to this hospital.

Your signature below gives me permission to include you in the study. The information which will be coded will be used only for study purposes and to see how we can improve our care for you.

I will plan to visit you 8 to 10 days after your discharge. Your help will be greatly appreciated.

Signature _____

Date _____ Witness _____

APPENDIX C

PATIENT-MEDICATION STUDY

DATE _____

TO _____

FROM _____

PARTICIPATING PATIENTS IN MEDICINE STUDY

NAME	HOSP. #	ROOM #

APPENDIX D

DATA COLLECTING FORM

Name _____ Code # _____ Patient # _____

Address _____

Phone _____ If no phone _____

Age _____ Sex _____

Married ____ Separated ____ Divorced ____ Widowed ____ Single ____

Living Arrangement: Alone ____ Child ____ Spouse ____ Other ____

Education: ____ Yrs. Elementary ____ Yrs. High School
____ Yrs. College, Technical, etc.

Date of: Discharge _____ First Interview _____ Second Interview _____

Medicines	First Score	Second Score	Difference
Lanoxin Digoxin			
Nitroglycerin			
Lasix			
Mean Score			

Medicines	Total # of tablets to be taken daily	Total # to be taken by _____ (date)	Total # taken by _____ (date)	Difference (+ or -)
Lanoxin Digoxin				
Nitroglycerin (p.r.n.)				
Lasix				
	Column I	Column II	Column III	Diff. between II and III

APPENDIX E

Pre Interview

1. What medication did you take regularly before coming to the hospital? _____

_____

_____

2. Name of medication _____

3. What is another name for this medication? _____

_____

4. What is the purpose of this medication? _____

_____

_____

_____

5. What other effects might have occurred while you were taking _____ _____? _____

_____

_____

_____

6. Did any of these ever occur to you? _____

7. What did you do? _____

_____

_____

_____

8. (If no to #6) What would you do if any of these effects occurred to you? _____

9. How often did you take _____? _____

10. How much did you take each time? _____

11. Did the way you took _____ vary day to day, varied occasionally, never varied?

12. (If yes to #11) How did it vary? _____

13. How did you remember to take _____? _____

14. Have you ever forgotten to take _____?

15. What were you told to avoid or include while taking _____? _____

APPENDIX F

Post Interview

1. What medication do you take regularly? _____

_____

_____

_____

2. Name of medication _____

3. What is another name for this medication? _____

_____

4. What is the purpose of this medication? _____

_____

_____

_____

_____

5. What other effects might have occurred while you were taking _____

_____? _____

_____

_____

_____

6. Did any of these ever occur to you? _____

7. What did you do? _____

_____

_____

8. (If no to #6) What would you do if any of these effects occurred to you? _____

9. How often do you take _____?

10. How much do you take each time? _____

11. Does the way you take _____ vary day to day, varies occasionally, never varies?

12. (If yes to #11) How does it vary? _____

13. How do you remember to take _____?

14. Have you ever forgotten to take _____?

15. What were you told to avoid or include while taking _____?

16. When did you last take _____? _____

17. What time change has occurred while taking _____?

18. (If there has been a time change) What was the reason for this?

_____

_____

19. What amount or dosage change has occurred while taking _____?

_____

20. (If there has been an amount change) What was the reason for this?

_____

_____

21. Have you forgotten to take _____ at any time?

_____

22. What over-the-counter medicines are you taking? _____

_____

_____

_____

_____

23. What more do you want to know about your medication? _____

_____

_____

_____

24. Who has discussed your medicine with you? _____

_____

_____

APPENDIX G

TEACHING GUIDE FOR SELECTED NURSES

LEARNING GOAL

To learn the correct medication administration, the action of the medications being taken, and the possible undesirable effects of the medication.

METHOD OF TEACHING

I. Discussion.

II. Show the patients each tablet and explain the action.

III. Show the patient a colored picture from the PDR of each medication.

IV. Explain that different manufacturers may make a certain medication in different colors and shapes.

V. Answer or find the answer to questions from the patient.

SUGGESTED OUTLINE

I. Determine what medication patient has been taking.

- A. Are the medications with him?
- B. What over-the-counter medications are being taken?
- C. Explain reason for asking A and B.
  1. Important for physician to know what is being taken.
  2. Some medication should not be taken with other medication.

II. Determine allergies to medication.

- A. Signs/symptoms - rash, swelling and/or nausea.

B. Importance of relaying this information.

III. Instruction on current medication and discharge medication.

A. Medication information.

1. Name of medication--one at a time.

a. Discuss generic or chemical name.

b. Discuss brand or company name.

2. Why taking the medication (physician approved).

3. Time to take the medication.

4. Amount or dosage to take.

5. How to take it--could be some specifics (with milk, etc.).

6. Storing medication--place and why.

7. Undesirable effects to report.

8. Possible length of time will be taking medication (check with physician).

9. Discuss those items that could affect action of medication.

B. Discuss self-administered medication procedure.

1. Voluntary.

2. Explain schedule sheet.

3. Bring schedule sheet to nursing station when requesting medication from "medicine nurse."

C. Self-administered medication guide.

1. Determine best time for patient to take medication while in hospital and when discharged to go home.

2. Suggest, upon discharge, to use a schedule for medication.

3. Discuss a possible check-off system on a calendar for home.

4. Discuss general guides for medication.

   a. When seeking medical help (dentist, etc.), tell current medication, prescription and non-prescription aspirin, laxatives, etc.).

   b. Tell any undesirable effects that might have occurred.

   c. If a dose is missed, wait until time for next dose--do not double the dose.

   d. Take medication for as long as physician prescribed it.

   e. Take only those medicines prescribed for you.

   f. Take only the amount prescribed.

   g. Flush old medication, no longer taking or lost strength, down the toilet.

   h. Keep medication away from children.

   i. Before medication is gone and no directions to discontinue, call your physician for further direction.

   j. If you drink alcoholic beverages, check with your physician before imbibing.

   k. When an undesirable effect occurs, call your physician.

IV. Suggested approach to adverse or undesirable effects of medication:

When you take a drug, it will fulfill the primary function

for which it was intended.

Some effects from medicines are not what you want. Medicines also cause undesirable or unexpected effects. These are known as side effects and can be caused by medicines bought with a physician's prescription as well as medicines purchased over-the-counter.

You should be alert to the possibility that medications can cause side effects. You should also be aware that every medication has potential to cause some unwanted effects in some people.

Unexpected or undesirable effects can be mild, such as a slight rash, mild headache, nausea or drowsiness. They can also be more severe, such as prolonged vomiting, bleeding, marked weakness, or impaired vision or hearing. These symptoms are Nature's way of telling you that the medicine is acting adversely and that you ought to do something about it. Every individual reacts differently to medicines. Just because someone you know had no side effects from a drug it doesn't mean you won't. For this reason, never take medication prescribed for someone else, even if you feel your symptoms are the same. And never give anyone else a medicine that has been prescribed for you. You may be doing a disservice by causing the other to have a bad reaction. If a drug you are taking causes an unexpected or undesirable effect, call your physician right away.

Often when your physician is writing a prescription, he will tell you that it may cause some side effects. Listen carefully

to what he says so you'll know what to expect. If you don't understand, ask your physician to explain it again. It's important to know just what to expect from the medicine before you take it.

If a side effect is unexpected or is unusually severe, your physician will have to make a decision. Often he can prescribe another medicine that has fewer or less severe side effects but that can still help your condition.

Often, the side effects known to occur from over-the-counter medicines are listed on the label. Read the label carefully before taking the medication. And if there are side effects, use common sense. If drowsiness is expected, for example, you shouldn't drive or operate any machinery until the medicine's effect wears off.

It's important to remember that mixing two types of medicines can often cause an unexpected and sometimes very severe reaction. You should never mix two medicines unless your physician tells you it's all right. Alcoholic beverages are also drugs and shouldn't be mixed with medicines unless your physician approves.

DRUG WARNING REMINDER SHEET*

1. Alcoholic Beverages and Medication. Patients should be advised to observe caution when taking drugs known to interact adversely with alcohol; they should also observe the same caution about alcohol intake with sedatives, hypnotics, and other CNS depressant drugs such as barbiturates, and with certain antihistamines and tranquilizers that are potentiated by alcohol.

2. Swallowing or Chewing Tablets. Tablets with enteric coatings and those containing an irritant dye or substance should not remain in contact with the teeth and oral tissues. They should be swallowed, not chewed. Such tablets should not be prescribed for the elderly and children who cannot swallow tablets whole.

3. Driving Automobiles or Operating Machinery. When analgesics, antihistamines, hypnotics, narcotics, or psychochemicals are prescribed in sedative doses, warn the patient about drowsiness as a side effect. Suggest the patient avoid driving an automobile or operating machinery while taking the medication.

4. Medication Stains, Irritation. Warn patients about all drugs that irritate, stain, or cause impairment or damage to dermatomucosal surfaces and clothes.

5. Medication on an Empty Stomach. Drugs that are inhibited or potentiated by certain food constituents should be taken about one hour before meals or three hours after meals. These include:

Ampicillin

Cloxacillin (Tegopen)

Dipyridamole (Persantine)

Erythromycin base

Lincomycin (Lincocin)

Monoamine-oxidase inhibitors (Tutonyl, Furoxone, Marplan, Nardil, Niamid, Parnate)

Pencillamine (Cuprimine)

Penicillin G potassium

Pentaerythritol tetranitrate

Phenmetrazine (Preludin)

Certain tetracyclines

6. Medication and Fruit Juices. Certain antimicrobials and other drugs tend to be destroyed by the constituents of fruit juices. If taken with fruit juices, premature breakdown of the following acidlabile drugs may occur:

Ampicillin

Cloxacillin (Tegopen)

Erythromycin base

Penicillin G potassium

7. Medication before Meals. To obtain absorption before food intake interferes, precise timing of the ingestion of methylphenidate (Ritalin) is required. The following drugs, given to inhibit vagal effects on gastric glands and gastric secretions when the acid content of the stomach is reaching a maximum, should be taken a half-hour before meals:

Atropine sulfate

Belladonna tincture

Clidinium bromide-chloridiaze-poxide (Librax)

Phenobarbital and belladonna extract (Donnatal)

Propantheline bromide (Pro-Banthine, Probital)

8. Medication and Dairy Products. Certain tetracyclines may be inactivated by calcium or other constituents of dairy products; bisacodyl has an enteric coating that dissolves in the alkaline medium produced by milk. These and other drugs whose absorption is decreased by an alkaline medium should not be taken with milk or milk products, but may be taken with juice or water. They include:

Bisacodyl (Dulcolax)

Potassium chloride solutions and tablets

Potassiumchloride-potassium bicarbonate mixtures

Potassium iodide

Certain tetracyclines

9. Medication with Water. Recommend large quantities of water with uricosuric drugs such as allopurinol (Zyloprim) to prevent precipitation of urates. With slightly soluble drugs, such as certain sulfonamides, recommend that the patient take plenty of water to prevent precipitation of sulfonamides, crystals. Patients taking drugs that require water to produce their bulk-forming effect should also be reminded to drink large quantities. The following drugs require large water intake:

All sulfa preparations

Natural vegetable compounds (Senokot and others)

Psyllium hydrophilic mucilloid (Metamucil)

10. Medication after Meals. The following drugs are too irritating to

be taken on an empty stomach. These should be taken immediately after meals or with food or milk:

Aminophylline

Aminosalicylic acid (PAS)

A.P.C.

Aspirin

Chlorpromazine (Thorazine)

Chlorpropamide (Diabinese)

Ferrous fumarate

Ferrous sulfate

Hydrochlorothiazide

Hydrocortisone

Indomethacine (Indocin)

Isoniazid

Metronidazole (Flagyl)

Nalidixic acid (NegGram)

Natural vegetable compounds

Nitrofurantoin (Furadantin, Macrodantin, Trantoin)

Phenformin (DBI)

Phenylbutazone (Butazolidin, Sterazoldin)

Potassium supplements

Potassium chloride **

Potassium gluconate

Potassium bicarbonate

Potassium chloride tablets **

Potassium chloride-potassium bicarbonate mixture **

Potassium chloride solutions **

Prednisolone

Prednisone

Reserpine

Salicylazosulfapyridine (Azulfidine)

Tolbutamide (Orinase)

Trihexyphenidyl (Artane, Pipanol Hydrochloride)

11. Medication and Urine or Stool Color. Methylene blue (Trac Tabs, Unised) turns the urine blue. The following drugs may color the urine shades of red:

Anthraquinone preparations (Modane)

Chloroquine (Aralen)

Diphenylhydantoin

Phenazopyridine

Phenothiazine

Phensuximide (Milontin)

Rifampin (Rifadin, Rimactane)

The following drugs may color the stool red:

Pyrvinium (Povan)

Phenazopyridine (Pyridium)

12. Medication with Antacids. Antacids should not be taken with drugs which form insoluble iron compounds that are poorly absorbed in the presence of alkalies. Antacids should not be taken with bisacodyl, which has an enteric coating that's dissolved by antacids, with a

consequent release of the irritant drug in the stomach that may cause vomiting. The following drugs should not be taken with antacids:

Bisacodyl (Dulcolax)

Ferrous fumarate

Ferrous gluconate

Ferrous sulfate

Tetracyclines

13. Aspirin and Medication. The following drugs have been reported to interact adversely with aspirin:

Coumarin (Dicumarol, Panwarfin)

Anticoagulants

Phenylbutazone (Butazolidin, Sterazolidin)

Probenecid (Benemid)

Spironolactone (Aldactazide)

14. Mineral Oil with Medication. Fat soluble vitamins dissolve in mineral oil when taken concomitantly for an extended time; dioctyl sulfosuccinate products are emulsifying agents that may cause increased absorption of mineral oil if taken together for a long period. Advise patients taking the following drugs not to take mineral oil:

All multivitamin preparations

Dioctyl calcium sulfosuccinate (Doxidan, Surfak)

Dioctyl sodium sulfosuccinate

15. Potassium Supplement and Medication. Certain diuretics and steroids that tend to cause hypokalemia should be taken with a potassium supplement, especially if the patient is taking a digitalis preparation.

Patients taking the following drugs should be encouraged to supplement their diet with potassium-rich foods such as bananas and orange juice:

Ethacrynic acid (Edecrin)

Furosemide (Lasix)

Desoxycorticosterone (Cortate, Cortinaq, Doca Acetate, Percorten)

Hydrochlorothiazide (or any thiazide diuretic)

16. Tyramine-rich Foods and MAO Inhibitors. Hypertensive reactions may follow ingestion of tyramine-rich foods (e.g., cheese, pickled herring, wine) in patients receiving monamaine-oxidase (MAO) inhibitor drugs, even weeks after the last dose, since these drugs cause irreversible blockage of MAO. Tyramine releases accumulated catecholamines in the adrenal medulla and sympathetic ganglia. Patients should avoid tyramine-rich foods while taking the following drugs:

Eutonyl

Furoxone

Marplan

Nardil

Niamid

Parnate

*Nursing Update, 1972.

**These drugs should not be taken with milk (see item 8).

APPENDIX H

Digoxin (Lanoxin, Davoxin, Saroxin)

Uniform and rapid absorption enables prompt digitalization to be obtained following oral administration of digoxin. It affects the mechanical and electrophysiologic action of the heart by increasing the strength of contraction and by alerting cardiac automaticity, excitability, conduction velocity, and refractoriness. The increase in contractility in the failing heart results in an increased stroke volume and cardiac output; greater systolic emptying; reduction in heart size, cardiac diastolic volume, and pulmonary arterial pressure; and diminution in blood volume and central venous pressure. In therapeutic concentrations it has little effect on automaticity except indirectly when cardiac slowing occurs reflexly after cardiac compensation is restored. Toxic concentrations may increase cardiac automaticity and lead to ectopic tachyarrhythmias. Digitalis decreases conduction velocity in the atrioventricular node, both by vagal and extravagal action, and in the bundle of His. Conduction velocity in cardiac muscle is slightly increased by digitalis, except in toxic doses, when a decrease is observed. It shortens the effective refractory period of the atrium and lengthens that of the atrioventricular node. Because it can alter the electrophysiologic action of the heart, it is used in the treatment of atrial fibrillation and atrial flutter. It usually will not convert an atrial fibrillation to a normal sinus rhythm in the presence of organic heart disease. Its usefulness in treating fibrillation lies in its ability to partially block conduction through the atrioventricular node, thereby protecting the ventricles from

bombardment by supraventricular impulses. As a result, the ventricular rhythm is slowed. In treating atrial flutter, it protects the ventricles from excessive stimulation and restores normal sinus rhythm in approximately 50 percent of the patients. It is also used to treat or prevent supraventricular tachycardia by reducing the automaticity of ectopic rhythm centers. Digoxin, form of digitalis, is a moderately rapid-acting glycoside with a relatively short duration of action that may be given orally or parenterally. Some physicians prefer digoxin to either digitalis or digitoxin because, if toxicity occurs, it is less persistent. Maintenance dose will not remain constant in a given individual but will vary in accordance with change in body mass, liver or renal function, alterations in electrolyte metabolism, the presence of other disease states, as well as many other factors. In sufficient dosage, all of the digitalis preparations produce nausea and vomiting due to their direct action on the central nervous system. Digoxin is not fully absorbed from the gut. It is prompt acting with the onset of action in 10 to 30 minutes after intravenous dose and maximal effect in 2 to 5 hours with the drug eliminated in 2 to 6 days.

Factors that tend to cause excessive accumulation are impaired liver or renal function; increased myocardial sensitivity due to hypoxia, alkalosis, hypokalemia, or hypercalcemia, and concurrent treatment with other antiarrhythmic drugs.

Anorexia, salavation (sometimes copious), nausea, vomiting, and diarrhea are the predominant and usually early symptoms of digitalis intoxication. Lethargy, drowsiness, and even marked confusion sometimes

occur, particularly in older patients. Visual changes, including a halo effect around dark objects, modified color perception, amblyopia (dimness of vision), diplopia and scotoma (an area of depressed vision within visual field), are caused by digitalis overdosage. It can also cause all types of cardiac conduction disturbances. These range from atrial tachycardia or interference dissociation with atrioventricular nodal rhythm or tachycardia, to supraventricular or ventricular tachycardia. The first signs of toxicity may be rather subtle such as in elderly patients, frequent early signs are mild anorexia and drowsiness. The most frequent cardiac sign of digitalis intoxication is the occurrence of ventricular extrasystoles. By depressing automaticity and conduction, it also can cause sinoatrial arrest or block and any degree of atrioventricular block. Digitalis-induced atrial tachycardia often is associated with incomplete or complete atrioventricular block. Atrial flutter and fibrillation are uncommon toxic effects of digitalis therapy. Digitalis is always suspect when a rate rhythm disorder occurs in a patient receiving the drug. Hypokalemia is a common feature of chronic congestive heart failure treated with digitalis and a diuretic. On the other hand, administration of potassium salts is hazardous when depressed automaticity or conduction predominate, since a rapid increase of serum potassium may lead to complete atrioventricular block or asystole. The hypoxic heart with infarction, angina pectoris, or with superimposed pulmonary disease is particularly sensitive to the effects of digitalis.

The extent of the reduction in heart size, pulmonary and systemic

venous decongestion, and disappearance of edema should be observed to assure that the amount of digitalis administered is no more than necessary to produce cardiac compensation.

Present evidence suggests that digitalis brings increased myocardial contractility by potentiating excitation-contraction coupling by means of: (1) increasing the influx of calcium ions across the membrane, (2) releasing intracellular bound ionized calcium during depolarization, and (3) decreasing outward movement or binding of intracellular calcium ions during and after depolarization. Potassium loss in patients sensitizes the heart to digitalis intoxication even with recommended doses. The diuretic agents as well as electrolyte manipulations by the physician are major causes of potassium depletion in cardiac patients. Not all undesired effects of digitalis are toxic effects. While anorexia, nausea, and vomiting can occur with digitalis toxicity, these symptoms can also be caused by gastric irritation from oral digitalis preparations and stimulation of the vomiting center. These effects are often self-limiting and disappear as the patient adjusts to the drug.

Additional signs and symptoms of digitalis toxicity include diarrhea, headache, visual disturbances, weakness, restlessness, and nervous irritability. Almost every type of arrhythmia can be produced by digitalis toxicity. The type of arrhythmia produced varies with the age of the patient. Premature ventricular contractions and bigeminal rhythm are common signs of digitalis toxicity in adults, while children tend to develop ectopic nodal or atrial beats. Digitalis arrhythmias

are caused by depression of the sinoatrial and atrioventricular nodes. The sinoatrial node depression is often greater than that for the atrioventricular node. This results in various conduction disturbances, first, second, or complete heart block. It may also cause increased myocardial irritability, producing extra systoles or tachycardias. Digoxin is incompatible with acids and alkalies and the drug should be protected from light.

Glyceryl Trinitrate (Nitroglycerin)

Unless the tablets are kept in a well-closed container in a cool place, the volatile nitroglycerin readily evaporates and the tablets lose their effectiveness.

It has a direct vasodilatory effect on smooth muscle. It is used in the treatment of angina pectoris, hypertension, and for the relief of smooth muscle spasm of the biliary tract, ureters, and gastrointestinal tract. It is rapidly absorbed after sublingual administration with the onset of action one or two minutes, and it has a duration of action of about thirty minutes.

Large doses may produce throbbing headache, flushing of face, palpitation, and fainting.

All blood vessels are not equally affected, but vasodilatation is marked in the coronary arteries and in cerebral, splanchnic, and cutaneous vessels. Dilatation of small postcapillary vessels leads to venous pooling of blood. Blood flow may be increased with only minimal decrease in blood pressure. Intraocular pressure is increased. Tolerance may develop.

Although this does produce coronary vasodilatation, it is now recognized that neither the cause of the pain nor the mechanism by which drugs prevent or relieve an anginal attack is fully understood. The effectiveness of any treatment for angina pectoris is difficult to determine because the frequency and severity of attacks varies and may be influenced by several unrelated factors such as weather, anxiety, and because the antianginal effect is subjective.

The most common adverse reactions are headache and hypotension. When taken sublingually the drug appears in the blood in about 2 minutes; peak blood level is reached in 4 minutes; the effect begins to disappear in 10 minutes and is virtually dissipated within 30 minutes. Fall in blood pressure occurs in 1 to 5 minutes after administration and maximum fall occurs in 5 to 10 minutes. There is a return to initial blood pressure readings within 15 to 40 minutes.

During an acute anginal attack, if pain is not relieved within 5 to 10 minutes, the dose may be repeated. If pain persists after two or more tablets have been taken, the physician should be notified. However, some patients take as many as 30 tablets per day without harm.

For prophylactic use the patient should be instructed to insert a nitroglycerin tablet sublingually prior to undertaking any effort that may cause him to have an anginal attack.

EKG patterns are unchanged by nitroglycerin.

Nitroglycerin readily deteriorates, for it is inactivated by time, light, heat, air, and moisture. Patients should be instructed as follows: (1) A fresh supply of drug should be kept on hand. A fresh supply should be obtained at least every 3 months. (2) The drug should always be kept in a dark, airtight container. (3) All but a few days' supply of drug should be kept refrigerated. (4) The drug should not be kept close to the body to protect it from body heat. Ineffectiveness of nitroglycerin may be caused by failure to adhere to these few simple rules. The drug is rapidly destroyed when taken orally. It is ineffective when taken sublingually.

Spironolactone with Hydrochlorothiazide (Aldactazide)

This is an extremely useful and unique combination of two diuretic agents with different and complementary modes of action. As a result of this combination, the different mechanisms of action of the two diuretic drugs exert an additive effect. Spironolactone (Aldactone) usually minimizes the potassium loss characteristically induced by hydrochlorothiazide and other thiazide diuretics. It is also capable of lowering diastolic and systolic pressure in some patients with essential hypertension. Aldactone effects diuresis by blocking, through competitive inhibition, the sodium and water-retaining and potassium-excreting effects of aldosterone on the distal renal tubules.

Hydrochlorothiazide, a potent diuretic agent, promotes excretion of sodium and water primarily by inhibiting their reabsorption by the cortical diluting segment of the renal tubule in contrast to Aldactone which exerts its diuretic effect more distally. Hydrochlorothiazide also promotes potassium excretion and hypokalemia may develop or preexistent hypokalemia be aggravated during its administration.

Aldactazide is contraindicated in anuria and in patients sensitive to thiazide diuretics or other sulfonamide derived drugs. It may also be contraindicated in severe or progressive liver disease.

Potassium supplementation concomitant with Aldactizide therapy is not recommended in other than exceptional instances.

Since hydrochlorothiazide and spironalactone (Aldactone) each reduce vascular responsiveness to norepinephrine, caution should be

exercised in the management of patients subjected to regional or general anesthesia if such patients have been treated with Aldactazide.

Thiazides should be used with caution in pregnant patients. Adverse reactions which may occur in the adult (hyperbilirubinemia, thrombocytopenia, altered carbohydrate metabolism) may possibly occur in the newborn, since such drugs cross the placental barrier and may also appear in breast milk.

The possibility of sensitivity reactions should be considered in patients with a history of allergy or bronchial asthma.

The possibility of disturbances in fluid and electrolyte balance should be considered. Serum and urine electrolyte determinations are particularly important when the patient is vomiting excessively or receiving fluids parenterally. Warning signs which may indicate possible fluid and electrolyte imbalance are dryness of mouth, thirst, weakness, lethargy, drowsiness, restlessness, muscle pains or cramps, muscular fatigue, hypotension, oliguria, tachycardia, and gastrointestinal symptoms. If mental confusion increases, Aldactazide should be discontinued for a few days. The most common electrolyte disturbance encountered with Aldactizide therapy is dilutional hyponatremia. This may be corrected by (1) restriction of fluids, (2) glucocorticoid therapy, or (3) use of an osmotic diuretic such as mannitol or urea.

Adverse reactions reported in association with the use of spironolactone include drowsiness and lethargy, mental confusion, diarrhea and other gastrointestinal symptoms, photosensitivity,

hirsutism, menstrual irregularity, deepening of the voice, headache, maculopapular or erythematous cutaneous eruptions, urticaria, organic brain syndrome, ataxia.

Adverse reactions reported in association with the use of thiazides include purpura, thrombocytopenia, leukopenia, agranulocytosis, gastrointestinal disorders, rash, pruritus, paresthesia, acute pancreatitis, jaundice, dizziness, vertigo, headache, urticaria, aplastic anemia, orthostatic hypotension, muscle spasm, weakness, and restlessness.

Furosemide (Lasix, Frusemide)

Lasix is a powerful nonthiazide sulfonamide diuretic and is rapidly absorbed. Its maximum effect occurs 2 to 4 hours after oral ingestion and its action lasts 6 to 8 hours. The primary mode of action appears to be inhibition of the reabsorption of sodium in the ascending loop of Henle. It does not inhibit carbonic anhydrase and is not an aldosterone antagonist. Furosemide also apparently exerts a direct effect on electrolyte transport at the level of the distal tubule, and decreases proximal tubular reabsorption of sodium and chloride, resulting in enhanced excretion of these ions in approximately equal amounts. In maximum effective doses, it is probably 8 to 10 times as powerful as the thiazides. Since it causes a high rate of chloride excretion, hypochloremic alkalosis may occur.

The great potency of Furosemide makes careful medical supervision mandatory. Dehydration and reduction of blood volume can lead to vascular collapse, thrombosis, and embolism.

Transient deafness and tinnitus have been observed after ingestion of excessive doses. Dermatitis, including uticaria and pruritus, and blood dyscrasias (anemia, leukopenia, thrombocytopenia purpura) may occur. Rapid loss of water and electrolytes may cause hypotension, weakness, lethargy, nausea, vomiting, diarrhea, and confusion. Furosemide is contraindicated in anuria or increasing azotemia and anuria, as well as during pregnancy and in nursing mothers. It is recommended that it should be given on intermittent dosage schedule (two or four consecutive days a week, followed by a drug-free rest period).

Weakness, fatigue, lightheadedness or dizziness, muscle cramps, thirst, diaphoresis, urinary bladder spasms, and symptoms of urinary frequency have also been reported to occur. Periodic blood studies and liver function tests should be performed especially in patients on prolonged therapy. Furosemide should be administered with caution to patients receiving potassium-depleting compounds such as corticosteroids. It may potentiate the action of hypotensive drugs if administered concomitantly. Also, Furosemide and salicylates reportedly have competitive renal excretory sites and accordingly, patients receiving the drugs concomitantly may experience salicylate toxicity at lower dosage than usual.

Exposure to light may cause discoloration of the drug but this does not affect its potency. It should nevertheless be dispensed in light-resistant containers.

Furosemide may be given orally, intravenously, or intramuscularly. Careful monitoring of blood pressure is essential when this is used alone or with other hypotensive agents, especially during initial therapy.

Warfarin Sodium (Coumadin Sodium, Panwarfin)

Warfarin depresses prothrombin activity of blood. It inhibits the synthesis of factor II (prothrombin), VII (proconvertin), IX (Christmas), and X (Sturart-Power) in the liver, which explains why their therapeutic action develops slowly. It is readily absorbed from the gastrointestinal tract and is used orally as well as intramuscularly or intravenously. The onset of action is 24 to 36 hours and duration of effect is 1 to 2 days. Prothrombin time should be determined before initial dose and every day or two thereafter until a constant value is attained, and at regular intervals thereafter (once a week). Although this test is not actually a measure of the therapeutic or antithrombic range, it is an indicator of the safety from bleeding. Overdosage can be counteracted by administering phytonadione (Vitamin K).

Coumarin compounds are relatively free of untoward effects and have been given for long periods of time without signs of toxicity (5 years). Occasional adverse reactions include gastrointestinal disturbances (especially diarrhea), elevated transaminase levels, urticaria, dermatitis, leukipenia, and alopecia. Of course, significant bleeding is an inherent risk but its frequency and severity can be minimized by careful management. The appearance of blood in the urine may give the first warning of anticoagulant bleeding.

Absolute contraindications to the use of anticoagulants are active ulcerative disease of the gastrointestinal tract, hemophilia, hemorrhagic blood dyscrasias, severe liver or kidney disease, subacute bacterial endocarditis, open ulcerative wounds, severe hypertension,

and recent surgery of the eye, spinal cord, or brain. In addition, anticoagulants should be used with great caution in the presence of liver and/or kidney disease, hypertension, alcoholism, drainage tubes in any orifice, a past history of ulcerative disease of the gastrointestinal tract, and any occupation that carries a substantial hazard of injury. Heparin is preferred for use in the pregnant or lactating female because it does not cross the placenta or pass into maternal milk.

Aqueous solutions of Warfarin decompose on standing and injections should be prepared immediately before administration.

Coumarin derivatives are the drugs of choice for long-term anticoagulant therapy to protect against sudden acute arterial occlusion or thrombcembolic phenomena from any predisposing factor that may cause loss of limb or life. They are the drugs of choice for recurrent phlebitis, chronic occlusive arterial disease, and myocardial infarction.

Major advantages of these drugs are (1) they are effective with oral administration, (2) they are inexpensive, and (3) they need to be given only once a day when the maintenance dose has been established.

Isosorbide Dinitrate (Isordil, Sorbitrate)

Isosorbide dinitrate produces coronary vasodilatation (basic action that of relaxation of smooth muscle) and relieves the pain of an acute attack of angina pectoris when administered sublingually, but its onset of action is slower than that of nitroglycerin. Its action may occur in 2 to 3 minutes and last 1 to 2 hours when given sublingually. Following oral administration, the onset of action occurs in about 30 minutes with the duration lasting about 4 hours. Individual response is variable and unpredictable. It may significantly reduce the number, duration, and severity of angina attacks.

When administered sublingually, it also may prevent an anginal attack when taken a short time prior to anticipated physical exertion or emotional stress. Although nitrates may be effective initially, tolerance may develop with repeated use of these.

Isosorbide dinitrate may produce headache, dizziness, palpitation, tachycardia, gastrointestinal disturbances, and paradoxical increases in anginal symptoms. It should be discontinued if anginal symptoms increase.

The most common side effect of isosorbide dinitrate is vascular headache, a manifestation of the pharmacologic action of nitrate drugs. Headache may sometimes be severe but is usually transient and can often be controlled by temporary reduction in dosage, by administering the drug with meals, or by concomitant administration of salicylates. In common with other nitrates, isosorbide dinitrate may increase intraocular pressure and should be used with caution in patients with glaucoma.

It can act as a physiological antagonist to norepinephrine, acetylcholine, and histamine. Alcohol may enhance severe responses to the drug.

Sources for Drug Information

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Cutting, Windsor C., M.D. Handbook of Pharmacology. New York, N.Y., Appleton-Century-Crofts, 1967.

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Swidler, Gerald. Handbook of Drug Interactions. New York, N.Y., Wiley-International, 1971.

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DISCHARGE MEDICATIONS

Please read and think over the following guidelines concerning the medicines you will be taking at home. Feel free to ask any questions.

It is important that you know what medications you are taking and why. Take your medication at the same time you do at the hospital or as directed on the container. Do not adjust or alter dosages on your own unless given specific instructions to do so.

If you forget to take your pills at a specified time, don't take twice the number of pills the next time to make up for the forgotten dose. Call your physician and ask him what to do.

Don't take medicines you can buy at the drug store without a prescription such as cold remedies, vitamins with added minerals, nose drops, or laxatives. These preparations can affect the action of some drug preparations you are taking. Always tell the physician the drugs you are taking. Also, ask your physician about using these medicines and be sure he knows what, if any, additional prescription medications you are taking. Alcohol is to be discouraged with medications unless your physician specifies otherwise.

Some medications may cause you unexpected responses. If this is suspected, check with your doctor or nurse before "discontinuing" the drug.

THINGS YOU SHOULD KNOW

Pain - Chest Discomfort

Chest pain, tightness, squeezing, etc., or any severe pain that lasts more than 10-20 minutes, and which is not relieved by nitroglycerin, should be taken seriously at least until it can be evaluated. In this case, if you get pain lasting more than 10-20 minutes within a week after going home, phone or return to this hospital as soon as possible and tell the nurse about your discomfort. Your pain or discomfort may be accompanied by other symptoms such as nausea, sweating, rapid heart rate, etc. Tell the nurse about these also. See your private physician if the pain is severe and you have resumed your visits to him.

Signs and Symptoms to Note

1. Increase in weight of two or more pounds overnight.
2. Increased difficulty in breathing while awake and upright or while lying down.
3. Prolonged rapid heart rate.
4. Ankle or extremity swelling.
5. Unusual fatigue or "tired feeling."
6. Changes in rate and rhythm of your heart beat ("hard" beats "fluttering" in check).
7. Prolonged pain.

APPENDIX I

Loma Linda University Medical Center

A DIGITALIS PREPARATION

Digitalis preparations strengthen the heart muscle. They can control an irregular rhythm. Take .125 mg. or 1 tablet each morning; i.e., 9 a.m. or as prescribed. Keep this medication in a dark place, away from sunlight and moisture.

Some commonly prescribed digitalis preparations are as follows:

Digitoxin

Digoxin (Lanoxin, Saroxin, Davoxin)

Ouabain

Call the doctor if:

1. You feel short of breath.
2. You are nauseated or vomit, or have diarrhea.
3. You suddenly see double, or everything looks blurred or yellow.
4. You feel your heart is turning over in your chest or you feel a thumping in your chest.
5. You suddenly lose your appetite or become unaccountably hungry.

Loma Linda University Medical Center

NITROGLYCERIN

Take when needed for relief of chest discomfort. Discontinue any exertion and lie down for a few moments. If pain is not relieved within 3-5 minutes, take a second one. Call your physician after taking 3 tablets if the pain is not relieved. Nitroglycerin tablets can be taken before precipitating events such as climbing stairs, sexual intercourse, or after a heavy meal.

This tablet should be taken at the earliest sense of chest discomfort.

Hold this tablet beneath your tongue until absorbed. Fresh tablets cause a tingling sensation. Carry some of the tablets with you at all times.

Keep your supply in a cool, dark place and in a tightly sealed container. All but a few days' supply of drug should be kept refrigerated in a dark container. Fresh tablets should be secured every 3-4 months.

Loma Linda University Medical Center

PRONESTYL

Pronestyl controls the rhythm of the heart. This medication should be sustained at a normal range in the circulatory system, therefore necessitating that you take the medication at set intervals. Pronestyl is sometimes given in conjunction with other medications. If you forget to take a pill, do not double the dosage the next time.

Notify your physician if you have any of the following symptoms: nausea, vomiting, diarrhea, palpitations, or an irregular rhythm.

Loma Linda University Medical Center

ALDACTIZIDE

This medication helps the body to lose water, therefore decreasing the swelling in the hands, legs, and ankles. A daily record of your weight can be a clue to how much retention of body fluid you may have.

You are encouraged to eat foods high in potassium due to the loss of this electrolyte when taking Aldactizide.

Some of these foods are: tomatoes, bananas, orange juice, raisins, cantaloupe, potatoes, and others.

Be sure you know how much, if any, salt you are allowed in your diet and abide by it.

Report the following symptoms to the physician when they occur: weakness, thirst, restlessness, muscle pains or cramps, diarrhea, or dizziness.

Loma Linda University Medical Center

COUMADIN

This tablet alters the normal process of clotting of the blood. As has been explained to you, the serious consequences of arteriosclerosis (narrowed arteries) are produced by the formation of acute thrombi (blood clots) in these arteries. This drug is designed to prevent or retard this process.

Spontaneous bleeding from the nose, skin, bowel, kidney (blood in the urine), or other area may occur if the effect of this drug becomes excessive. Notify your physician immediately if any of these occur.

Several drugs change the dose requirement of this drug. These are: aspirin, alcohol, Vitamin K, some types of hormones, antibiotics taken by mouth, phenobarbital, or other barbiturates. Your physician should be notified before any drugs are taken.

Loma Linda University Medical Center

DILANTIN

Dilantin controls an irregular rhythm.

Notify your physician if any of the following symptoms persist: nausea and vomiting, faintness, dizziness, or confusion.

Loma Linda University Medical Center

METAMUCIL

Metamucil acts as a laxative by providing the necessary bulk for your intestinal tract. It does not act by irritation, but travels through the intestinal tract in about 36 - 72 hours, the same time it takes food to pass through the tract.

Other ways to enhance elimination are as follows:

1. Eat bulky foods such as fruit, salads, and vegetables.
2. Drink 8 glasses of water daily.
3. Do a moderate amount of exercise daily.
4. Obey the urge to move your bowels.
5. Establish a convenient time for your bowel movement.

Loma Linda University Medical Center

COLACE

Colace is not a laxative, but keeps the stool soft for easy passage without straining to have a bowel movement. It is advisable to continue to breathe naturally without holding your breath, while turning over in bed or sitting on the commode trying to have a bowel movement.

Loma Linda University Medical Center

VALIUM

Valium provides relaxation. Take 5 mg. or 1 tablet three times a day and 2 tablets at bedtime or as ordered.

This medication can cause drowsiness or sleepiness; therefore, driving a car may not be advisable.

Occasionally, patients may experience a headache, flushing of the skin, nausea and vomiting, or dizziness (but usually to a mild degree).

NOTE:

1. Do not drink alcohol while on this drug.

2. It is best not to engage in hazardous occupations requiring complete mental alertness (such as operating machinery or driving a motor vehicle) while you are receiving this drug.

Loma Linda University Medical Center

LASIX

Lasix helps the body to lose water, thus diminishing the swelling in the ankles, legs, fingers, and other parts of the body.

A daily record of your weight can be a clue to how much retention of body fluid you may have. Also, an awareness of your intake and your urine output to evaluate if they are approximately equal can be helpful. This tablet will cause you to urinate in a short period of time; therefore, should not be taken prior to bedtime.

You are encouraged to eat foods high in potassium due to the loss of this electrolyte when taking Lasix.

Some of those foods are as follows: tomatoes, bananas, orange juice, raisins, cantaloupes, potatoes, and others.

Take one tablet each morning.

Be sure you know how much, if any, salt you are allowed in your diet and abide by it.

APPENDIX J

GENERAL MEDICATIONS

PURPOSE	DRUG
STRENGTHENS HEART MUSCLE.	DIGOXIN, LANOXIN
RELIEVES CHEST PAIN	NITROGLYCERIN, ISORDIL, SORBITRATE
HELPS BODY TO LOSE WATER.	LASIX, ALDACTYZIDE, NATUERIN, DIURIL, DYAZIDE
RELAXER	VALIUM, LIBRIUM, SINEQUAN, VISTARIL
STOOL SOFTENER.	COLACE
BLOOD THINNER	COUMADIN, HEPARIN, PERSANTINE AND ASPIRIN
CONTROLS HEART RHYTHM	INDERAL, PRONESTYL, QUINIDINE, DILANTIN
ENHANCES SLEEP.	DALMANE, SECONAL
RELIEVES PAIN	DARVON, ASPIRIN, EMPIRIN
RELIEVES STOMACH DISCOMFORT	MAALOX, LOMADROX, MYLICON
CONTROLS BLOOD SUGAR.	INSULIN, ORINASE, DIABINESE, DYMELAR
RELIEF FROM GOUT.	ALLOPURINOL, QYLOPRIM, BENEMID
LAXATIVE.	MOM, METAMUCIL, PERICOLACE
REPLACES POTASSIUM.	KLORVESS, KCL ELIXIR
LOWERS BLOOD PRESSURE	ALDOMET
DECREASES INFECTION	AMPICILLIN, GANTRISIN
DECREASES CHOLESTEROL	ATROMID-S
VITAMIN	THERAGRAN
RELIEVES RESPIRATORY DISTRESS	QUIBRON

HORMONE REPLACEMENT	STILBESTEROL
ANTI-TUBERCULOSIS	INH, ETHANBUTAL
ANTI-INFLAMMATORY	PREDNISONE
BRONCHODILATOR, eases respirations.	TEDRAL, DAINITE-NIGHT
STABILIZES BLOOD PRESSURE	FLORINEF
DECREASES MUSCLE TREMOR	ARTANE, SYMMETREL
EXPECTORANT, relieves coughing.	PYREBENZAMINE
MOOD ELEVATOR	TOFRANIL

APPENDIX K

NAME_____

Loma Linda University Medical Center
MEDICATION SCHEDULE

TIME	6:00 a.m.	9 a.m.	12 p.m.	6 p.m.	12 Midnight
Purpose:	MEDICATIONS	MEDICATIONS	MEDICATIONS	MEDICATIONS	MEDICATIONS
Strengthens heart muscle	Digoxin .125 mg. 1 TABLET				
Controls heart rythm	Inderal 15 mg. 1 1/2 TABLET		Inderal 15 mg. 1 1/2 TABLET	Inderal 15 mg. 1 1/2 TABLET	Inderal 15 mg. 1 1/2 TABLET
Relief from Gout	Allopurinol 100 mg. 1 TABLET		Allopurinol 100 mg. 1 TABLET	Allopurinol 100 mg. 1 TABLET	
Relaxer	Valium 5 mg. 1 TABLET		Valium 5 mg. 1 TABLET	Valium 5 mg. 1 TABLET	
Relieves stomach discomfort	Lomadrox 2 TABLESPOONS		Lomadrox 2 TABLESPOONS	Lomadrox 2 TABLESPOONS	Lomadrox 2 TABLESPOONS
Blood thinner			Coumadin 5 mg. 1 TABLET		
Helps body to lose water	Lasix 40 mg. 1 TABLET			Lasix 40 mg 1 TABLET	

	THESE MEDICATIONS ARE TO BE TAKEN ONLY AS NEEDED:
Relieves chest pain	Nitroglycerin 1/150 gr. under the tongue as needed.
Enhances sleep	Dalmane 30 mg. at night as needed.
Laxative	MOM 2 TABLESPOONS at night as needed.
Stool softener	Colace 100 mg. 1 TABLET daily as needed.

Loma Linda University Medical Center
MEDICATION SCHEDULE

TIME	7:30 a.m.	9 a.m.	1 p.m.	5 p.m.	9 p.m.
Purpose:	MEDICATIONS	MEDICATIONS	MEDICATIONS	MEDICATIONS	MEDICATIONS

THESE MEDICATIONS ARE TO BE TAKEN ONLY AS NEEDED:

APPENDIX L

MEDICATION TEACHING-UNIT 4100

_____ _____
Name Room

has been instructed in the following:

Digoxin-Lanoxin Date_____

Nitroglycerin Date_____

Lasix Date_____

_____ Date_____

_____ Date_____

_____ Date_____

_____ Date_____

_____ Date_____

_____ Date_____

_____ Date_____

Discharge Meds Date_____