A COMPARISON OF DISCHARGE MEDICATION ORDERS WITH THE HOME MEDICATION REGIMEN OF SELECTED POST CORONARY PATIENTS

by

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CHAPTER I

INTRODUCTION

The occurrence of potentially serious medication errors can be documented by talking with patients, whether in their home, in the clinic, or in the hospital. During a readmission interview in a Coronary Care Unit, one patient stated that he had not refilled his prescription for a digitalis preparation because he did not know he was supposed to. Another patient, returning to clinic, said, "I thought the doctor said two tablets." She had doubled her dosage even though the physician had provided clearly written and detailed instructions.

The number of medications a patient is taking has been found to be related to the number of errors made; some studies report more errors made by patients who are taking a larger number of medications (10, 31, 32). In contrast, another study reported that a patient with a large number of medications ordered fro post-hospitalization was helped to avoid self medication error by well planned nursing intervention before he went home, and by follow up visits in his home to reinforce the teaching (10).

The shift from totally supervised hospital care to self responsibility at home may be too abrupt. Instructions

and restrictions, although expertly devised, may have unexpected interpretations by patients in their particular home situations. When patients return home to convalesce following hospitalization for a serious or acute episode of illness, they are often faced with some degree of alteration in life style. Examples include medication schedules, patterns of activity and rest, dietary restrictions, and perhaps a need to change income producing occupations. The attending physician transmits his plan of care to his patient either directly or by delegation. The patient must then resolve the conflicts with his customary life style according to the physical, social and emotional forces of his own makeup. Numerous discrepancies have been observed between physicians' well planned programs and those which patients adopt for themselves.

Attempts to decrease self-medication errors need to be related to knowledge about the causes for such errors. Some questions which need yet to be answered involve the social, economic, cultural and individual psychological influences on the problem.

The Problem

Errors in the management of self medication in the home environment are not unusual. The literature reveals a number of studies regarding home self medication error rates which vary from 25 per cent to more than 90 per cent. The reported studies describe patients with chronic illness, the elderly, general clinic populations, and frequently those with tuberculosis or mental illness.

Reports of studies of patients cared for by private physicians have not been found, and the question arises as to whether they are not equally prone to self medication errors. Such patients may have more readily available physical and financial resources, have more access to transportation, and can choose the physician who will care for them. Although not stated, some of the studies reviewed implied that the absence of such factors may tend to increase the home self medication error rates.

The lack of information and documentation about the home self medication habits of patients cared for by private physicians indicates a need to investigate this group for self medication errors, and to evaluate the effects of individualized instruction to reduce such errors.

Literature Review

Errors in self medication have been the concern of numerous investigators, and the problem has been approached in several different ways. The literature reviewed lends itself to a variety of topics for discussion. With this in mind, the following topics were chosen to organize the material reviewed: the extent of the problem; techniques used to determine errors; in hospital self medication; reasons for self medication errors; recognition of patient reliability; improving self medication accuracy; attitudes of health professionals; patient teaching; and the nurse specialist role.

The discrepancy between physician intention and patient action has long been a significant problem. Weed (33) observed:

> When patients are discharged, the physician fully expects that they will understand and manage their own procedures and drugs and diets, when in reality they may often be wholly confused, not only about the character of the treatment, but also about the function of it and about what effect a particular drug is supposed to produce or a particular personal regimen is intended to create.

Schwartz, Henley and Zeitz (32) expressed a very similar observation: "A particularly interesting finding is that many patients' own treatment regimen varies significantly from that which has been prescribed for a variety of reasons." The Schwartz, et al., study of elderly, ambulatory clinic patients with chronic, long term illness is perhaps the most widely known investigation offering information

about self medication errors. The proportion of subjects making errors (59 per cent) compares with those observed by Clinite (6) and McInnis (18) in their studies of pulmonary tuberculosis patients. The descriptive study by Schwartz, et al., relates some of the reasons for errors, and notes that omission was the most common error. Others reasons were communication failures between the physician and the patient, with the patient often unaware he was expected to take a particular medication. Some patients knowingly made ommission errors because they were " . . . too ill, too tired, or too short of funds to obtain their prescriptions at the pharmacy following a clinic visit." The same reasons, and lack of motivation, served to explain failure to obtain refills when prescriptions ran out.

Hecht (11, 12, 13) has studied the problem extensively with adult tuberculosis patients. In her 1969 study (12) done in Buffalo, New York, she demonstrated that increased amounts of teaching resulted in lower self medication error rates. Forty seven patients selected at the time of discharge from the hospital were placed in four groups. Group one was used as a control, while groups two, three, and four were given progressively increased teaching about their medications by the research team. Errors were determined by multiple measures which included patient report, pill counts, and urine tests to determine reliability of the patients' reports. Results showed that 82 per cent of

the control group made errors, with 53 per cent serious, but 33 per cent of group four (most teaching) made errors, with 17 per cent serious. Hecht concluded that patient report was of least value in error determination. The addition of a pill count and urine tests were found to increase greatly the accuracy of error measurement.

Patients may fail to follow physician prescribed regimens from 15 per cent to as much as 90 per cent, or more, of the time, according to one survey (35). The patients studied had a wide range of health problems and obtained medical care in varied settings. The locale of most of the studies included in the survey was the clinic, where patients returned periodically for supervision of some form of chronic illness. In addition, the survey indicated that reports of self medication errors found in their practice by private physicians were generally subjective, and without statistical measurement.

In the studies which reflect the extent of self medication errors, patients with pulmonary tuberculosis were most frequently used. This group was recognized to have serious error rates and, although not elaborated upon, the possibility of a "social-psychological" aspect was suggested for the self management failures (6).

The problem of noncompliance with physician prescribed regimens was believed by some to have an irreducible minimum. Some physicians estimate a "hard core" noncompliant population

ranging from five to fifteen per cent. Included in the hard core group are patients described by one physician as "chronic complainers." The suggestion was made that " . . . separating the incorrigibly disobedient from the well motivated, responsive patient--and directing the communication where it will count most could be a major step toward reducing the high noncompliance rates" (35).

Based on the literature reviewed, it is evident that the extent of self medication errors is great. Many patients fail to get full benefit of prescribed regimens. Many of the errors were serious in nature, and the idea of a hard core group was proposed, whose errors may be very difficult to reduce.

Several studies reviewed described different techniques to determine whether patients take medications as prescribed. The patient interview was the simplest means to gather information about individual habits of taking medication, and most researchers used it in some form. Often the interview was combined with one or more additional techniques. The skillful combination of several techniques resulted in increased reliability of error determination and measurement.

In one study, a pharmacist dispensed medications and instructed patients in their use at the time they were discharged from a Veterans' Administration Hospital. Six to eight days later, the pharmacist made home visits to the patients involved and counted the number of pills remaining

from those he had dispensed at the time of discharge. Of the 30 patients included in the study, only four took all medications as prescribed. In addition, the investigator found greater than 25 per cent error rates, with most errors related to a larger number of drugs per patient, larger number of times per day to take them, and length of therapy (6).

Onstad (22) described an intensive outpatient program designed to decrease medication failures of patients for whom antituberculosis medications were prescribed. Those who missed appointments were promptly followed up by a communicable disease investigator. Missed treatment rate during the study was reported to be 2.1 per cent for 51 of 56 patients in the program, a very low rate compared with similar populations in other studies. Therefore, it could be assumed that the rate of error was reduced.

A study by McInnis (18) was carried out in five treatment centers of a health department. The 144 patients were given their supply of antituberculosis medications, and then interviewed several days later with a urine specimen obtained during the same visit. During the interview, an array of the medications was shown, and the patient was asked to pick those he took, and tell how and when they were taken. Patients were also asked how they remembered to take their medications, why they took them, and how long they were advised to take them. The urine specimen was tested with

Phenistix for para-aminosalicylic acid (PAS) metabolites, then refrigerated to be sent out to a laboratory for Isoniazid (INH) analysis. Of the 144 patients on INH, 59 per cent showed positive urine tests, while the 31 patients taking PAS had 55 per cent positive urine tests. The accuracy of error measurement was improved by comparison of the urine analysis findings with the interview and the medication array findings.

Metabolites of some medications can be detected by a urine test performed within 12 to 36 hours after ingestion of the medication. The Belles-Littleman (4) urine test can be used to detect Isoniazid. This test, named for its developers, consists of sensitive filter paper which indicates positive, negative, or indefinite, when a drop of urine is placed on it, allowed to dry, and then treated with cyanogen gas. Urine tests are also available to detect other drugs the patient may be taking. When combined with interview and other techniques used to determine compliance with medications prescribed for patients having tuberculosis and other illnesses, the urine tests had special value.

A significant study by Moulding, Onstad and Sbararo (21) used film records from medication monitors to determine whether 122 patients took antituberculosis medications as prescribed. The medication monitor, developed by Moulding (20), is a calendar marked medication dispenser that includes radioactive material and photographic film to provide a film record of patients' pill taking habits. Prescribed

daily dosages of a patient's pills were packaged separately and fastened to the dated monitor board. Depth of exposure detected whether pills were removed daily, or whether several were removed at the same time. Grossly unreliable patients were excluded from the study. The results indicated that 61 per cent took more than 90 per cent of medications regularly, and 13 per cent took less than 70 per cent of medications.

The literature indicates that a number of techniques were developed and tested for the measurement of self medication errors. The error measurements were more reliable when two or more techniques were combined. Another area of concern was that of developing effective ways to decrease the number of self medication errors.

One means of attempting to reduce patient self medication errors was that of providing a period of self responsibility for medications before a patient was discharged from the hsopital. With professional help readily available, questions and problems could be handled as they developed, and the patient's ability to manage self medication could be closely monitored by those preparing him for discharge.

Several studies are reported which provided for a period of self medication before a patient was discharged. One such study described an independent living unit at Fergus Falls, Minnesota, State Hospital, (27). Reasoning that regular self medication was essential for success in the community, it was decided to make successful self medication

a requirement for discharge. Most of the patients succeeded, although the author reported that the nursing staff occasionally " . . . still find a few bright colored pills in odd places in patients' rooms."

Reibel (28) remarked that "In the area of medications the active role of the patient has too often been ignored or deemed inadvisable." In a descriptive study, the feasibility of a self medication program at Dodd Hall, Rehabilitation Center of Ohio State University Hospitals, was evaluated. During a three month period in late 1966, 27 patients were responsible for self administration of medications, " . . . whether taken orally, applied locally, inserted rectally, injected subcutaneously, or instilled into the urinary bladder via an indwelling catheter." Most errors were errors of omission, and no life threatening errors were made. One patient was found unreliable and removed from the study.

In another study of in hospital self medication, certain standardized medications were agreed upon by the obstetrical staff. Following delivery and a period of rest, a tray containing the medications ordered for the patient was taken to her room by the nurse, who gave instructions for using the medications. Patients administered their own medications from the tray of prescribed drugs. The intent of the program was to simulate the home environment as much as possible. The nurses and physicians were reported to be

enthusiastic over the success of the in hospital self medication program (25).

In a 1966 study in Buffalo, New York, Hecht (11) attempted to demonstrate the effects of pre-discharge self medication by hospitalized tuberculosis patients. Of the 26 patients studied, 15 were in the experimental group and eleven served as controls. The in hospital self medication group patients were given bedside supplies of prescribed medications for periods ranging from three to 39 days before discharge. The patients were interviewed in their homes one to two weeks after discharge, with an exception of one patient who was interviewed at 18 days. Results showed that 65 per cent of the 26 patients made self medication errors at home, while 35 per cent followed medication regimens correctly. Analysis of the study findings showed that the experimental group made more errors than the control group, although the sample size was too small to test for significance. The small sample size and possible bias were suggested as partial explanation for the higher rate of the experimental group: subjects in the experimental group were found to have a higher mean age, a lower educational level, and more of them lived alone than the control group subjects. Hecht argued as follows:

> A necessary corollary of teaching a procedure or a technique is to allow the patient to practice it. The diabetic learning insulin administration practices it; the patient learning to change a dressing demonstrates

> his proficiency. Nurses who teach patients about their drugs should let them practice taking them before discharge.

Although no studies were found for post coronary patients, an adaptation of the in hospital self medication program could benefit both patients and staff. Observing and assisting the patient as he begins the transition from having all his needs managed for him, to assuming total control, the nurses and physicians could learn some of the problems he encounters. They would be present to answer questions and evaluate his capability, and to make changes promptly if needed. Matheney (16) observed: "When the climate for learning is good, it can be exploited successfully."

The technique of in hospital self medication was found by most investigators to be an effective way to reduce self medication errors. Unrealistic specifications, such as limitations on information given to patients may have limited the value of some results.

Medication errors have multiple causes, and many investigators looked for factors which would be related to error incidence. The reasons patients make medication errors were listed by some investigators. Schwartz, et al. (32) reported that 67 of 105 error making patients omitted an average of two medications each which they should have been taking, with many being serious omission errors. Reasons given for the omissions indicated that some were

aware of the errors while others were not. Known omissions were made because of health, economic or motivational factors which prevented them from having prescriptions filled, or refilled. Unknown errors were usually due to communication breakdowns between the patient and the physician. Memory was a problem for one patient who said: "I don't know if it is today or yesterday."

A list of reasons for noncompliance presented in one survey were:

> Feels better or is asymptomatic before, during or after the diagnosis.
>
> Does not understand the doctor's orders or the nature of the illness.
>
> Finds the physician too busy to offer much more instruction than a hastily penned prescription.
>
> Complains "My doctor doesn't listen." "The patient doesn't explain himself well," counters the doctor. The problem amounts to poor communication, both ways.
>
> Denies the illness or disease.
>
> Sees restrictions, such as bed rest, diet, reduced work load, or long term medication as a threat to his way of life.
>
> Fears side effects of medications.
>
> Seeks advice from relatives and friends, or shops around for a clinician who agrees with his own diagnosis.
>
> Dislikes or fears the physician, a feeling that is usually expressed as passive hostility. Subconsciously, the patient is looking for a warm friend. But he usually gets a busy, overworked authority figure.

> Other factors such as expense or inconvenience of recurring treatment can also influence a patient's adherence, or lack of it, to the physician's instructions (35).

Hecht (13) cited similar reasons for medication errors, and elaborated upon one problem patients must face. She noted that the physician's instructions

> . . . are almost always dissonant with the patient's customary life style. He learns about his condition and is instructed to change his behavior both prescriptively and proscriptively. He may be told to eat a special diet, take pills, or even change his job, and he must then achieve consonance between his usual habits and what the doctor suggests. He will either change his patterns of living to conform with the instructions, or ignore the medical advice.

Cultural beliefs and traditions may also affect compliance. One physician learned that Puerto Ricans classify disease or illness as either "hot" or "cold". To be effective, the physician must understand the classification, and that " . . . hot diseases must be treated with cold medications and vice versa" (35).

The reasons for self medication errors that were listed by investigators have many common elements. Social, cultural, environmental, economic and health factors are involved. Individual attitudes and reactions to the multiple forces affecting him must be evaluated before effective intervention can be made. The use of information about causes of self medication errors to develop a profile of error making proneness was one idea proposed. At least

one group which hoped to develop a profile to aid in recognizing the error prone patient was not successful. Rather, the frequency of errors in all categories of patients in the group studied brought the recommendation that the " . . . entire elderly, chronically ill population of a clinic be considered at least potentially at risk and screened through individual evaluation" (32). A thorough medication history interview was recommended to determine how much responsibility a patient might be capable of assuming.

Hecht (12) included an attitude rating scale in the 1969 study with the conclusion that it did not provide significant information to evaluate reasons for error making, although it was a step toward a hoped for development of a profile to help identify the error prone patient. Subjects were also rated according to coping ability, a profile measure which was used previously by Schwartz, et al. (32) in their study of elderly, ambulatory, chronically ill patients.

Moulding, et al. (21) also discussed patient reliability. They remarked: "Many health workers believe they know their patients well and can distinguish the reliable from the unreliable individuals." The predictions of patient reliability made by physicians and nurses were compared with the film records from the medication monitors and found to be only partially true. In addition, they found that the patients most likely to take medications correctly were

female, had more than twelve years of education, and had a higher economic status, but none of the factors was a positive means for identification of the non error maker.

Physicians who were asked to identify noncompliant patient characteristics gave subjective descriptions. Responses included: passive-agressive, teachers, and dynamic young executives. One physician named engineers as the most compliant group (35).

Deuschle (8) suggested that the increasing shift of responsibility for treatment of disease to the patient, rather than the doctor or nurse, makes reliability evaluation an urgent problem. He stated:

> The successful application of ambulatory or home care programs for the control of disease demands that the physician be able to detect those persons who will, and those who will not take self medication as prescribed. Ultimately, by recognition of certain characteristics or personality traits, the physician may be able to detect the potentially unreliable patient before treatment is begun. These characteristics have not been defined thus far, however, and actual detection of the drug in the body fluids during the course of therapy and/or the ultimate therapeutic response remain the only means of knowing who has taken the prescribed drug.

Thus, the reasons patients make self medication errors are multiple and varied, and a simple remedy for the problem appears unlikely. Some attempts to improve accuracy in self medication have been made, and some of the error making characteristics observed have been reported. In addition, some investigators looked specifically for ways

to improve accuracy in self medication.

Hecht (13) emphasized that attempts to reduce self medication errors need to be based on knowledge of why patients make errors. She expressed confidence that patients can be helped to remember medications. Suggestions included: association of medications with meals and other daily events, and keeping medications on the dining table; calendars or simple charts could be useful to some. Recognition of obvious situations which frequently lead to errors, then acting to help patients avert the errors, is the concern of everyone. Helping a patient make a chart when he has multiple medications and times to remember, use of a pill calendar or package similar to those made for oral contraceptives, color coded medication boxes, or individual plastic pill boxes for daily medications are useful suggestions.

Better communication with patients is also recommended. This requires "listening" to patients, and "hearing" their message, while giving essential information about the drugs they must take, to permit the patient to make intelligent decisions for himself. In addition to knowing what a drug is and does for him, a patient must know how long he must continue taking it. Interviews with patients should also identify problems such as illiteracy, foreign language, poor vision and hearing, and attitudes toward drug taking--both personal and ethnocultural (13, 35).

Schwartz, et al. (32) pinpointed higher frequency of

errors in those over 75, widowed, living alone, having little education, with a large number of diagnoses, and coping poorly with their environment. Recommendations included a complete drug history interview for each patient; medications labeled with specific directions, and not "Take as directed;" review of specific medication schedules at regular and frequent intervals; having patients bring all medications in for review before new ones are given; recognizing potentially hazardous situations, and reinstructing frequently; and appointing a supervising friend or relative when needed. Periodic home visits should be included in planning realistic care. A one sentence lesson from the study was: "Never take anything for granted, no matter how simple."

The multiple values of the Schwartz, et al. (32) study were further indicated by Abdellah and Levine (2) who remarked:

> Nurses must know the nature and range of patient needs that exist. Likewise, the need for obtaining information systematically about what a patient is doing or plans to do, and what he understands or thinks he understands, becomes clearer to the individual nurse who is giving care.

Thoughtfully planned patient care management which aims to increase patient insight and utilizes periods of increased motivation and receptiveness for teaching can be effective in improving patient compliance. Moss (19) discussed aspects of his patient education plan following myocardial infarction. He described his approach as progressive, with the use of

"broad strokes" to paint the picture, then details were filled in later. He developed a booklet which was given to patients four days before discharge. Included was information about acute myocardial infarction, stages of convalescence, and various preventive considerations. Questions were to be written on the last page to be used for a discussion the day before discharge. Moss explained that the final meeting prior to discharge consisted of a very personalized discussion with the patient and with the spouse. The gaps of the booklet and the many previous discussions were filled in by highly specific comments. In addition, the medications prescribed for each patient at the time of discharge were written down, ". . . including the color of the pills, the frequency with which they must be taken, and most importantly, the reason for the specific medication."

The techniques to help reduce self medication errors just reviewed have been tried and found effective. Each patient's problem must be evaluated and the appropriate remedy used.

The attitudes of health professional people play an important part in the continuation of patients' self medication errors. The findings of some studies indicate a need for behavioral changes for this group. Medical personnel have been observed to react with apathy or guilt toward factual information about patient medication errors. Schwartz, et al. (32) observed that such feelings are absent

on viewing x-ray evidence of a fracture, or laboratory evidence of abnormal findings; they recommended that error making be viewed as a very human tendency which is preventable.

Hecht (13) said:

> Perhaps one reason for the apathy is that these errors are a blow to the collective ego of the health team. Implicit in a high medication error frequency is failure of health professionals to make enough of an impression on patients to ensure their following instructions. The simplest response is to ignore the problem.

She points out also that patients do not report self medication errors even when aware of them, and it is rare that a patient is hospitalized because of a serious error. And yet, many patients fail to obtain the maximum benefit from a prescribed therapy. A more realistic attitude toward patients' self medication errors could provide information useful in preventing or correcting them.

Individualized teaching was recognized as an appropriate and effective means to reduce self medication errors. The use of educational principles and concepts necessarily incorporates an evaluation of the patient's readiness to learn. Social, psychological and environmental influences must be considered.

Matheney, Nolan, and Ehrhart (17) observed that the shifting emphasis of health care is in the direction of helping patients and their families manage and live with chronic and long term illness. They considered the increased need for appropriate and individualized teaching as

follows:

> No longer can treatment of a disease be a sole or primary goal. No longer can the preservation of life during an acute episode completely dominate medical and nursing therapy. Since most patients will need to make some degree of life modification, their need to know becomes imperative. Patients need to know how, what, where and when in dealing with their particular health problem. With this changing social pattern, teaching has assumed a new and significant emphasis in planning nursing care.

To teach effectively demands that the teacher be a listener and an observer first. Sensitivity to the needs expressed or unexpressed, the readiness, the ability to learn, the emotional and physical states, is required. Teaching content must be planned to meet an individual's needs. Matheney, et al. (17) continued:

> Age, cultural background, degree of acceptance of health problem, necessary life modification and its meaning, personal concerns or anxieties, and a realistic or unrealistic self image are examples of factors in the individual that may affect how and when the content that is needed may be presented. . . . In fact, at the end of such an assessment, the conclusion that another member of the family should be taught rather than the patient is sometimes inescapable.

One component of teaching, "clarifying communication," was discussed by Dye (9):

> Exploration to find out from a patient how he feels, what he thinks he needs, and whether he thinks he has been helped is necessary in providing good nursing care . . . . Nursing care should focus on patients as individuals, for these studies suggest that, even when it seems that the basic nursing care has been given, the

> patient may not be regarded as cured because he does not regard himself as cured.

Adaptation, as discussed by Roberts (30) is pertinent to timing for teaching:

> Man has two systems of adaptation--physiological and psychological--which are so closely related that the mechanisms used to control the environment of one system may affect the other system.

The emotional impact of illness, and particularly serious problems such as myocardial infarction, which may have residual effects, may narrow the patient's intake ability so that he does not hear what is said to him. Intervention attempts may require repetition until the patient reaches the stage of adaptation which permits him to hear what is said, and to ask questions which need answers. Wiley (34) described a situation which is not unusual for patients following myocardial infarction:

> "It was odd," the patient said. "I understood what you were telling me, and I remember all of it. But I just couldn't believe you were talking about me. I think I was just starting to admit it--to realize that I was going to have to relax and accept help from other people--when I started to feel that flutter and pain."

Knowledge of factors which interfere with learning is an important consideration in attempts to reduce self medication error rates. A study by Leary (14) found that teaching about medications prior to the date of discharge resulted in significantly better informed patients than were those taught the day of discharge, or after discharge from the hospital. Another positive influence was the presence

of a family member when a patient was taught about his medications.

Hecht (12) found the first visit after hospitalization to be a most logical time for teaching intervention. She reported an interesting observation about delayed teaching:

> When patients from the large clinic who had been on drugs for long periods were approached for drug teaching, they responded with surprise or rejection. ("Why are you teaching me now?" or "I know all about my medications already.")

For patients who were illiterate, Ravensborg (27) found that the color and the size of medication containers were successful elements in teaching about medications for one patient.

Weed (33) criticized the medical profession for serious neglect in the area of patient education. He stated that a patient with chronic disease:

> . . . must in large part be his own physician; if he does not understand his own illness and its treatment, moments of reprimand and irritability in the office of the busy practitioner or busy clinic will provide little in the way of correctives. It is not surprising that studies of compliance in medical therapy indicate a level of non-compliance as high as 25 to 50 percent.

To summarize, patient teaching is essential to effect a reduction in self medication error rates. The teaching must, however, be based on a knowledge of educational principles and concepts, and the ultimate measure of its appropriateness depends on whether the patient feels he has been helped or not helped.

The literature indicated that a trend in patient care today is the use of Nurse Specialists who manage clinics or work with groups of physicians. They supervise patients' medical care before and after the acute phases of illness, and patients generally find them approachable and respond to them positively.

Physicians, patients and other observers surveyed by one investigator suggested the Nurse Practitioner, or Specialist, as an effective means to improve patient compliance. The author remarked that doctors are too busy, will get busier, and ". . . the health maintenance nurse will take over after the diagnosis is made and will probably improve compliance" (35). Citing a diabetic patient as an example, he noted that the patient may not hear anything beyond the diagnosis of diabetes:

> But if the nurse sits down with the patient, she's non threatening and when she says "Let's talk about how to take care of your feet," the patient will cooperate. If the doctor should say that, the patient would probably feel his feet will drop off.

Nurse Specialists are operating clinics at Johns Hopkins Medical Center and at the Kaiser-Permanente Medical Group in Oakland, California, in addition to well-baby clinics in many areas. Patients generally feel they can relate to the nurse who takes time to listen and understand their very personal problems. They are able to ask necessary questions, and get answers.

In summary, the literature has indicated that very little has been done to reduce errors in self medication effectively, although the fact of the errors was frequently observed and study recommended. Investigators generally agree that more studies are needed to provide information about problems associated with self administration of prescribed medications by ambulatory patients. One aim of investigators is the eventual development of a profile to permit ready recognition of error prone individuals so that appropriate actions can be taken.

Some private physicians have reported accidental findings and estimates of self medication errors made by their patients, but statistical measurements for this group were not found. Some studies covertly imply that being a non private patient affects adversely the rates of self medication errors. Do the self medication error rates of patients with medical care supervised by their personally selected private physicians differ from those of the clinic populations described in the literature? Would the intervention of individualized instruction to correct the self medication errors found be effective in reducing the incidence of errors?

Purpose of the Study

This study was proposed to investigate the incidence of self medication errors made by a group of post coronary patients in the immediate post hospital period and the effects of specialized instruction to prevent such errors. The hypotheses tested were:

1. Patients who are under the medical supervision of personally selected private physicians do not exceed a five per cent probability level of individuals making self medication errors in the immediate post hospitalization period.

2. There is no difference in the self medication error rates for patients who receive individualized preventive instruction and those who do not.

CHAPTER II

METHOD

The locale of the field experiment herewith described was a large West Coast metropolitan area. The Coronary Care Units of two private hospitals were the sites of initial study activities. The hospitals were identified as Hospital A, and Hospital B, and can be further described as follows:

Hospital A: A 540 bed general hospital with a four bed Coronary Care Unit. Intensive Care and Intermediate Care Units were also available.

Hospital B: A 454 bed general hospital with a nine bed Coronary Care Unit, and one intermediate Coronary Care bed. An Intensive Care Unit was also available.

Criteria were developed to define the population eligible for the study. All patients who met the criteria during the data gathering period became tentative participants. A minimum of ten subjects from each hospital was deemed necessary, while a maximum of approximately 20 from each hospital was expected to be available during the data gathering time limits. The criteria for inclusion in the study were:

Patients twenty one years of age or older.

Having had a first recognized acute myocardial infarction.

Hospitalization in one of the two selected private hospitals, with a part of care given in a specialized unit providing intensive coronary care, during the research study time period.

Permission from the attending physician.

Voluntary agreement to participate, with the privilege of withdrawing at any time.

Residence (temporary or permanent) in or near the location of the study for at least one week following discharge from the qualifying hospitalization.

The rationale for selection of patients following an initial myocardial infarction was that individuals with the same type of illness would be more comparable than those with a wide variety of illnesses.

Initial Myocardial Infarction: A first recognized and diagnosed myocardial infarction was considered to be an initial myocardial infarction. So called silent, undiagnosed myocardial infarctions were not considered to interfere if such evidence should be discovered during the patient's qualifying hospitalization. Also, a second infarction during the qualifying hospitalization was considered as a part of the same illness.

Twenty four subjects, twelve from each hospital, were identified as qualified participants for the study. Using a schedule determined by pre study coin flips, the twenty four subjects were randomly assigned to a control group or an experimental group. The control group was comprised of twelve subjects, with six members from Hospital A, and six members from Hospital B. The experimental group also had twelve subjects, with six from Hospital A, and six from Hospital B.

All subjects in the control group were married, while ten subjects in the experimental group were married, one divorced, and one single (never married). All control group subjects were male, while six experimental group subjects were male, and six were female. The appearance of all the female subjects in the experimental group was considered to be a chance contamination. Religious preferences stated were: Catholic - 3; Protestant - 13; Jewish - 1; none stated - 7. One subject was born in Germany, while all others named twelve of the United States as their birth places. Twenty one subjects lived in their own homes, one lived in a rental house, and two lived in apartments. The number of rooms ranged from three for the two apartments to homes with five to fourteen rooms. The one female single subject lived alone, while other households consisted of two to six persons.

Data Collecting Instruments

Experimental Visit Form: The Experimental Visit Form (See Appendix B) listed five questions to guide the nurse who made visits to subjects in the experimental group, along with instructions to assist and teach the patient about his medications according to his needs. Discharge medications were listed, with a grid to check a yes or no answer to the five questions for each medication and to indicate whether instructions were given.

The Interview Guide: An Interview Guide (See Appendix

B) was devised with eleven sections to record data. The first page contained four sections to record information available from the patients' charts. Items included were demographic information, diagnoses, and medications prescribed at the time of discharge from the hospital. Sections five through eleven comprised the research interview which was completed in the patients' homes between seven and ten days after discharge from the hospital.

Three techniques to determine self medication errors were included in the interview. The first was an array of medications frequently prescribed for post myocardial infarction patients. Subjects were asked to identify medications they were taking from the fifteen drugs shown in the array. The second measure was a detailed description by the patient of his daily schedule of medications, which included the name of the medication, the number of pills taken, the number of times per day, the specific times taken, and what the medication did for him. The third measure was a count of remaining pills of the medications prescribed at the time of discharge.

The Medication Array: A Medication Array booklet was designed by the researcher and constructed by the Graphics Department of the University of Oregon Medical School, to be used during the first measurement of self medication errors. One sheet of quarter inch thick corrugated cardboard, size 11½ inches by 8½ inches, was covered on both

sides with pale blue art paper of the same size. The blue paper was glued firmly in place. Then fifteen one inch diameter circles, evenly spaced in rows of three by five, were cut out of the prepared sheet. The next step was to place a sheet of yellow art paper, also 11½ inches by 8½ inches, under the prepared sheet (not glued) so that the yellow color was seen as a background color through the fifteen holes. Two sheets of dark green cardboard, 11½ inches by 8½ inches, were placed as a front and back cover on the prepared blue and yellow sheets. The four sheets were then fastened together with a spiral loose leaf device along one side to permit opening in a book like fashion.

A selection of commonly used post coronary medications was obtained from the pharmacy with the assistance of James Metcalf, M. D. A pill or capsule was folded in Saran type material and taped to the back side of each of the fifteen holes in the quarter inch thick blue "page," to permit easy visibility when the front cover of the device was opened. Each of the fifteen holes displayed a medication, with changes made as necessary for each patient, to make sure the array included examples of all his discharge medications ordered. The quarter inch thickness of the blue "page" protected the medications from being crushed.

Design and Procedure

This study was a field experiment designed to evaluate the self medication proficiency of a selected group of patients cared for by private physicians. The sample of twenty four subjects was randomly placed into two groups. One group of twelve served as controls, while the independent variable of teaching to correct self medication errors was applied to the second group of twelve subjects. The study design is presented in Figure 1.

	Experimental Visit Within 3 days of Discharge	Investigator Visit Between 7 and 10 days after Discharge
Experimental Group N = 12	1) Evaluation 2) Instruction to correct errors	1) Interview Guide Completed 2) Use of 3 techniques to measure errors
Control Group N = 12		1) Interview Guide Completed 2) Use of 3 techniques to measure errors

Figure 1. Design of Experiment, indicating number and purpose of home visits to the Experimental and Control Groups.

The population from which the study participants were drawn was identified from the Coronary Care Unit censuses

of the two hospitals. The staff nurses assisted the investigator to determine whether a patient met the criterion measure of a first myocardial infarction. When a patient was transferred to a general care unit and his condition had stabilized, the private physician was asked for permission to invite the patient to participate in the research study. Each physician who was approached granted permission, which was indicated by signing the Attending Physician's Permission Slip (See Appendix B). At that point, group placement in either the experimental or the control group was determined according to a schedule based on pre-study coin flips. The first visit to patients was then made, at which time the investigator introduced herself and stated briefly the purpose of the visit. She next stated that the patient's physician had given permission to extend the invitation to participate in a research study. Although acceptance was frequent at that point, an explanation of the patient's role was presented, and questions were encouraged. The Research Study Participation Agreement (See Appendix B) was then explained and presented to the patient. For those patients who had difficulty with reading, the agreement was read to them before they were permitted to sign it.

If the patient wished to talk longer at that point, the researcher remained, allowing the patient to determine topics for conversation. Patients who asked what kind of questions they would be expected to answer were told that questions

would not be difficult nor personally sensitive, and that they had the privilege of not responding.

Explanations that were given did not vary among the patients with one exception: the experimental group was advised that they would be visited at home two times, once within three days following discharge, and again seven to ten days after discharge; the control group was told they would be visited once only between seven and ten days of discharge.

From a total of 46 patients identified by the Coronary Care Unit censuses, 22 failed to qualify for various reasons, and twenty four qualified as study subjects. Reasons for failure to qualify were: distance - 5; surgery - 4; serious complications - 2; discharged to a convalescent hospital - 1; patient willing, but wife refused - 1; refused - 3; not discharged - 2; died - 4. Table 1 describes the study population by hospital of origin, sex, and reasons for attrition.

Table 1. Study Population: Potential and final members by hospital, sex, and reasons for attrition.

	Hospital "A"			Hospital "B"			
	Male	Female	Total	Male	Female	Total	Totals
Potential Number of Participants	17	5	22	15	9	24	46
Met Criteria to Participate	9	3	12	9	3	12	24
Failed to Meet Criteria	8	2	10	6	6	12	22
Reasons Failed: Distance	2		2	2	1	3	5
To Surgery	3	1	4				4
Serious Complications	1		1		1	1	2
To Convalescent Hospital				1		1	1
Patient "yes" Wife "no"	1		1				1
Refused	1		1		2	2	3
Not Discharged				2		2	2
Deceased		1	1	1	2	3	4

The physicians' progress notes were followed for clues to indicate the discharge date for each patient. When length of hospital stay permitted, the investigator stopped at the

patients' rooms to greet them on subsequent hospital rounds. If the patient wished to talk, the investigator entered for a brief visit, again allowing him to determine topics for conversation. Appointment dates and times were made for two patients before they left the hospital because they did not have telephones, or would not be in their own home at visit time.

Lists of the medications prescribed at discharge were obtained in the following ways: from the patient's chart; from statement by the physician at the time of discharge; and from prescriptions given to the patient at the time of discharge. The nurse who had agreed to make the experimental visit was notified of discharge dates and given pertinent information including medications prescribed at the time of discharge.

The Experimental Visit: The experimental visit consisted of a post hospitalization visit to each experimental group subject by a registered nurse qualified by education and licensure to make such visits. The nurse gathered data specified by the investigator. When a subject in the experimental group was discharged, the nurse was notified and given an Experimental Visit Form (See Appendix B) which listed the medications prescribed and pertinent information. The subject's medical record could also be reviewed by the nurses before the experimental visit. Appointments were made by telephone, and each subject was visited within

three days of discharge. The nurse was instructed to use the five questions listed on the guide to determine whether the subject had obtained the prescribed medications, was taking them correctly, had knowledge of their names and purposes, and she was to assist the subject by teaching correct self medication procedures and information as indicated. Nursing intervention was not limited to the required data, and the nurses were advised to contact the subject's physician directly in an emergency situation, and to notify the investigator promptly if serious discrepancies were found.

The control group subjects did not receive an experimental visit.

Investigator's Visit: The total group was visited by the investigator between seven and ten days after discharge. The Interview Guide was used to gather data, and subjects were encouraged to ask questions after completion of the interview.

The investigator was assisted by four registered nurse specialists who made the experimental visits. Their specialties were: cardiovascular and coronary, diabetes, neurological, and respiratory patient care.

Criteria for Errors

The classification of self medication errors was based on those of Schwartz, et al. (32). Four types of self

medication errors were identified:

Type 1. A medication taken by the patient, but not ordered by the physician: Any prescription medication which was neither ordered for the patient at the time of discharge, nor in the interim before the investigator's visit.

Resuming a previously prescribed medication without specific order by the physician was considered to be an error.

Non prescription drugs for minor complaints were not considered an error unless they were obviously contraindicated.

Type 2. Medication ordered by the physician but not taken by the patient: The patient was considered to have made an error of omission when he failed to take a medication ordered at the time of discharge and not discontinued by the physician before the investigator's visit.

Medications ordered pro re nata were not included in error determinations.

Type 3. A medication ordered by the physician, but taken in incorrect dosages. Taking more or less than the prescribed amount of a medication was considered an error.

This classification included taking medications at incorrect time intervals, but in prescribed dosages, since the ultimate error would be one of incorrect dosage.

Type 4. Lack of knowledge about a medication: The patient's ability to express a recognized purpose for the

medication, in words meaningful to him, was considered knowledge of purpose. One example might be a diuretic which the patient refers to as "My water pill--I can't get rid of water without it."

Use of a recognized purpose as the name of a medication was acceptable, as in the above example.

Serious error: Any self medication error which could result in harm or serious consequences for the person making the error. Examples of serious errors: 1) Taking a medication which is contraindicated for the patient concerned; 2) Taking more than the prescribed dosage of potent drugs; 3) Incorrect knowledge of, or lack of knowledge of the purpose or action of potent drugs.

Sources of Data

Primary sources of data were the Interview Guide, the Experimental Visit Form, patients' medical records and statements from their private physicians. Data taken from the medical records included demographic information, occupation, diagnoses, and the medications prescribed at the time of discharge.

Secondary sources of data were the literature reviewed.

Plan for Data Analysis

When all visits had been completed, data were tabulated and discharge medication regimens were compared with the subjects home medication regimens. A master summary sheet

was prepared, and appropriate tables were developed. The number of subjects in each group who made errors was compared and tested for significance by Chi-square. The self medication errors were classified by type, according to the criteria, and the effectiveness of individualized instruction to reduce self medication error rates was determined by a *t* statistic for significance. Group age means and group education level means were tested for significance by *t* tests also. The results must be viewed in relation to the sample number.

Summary

Twenty four post myocardial infarction patients under the care of their private physicians were selected from two large hospitals in a West Coast metropolitan area. The subjects were randomly divided into two groups of twelve each, one the control group, and one the experimental group. The independent variable of individualized instruction at home, to correct self medication errors, was applied to the experimental group. Both groups were evaluated for self medication errors between seven and ten days after discharge with errors classified into four types.

The experimental and control group error rates and subjects making errors were compared and tested for significance. The small number of the sample precludes statistical significance at a high level of probability.

CHAPTER III

RESULTS

The study results were considered in relation to the hypotheses, which were:

> Hypothesis 1: Patients who are under the medical supervision of personally selected private physicians do not exceed a five per cent probability level of individuals making self medication errors in the immediate post hospitalization period.
>
> Hypothesis 2: There is no difference in the self medication error rates for patients who receive individualized preventive instruction and those who do not.

Results show that twelve, or 50 per cent of the twenty four subjects made self medication errors, and therefore hypothesis one was rejected. In the control group, there were eight or 66.7 per cent, subjects who made errors, and four, or 33.3 per cent, subjects in the experimental group. The per cent of subjects making self medication errors does not appear to differ appreciably from the studies reported in the review of literature. Table 2 depicts the number of subjects who made errors, and those who did not make errors, in the control, the experimental, and the total groups.

Table 2. The number of subjects making errors, and the number not making errors, in the control, experimental and total groups.

	Control Group N = 12	Experimental Group N = 12	Total Group N = 24
Subjects making errors	8	4	12
Subjects not making errors	4	8	12
Group Total	12	12	24

A total of thirty six errors were made by the two groups. The control group made twenty nine, with a mean per subject of 2.42, and the experimental group made seven errors, with a mean per subject of 0.58. A *t* statistic of the error means for the two groups was 7.077, indicating that the difference was statistically significant at a probability level of .01. Table 3 describes the number of errors made by the control, experimental, and total groups, with the means for each group, and the *t* results.

Table 3. Number of errors made by experimental group, control group, and total group, and the error mean for each group, with *t* statistic.

	Control Group N = 12	Experimental Group N = 12	Total Group N = 24
Number of errors	29	7	36
Error mean per subject	2.42	0.58	1.5
t = 7.077, df - 22, *p* < .01.			

Considering only error making subjects, both groups were compared. The control group had eight error making subjects, with a mean of 3.63 per subject, and the experimental group had four error making subjects with a mean of 1.75 per subject. Chi-square result of 1.5 indicated the difference between the number of error makers for the experimental and control groups was not significant at a .05 probability level. Table 4 shows the number of error making subjects in each group, and their means. Chi-square is given also. (See Table 4, page 45).

Table 4. Number of error making subjects in the experimental group, the control group, and the total group, and the mean for each group (by error makers only). Chi-square result also shown.

	Control Group N = 12	Experimental Group N = 12	Total Group N = 24
Error Makers	8	4	12
Means (for error makers only)	3.63	1.75	1.50
X^2 (1) = 1.5, $p > .05$			

Based on the results just described, and the small sample size, the results are not conclusive for hypothesis two. The *t* of 7.077 for the differences in errors made by the two groups is statistically significant, and would indicate rejection of the second hypothesis, while the Chi-square of 1.5 for the differences between the number of error making subjects of the two groups is not statistically significant, and indicates acceptance of the second hypothesis. The results are therefore considered inconclusive.

A comparison of subjects from the two hospitals for number of subjects making self medication errors, and for number of errors made, showed minimal differences. Six subjects from Hospital A made seventeen errors, and six

subjects from Hospital B made nineteen errors.

The number of errors made by the experimental group before teaching was seventeen, by six subjects. After instruction, the number of errors was seven, by four subjects. The *t* statistic for the error means of the experimental group before and after instruction was not significant at 1.315. Table 5 describes the experimental group before and after teaching.

Table 5. The experimental group: number of errors and number of error making subjects *before* instruction and *after* instruction, with *t* statistic for difference between error means.

	Number of Errors *Before* Teaching	Number of Errors *After* Teaching
Experimental Group N = 12	17	7
Number of Subjects Making Errors	6	4
Means per Error Making Subject	2.88	1.75
t = 1.315, *df* = 22, *p* = .05		

When the error making characteristics for the experimental group before teaching, and the control group were tested by *t* statistic, the results (0.752) indicated the two groups were from the same population.

Table 6 describes the errors made by the experimental group, the control group, and the total group, by types of errors, and includes the number of subjects making those errors for each group. The most frequent type of error was Type 4, incorrect knowledge of prescribed medications. The total sample made twenty five Type 4 errors, with nine subjects responsible, while the control group made nineteen Type 4 errors with five subjects responsible, and the experimental group made six Type 4 errors, with four subjects responsible.

Table 6. A comparison of errors made by groups, and by type of errors made; also showing the number of subjects making each type of error.

Group	Type of Error				Totals
	Type 1	Type 2	Type 3	Type 4	
Control Group, N - 12					
Number of Errors	8	0	2	19	29
Number of Subjects Making Errors	1	0	2	5	8
Experimental Group N = 12					
Number of Errors	0	0	1	6	7
Number of Subjects Making Errors	0	0	1	4	* 4
Total Group, N = 24					
Number of Errors	8	0	3	25	36
Number of Subjects Making Errors	1	0	3	9	12

* One subject made two types of errors.

Three Type 3 errors, incorrect dosage, were made. Two experimental group subjects made two Type 3 errors, and one control group subject made one Type 3 error. There were no Type 2 errors (omission of drugs), which was the most frequent error reported by the Schwartz, et al. (32) study. Type 1 errors, taking medications not ordered by the physician, were second in incidence, with eight errors made by one subject in the control group, and none by the experimental group. However, one experimental group subject, at the time of the experimental visit, was making six Type 1 errors. The errors had been corrected before the investigator's visit.

Fifty nine medications were prescribed for the study group at discharge. Pro re nata medications were excluded because of the difficulty in evaluating their use. The control group medications numbered thirty three, with a range from none to five, and a mean of 2.75 per subject. The experimental group had a total of twenty six prescribed medications, a range of none to five, and a mean of 2.17 per subject.

Four subjects were discharged with only pro re nata medications: two in the control group, and two in the experimental group. A tentative decision to drop them from the study was discarded with unexpected results. One subject in the experimental group resumed six previously prescribed, but not re-ordered medications, one of which was

specifically contraindicated; and one control group subject resumed eight non prescription drugs, one also being contra-indicated. The contraindicated medication resumed by the experimental group member was considered a very serious error, and was reported to the subject's physician. The medication had been discontinued before the investigator's visit.

The number of serious errors made by the total group of twenty four at the time of the investigator's visit was nine. The control group had eight serious errors made by four subjects, and the experimental group had one serious error made by one subject.

Age range for the total group was forty one years to seventy six years. The age range for those making errors (at the time of the investigator's visit) was fifty one years to sixty four years. When the data from the experimental visit were included, the error making range increased, being forty one years to sixty four years. Table 7 presents the age and error making characteristics of the total group, and includes the errors being made by the experimental group before they were given instruction to correct errors. (See Table 7, page 50).

Table 7. Age and Error Making Characteristics for Total Group, and Including Experimental Group Before Instruction.

Age in Years by Intervals	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Totals
Number of Subjects	3	1	5	6	6	2	0	1	24
Subjects making errors	0	0	4	3	4	0	0	0	12
Experimental Group Before Teaching									
Number of Subjects	3	1	1	2	4	1	0	0	12
Subjects making errors	1	0	1	2	2	0	0	0	6

The mean age for all subjects was 56.9 years; for the control group, fifty nine years; and for the experimental group, 54.8 years. A t statistic indicated no significant difference in the mean ages for the two groups. Years of education ranged from five to eighteen years for the total number of twenty four, with a mean of 12.46 years. The control group had a range of five to sixteen years, with a mean of 11.67 years of education, while the experimental group education range was seven years to eighteen years, with a mean of 13.25. A t statistic indicated no significant difference in the mean years of education for the two

groups. Table 8 describes the age and education characteristics for the control group, the experimental group, and the total group, with means for each, and *t* statistics of the differences. The mean age of error making subjects only was 52.9 years. Mean years of education for error making subjects only was 11.8 years, while the median was 12 years.

Table 8. Comparison of age and education means for the total sample, the experimental and the control groups, and *t* statistics for the difference between the means.

Group	N =	Mean Years of Age	Mean Years of Education
Total Group	24	56.9	12.46
Experimental Group	12	54.8	13.25
Control Group	12	59.0	11.67
t = *df* = 21, *p* = .05		1.207	1.289

The number of diagnoses for the study subjects varied from one to seven, with a total number of 83 diagnoses listed for the group of twenty four subjects. Members in the control group had forty five diagnoses, ranging from one to seven and with a mean of 3.75 per subject. The experimental group had a total of thirty eight diagnoses, ranging from one to five per subject, and a mean of 3.17

per subject.

Further Findings of Interest

Subjects were asked the cost per month of medications, and the impact of that cost on their customary life style. The range of costs per month was from nothing for one subject to $40-$50 for one subject. The impact of medical costs was no problem for twenty two subjects. One stated that medication costs would be a problem if they got higher (a 64 year old female whose husband was retired). One fifty one year old male subject stated the elevated costs since his illness did alter his life style somewhat.

Occupations varied widely, as did subjects' education. Work titles included: laundry presser, auto mechanic, truck driver, housewife, railroad clerk, fireman, clinic administrator, agency director, company owner, company president, and international management consultant. Five subjects were in the retired category.

The study sample had good mobility. Twenty three subjects had automobiles which they or a family member could drive. One subject did not, but he lived in town, only a few blocks from a hospital and physicians' offices, and other necessities were also nearby, including bus and taxi services. Friends and relatives were available to assist all subjects in emergencies.

Twenty one subjects could ambulate without aids such

as a cane, walker, wheelchair, or another person. Three subjects had canes: one used it to remind himself to slow down; one used the cane occasionally; and the third used the cane because of residual impairment following an old injury.

Most subjects were able to manage all activities of daily living with help of their immediate families. Twenty three subjects had a spouse or children in the household to assist them during illness. One of these, a divorced female, had a fourteen year old son who did not comprehend the subject's illness and needs and caused his mother considerable anxiety. She did have friends who helped intermittently. The female subject who was single stayed with a niece temporarily. Three subjects had daughters who returned to help the parents during their illness.

CHAPTER IV

DISCUSSION

The study was considered successful in providing evidence that non clinic patients, who select private physicians to supervise their medical care, have self medication error rates which do not differ appreciably from those of clinic populations reported in previous studies. In addition, individualized instruction to correct self medication errors was found to be effective in reducing errors by 58.8 per cent.

The population studied differed from previously reported studies by diagnosis, length of illness, life style characteristics, and type of medical supervision. Subjects reported adequate income for their needs, available transportation and family members and friends who helped in emergencies. The mean years of education was 12.46, which was above high school graduation level, although five of the twenty four subjects had not completed high school. Eighteen subjects stated they had been aware of their illness for less than six months, with twelve of those not aware until the event of the myocardial infarction. Six subjects stated they had known for twelve months or more that they had cardiovascular problems.

The number of error making subjects for the total group

(considering the experimental visit data) was fourteen, or 58.3 per cent, which does not appear to be different from previous reports of studies done on clinic and chronically ill populations. The types of errors made most frequently were compared with those of the previous reports. The most frequent type in this study was Type 4 (incorrect or lack of knowledge), with Type 1 (taking an unordered drug) placing second in frequency. Hecht (12) reported Type 1 to be the most frequent, although she did not include a classification for knowledge. The study by Schwartz, et al. (32) found "omission" the most frequent error made by the chronically ill clinic population studied, while this investigator found no omission errors (with the exception of one error before instruction for the experimental group) in a much smaller sample. Speculation would be appropriate here to consider the differences between patients who have long term, chronic illness, and those who do not; and the social-psychological attitudes of patients with illnesses such as tuberculosis or diabetes, and the more socially-psychologically acceptable diagnosis of myocardial infarction. The duration of illness, and social emotional attitudes toward the illness may well be related to increased incidence of self medication errors.

One particular value of this study was the correction of one very serious error being made by the youngest subject--a forty one year old father of four young children. The

subject had resumed six previously prescribed medications (prescribed only one month before the myocardial infarction) with one being contraindicated for patients having a history of myocardial infarction. That one serious error was 4.2 per cent of the total sample of twenty four.

The specifications of this study limited report of error making in the home to those of self medication errors. However, many other kinds of errors and problems were found. They included diet and activity, and situations which needed intervention to permit the subjects to recover. Counseling was provided, with the attending physicians' permission, for two subjects who had urgent needs.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was a field experiment undertaken to investigate the incidence of self medication errors of twenty four post myocardial infarction patients. Twelve subjects served as a control group, while the independent variable of individualized instruction within three days of discharge was applied to twelve subjects in the experimental group. Three techniques were used to measure errors. The data, obtained by patient interview and from subjects medical records and personal physicians, were tabulated and analyzed and the hypotheses were tested. Results should be viewed in relation to the sample size. No bias was found in the sample.

The results substantiate the high error frequencies found in previous studies, and provide evidence that appropriately timed teaching intervention is effective to reduce self medication error rates. The difference between the number of errors made by the experimental (19.4 per cent) and the control groups (80.6 per cent) was significant. The experimental group improvement after instruction was not great enough to be statistically significant. One very serious error (resuming a prescription not ordered at discharge, which was specifically contraindicated) was discovered and corrected.

Conclusions

A number of conclusions can be drawn from the study results while remembering the limitations imposed by the small number of subjects involved:

1. Non clinic patients under private physician care may often establish home medication regimens which differ from those prescribed by their physicians.
2. Because of lack of knowledge, patients may make errors which are serious in nature.
3. There is reason to believe that most errors could be eliminated by appropriate interventions, among which are:
   a. Selective and appropriate teaching planned individually and done at times of high intake ability.
   b. Teaching about medications which includes specifically what <u>not</u> to do, as well as what to do.
   c. Home visits in the immediate post hospital period by qualified nurse specialists to evaluate what the patient is doing, and to correct errors at a most effective time.
4. There is reason to believe that patients who do not have medications ordered following an illness may take unordered drugs.

5. Medication orders need to be both prescriptive and proscriptive.
6. The variables of age and education may be less related to self medication errors than attitudes toward illness, a specific diagnosis, length of illness, taking medications, and the need to change one's life style.
7. The interview was an appropriate means for data gathering for this group of subjects.
8. Self medication error rates for non clinic patients who select private physicians to supervise their medical care do not differ appreciably from those of clinic populations reported in previous studies.

Recommendations

This study was deemed successful in determining that self medication error rates for patients having medical supervision by private physicians do not differ appreciably from those of the previously reported studies concerned with clinic and chronically ill populations. Further study is recommended along the following lines:

1. This study should be repeated with the following changes:
   a. A larger sample size is needed.
   b. Availability of discharge orders, and the number of pills ordered need to be specified.

2. Development of a multi-attitudinal scale to assist in recognition of patients most likely to commit different types of self medication errors.
3. A study to identify the characteristics of subjects who do not make self medication errors.
4. A study to compare the reliability of the interview method of data gathering from clinic pupulations and from private patient populations.

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APPENDIX A

CORRESPONDENCE

15 April 1972

Dear :

In partial completion of the requirements for a Master of Science degree at the University of Oregon School of Nursing, I am undertaking a study of "A Comparison of Discharge Medication Instructions With the Home Medication Regimen of Selected Post Coronary Patients."

The data will be collected by means of an interview in the homes of selected patients who have been discharged following hospitalization which included a period of care in a Coronary Care Unit. This letter is a request for permission to select a group of patients for the proposed study from . Information will remain confidential, and anonymity of those participating in the study will be preserved.

Upon completion of the study, copies of the report will be placed in the library at the University of Oregon Medical School where it will be available for review by those interested.

Yours truly,

(Mrs.) Gerrie Reasor, R.N.

Gerrie Reasor is a regularly enrolled graduate student at the University of Oregon School of Nursing. Any assistance you can offer Mrs. Reasor will be greatly appreciated.

Miss Evelyn Schindler
Thesis Advisor

May 9, 1972

Mrs. Gerrie Reasor, RN

Dear Mrs. Reasor:

This letter confirms my conversation with Miss Evelyn Schindler on May 8, 1972 granting your request for permission to select a group of patients from
for your proposed study "A Comparison of Discharge Medication Instructions With the Home Medication Regimen of Selected Post Coronary Patients."

Any assistance that you might need while here at , please feel free to contact either myself or Mrs. Sally Shields, Head Nurse, Coronary Care Unit.

Sincerely,

(Signed)

(Mrs.) Jane A. Smith, RN
Acting Director of Nursing

JAS/m

APPENDIX B

STUDY INSTRUMENTS

ATTENDING PHYSICIAN PERMISSION

To:_____attending Physician for

_____a patient in the

_____Hospital,_____

Gerrie Reasor, R.N., a graduate student at the University of Oregon School of Nursing, is collecting data for her thesis study, "A Comparison of Discharge Medication Instructions With the Home Medication Regimen of Selected Post Coronary Patients."

The study involves selection of patients who meet the criteria, and inviting them to participate in the study a few days before they are discharged from the hospital. One half of the patients selected are to receive a Nurse Specialist's visit within three days of discharge, and all of the patients selected will be interviewed at home by the Research Nurse approximately one week after discharge.

The above named patient appears to meet the criteria for participation in the study. May I invite this patient to participate?

_____(patient's name)

may/may not be invited to participate in the above described study.

_____ _____

Date Attending Physician

RESEARCH STUDY PARTICIPATION AGREEMENT

Mrs. Gerrie Reasor, R.N., a graduate student at the University of Oregon School of Nursing collecting data for her thesis, requires the following consent from the patient:

Date_____Hour_____

I volunteer to participate in the study designed to evaluate the understanding of medication information. The study will involve an interview in my home, approximately one week after discharge from the hospital, by the Nurse Researcher. This study has been discussed with me, and I have been given an opportunity to ask questions. I understand I have the right to withdraw at any time from participation in the study.

_____
Patient's Signature

C

RESEARCH STUDY PARTICIPATION AGREEMENT

Mrs. Gerrie Reasor, R.N., a graduate student at the University of Oregon School of Nursing collecting data for her thesis, requires the following consent from the patient:

Date_____Hour_____

I volunteer to participate in the study designed to evaluate the understanding of medication information. The study will involve a Nurse Specialist's visit in my home shortly after discharge, and an interview in my home a week later by the Nurse Researcher. This study has been discussed with me, and I have been given an opportunity to ask questions. I understand I have the right to withdraw at any time from participation in the study.

_____
Patient's Signature

E

EXPERIMENTAL VISIT

PURPOSE: RESEARCH

Name_____Discharge Date_____

Address_____Telephone_____

The above named person is a voluntary participant in a research study. As a part of the study, a Nurse Specialist's home visit is to be made within three days following discharge from the hospital.

The home visit should follow the usual pattern for such visits, including evaluation and carrying out physician's orders. Special attention is requested as follows:

1. Does he have all medications ordered?
2. Is he taking ordered medications?
3. Does he take medications according to the physician's orders?
   Time Route
   Amount Omissions
4. Can he state a purpose for each medication?
5. Does he use any special reminders to take medications?

Please assist and instruct the patient concerning his medications as indicated by your findings during the visit. Information can be quickly noted on the chart below:

Visiting Nurse_____Agency_____Visit Date___

Medication	Has Med.		Takes Med. Correctly		Manages Alone		Can State Purpose		Special Reminder		Instruction given	
	yes	no	yes	no	yes	no	yes	no	yes	no	yes	no

Thank you. When completed, please forward to; Gerrie Reasor, R.N.

INTERVIEW GUIDE FOR THE HOME MEDICATION REGIMEN OF POST CORONARY PATIENTS

1. a. Name_____ b. Study #_____

   c. Address_____ d. Hospital #_____

   e. Birth Date_____Age_____ f. Sex: M____ F____

   g. Marital Status: Single___ Married___Divorced___Sep___Widow(er)___

2. Cultural Background:

   a. Birthplace_____ b. Nationality_____

   c. Religion: Protestant___Catholic___Jewish___Other____

   d. Highest grade completed: 1 2 3 4 5 6 7 8 9 10 11 12 College____

3. Diagnoses:

   a. _____

   b. _____

   c. _____

   d. _____

4. Discharge Orders:

	Rx	Number	Dosage	Frequency	Route
a.					
b.					
c.					
d.					

Study#_____

5. Living Arrangements:

   a. Type: House____ Apartment____ Room____ Other____

   b. Number of Rooms____ c. Floor____ d. Elevator ____ e. Stairs___

   f. Number of Persons Living in Unit:_____

   g. Description of Others Living in Unit:

	Person	Relationship	Sex	Age	Ambulatory?
1.					
2.					
3.					
4.					

We all know that sickness affects people's lives in many ways. I'd like to ask you some questions about your illness, and what you do at home from day to day.

If you have questions as we go along, try to remember them, and we'll talk about them after the form is completed.

First, will you tell me

6. a. For what kind of illness are you under treatment now?

   Verbatim:_____

   b. What has the doctor told you about_____(repeat patient's words)?

   Verbatim:_____

   _____

   c. About how long ago did your present illness start? Mo___(or) Yr___

7. Now, I'd like to talk about the kinds of medicines you take. . .

   a. Would you look at this chart (array of post coronary medications) and tell me if you recognize any medications you are now taking?

   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

   b. How many?_____

   c. Times per day?_____

Study #____

8. b. Beginning with when you get up in the morning, tell me what medicines you take throughout the day:

Medication	Amount	How Often	What Time(s)	How Taken	What does it do for you?

c. Are there any others you take less frequently?

_____

_____

d. Have you found any medications on your own (not ones prescribed by the doctor) that help with a headache, or an upset stomach?

yes____ no____

If yes, what are they?

_____

e. If you get any injections at home, who gives them to you?

_____

f. About how much do you spend for medicines each month? _____

g. Is this a problem for you? Yes____ No____

h. (If yes,) In what way? Verbatim:_____

_____

Study #_____

9. May I see the medications you are taking now?

Medication	Number in Container

10.

a. Are you able to get from home to other places you want to go?

Yes___ No___

b. How do you travel? Auto___Bus___Friend___Relative___Other___

c. Do you

a. ____Walk alone without a crutch or cane?
b. ____Need the help of crutches or a cane?
c. ____Need the help of a wheelchair or walker?
d. ____Need another person to help you walk?
e. ____Need another person to help move you in a wheelchair?
f. ____Do you wear any kind of a brace or splint?

11. When you think about all the things that we've talked about today, are there some things a nurse coming to your home could help you with?

a. Yes____ No____

b. (If yes,) In what ways? (List)

_____

_____

_____

_____

_____

APPENDIX C

PATIENT RESPONSES

Patient Responses to Question 6, parts a and b

Note: Patient code numbers are indicated to the left; they include the hospital (A or B), the group (E or C), and the patient's number.

Question 6, part a: For what kind of illness are you under treatment now?

b: What has the doctor told you about_____ (repeat patient's words)?

A-E-1, a. I had a mild cardiac infarction.

b. Less arm waving, and don't get up tight. Don't over exercise--one walk around the block in the morning if I feel like it, or rest in bed. No driving, no rides because of the traffic; no jumping up--get up slow.

A-E-2, a. I am not ill. Not illness, more 'accident.' I am recuperating from an unfortunate incident that perhaps could have been avoided with more rest and relaxation.

b. Have to restrict activities, pace yourself, not take things so serious.

A-E-3, a. Take care of the heart.

b. To see him Monday. Stay quiet, like in the hospital, for another week.

A-E-4, a. A resting or convalescent period following a minor heart attack. I'm not ill, nor maimed, in anyway.

b. It was a coronary. Very slight damage to the outer left part and lower part of the heart. He will see me Friday at 9:45 and give me some instructions then.

A-D-5, a. A couple of heart attacks right in a row.

b. That I have to be careful, and do as I'm told. In two weeks (I'm walking now) I can start driving my car, and go to weight watchers.

A-E-6. a. All I know is a heart attack. I am to go in the morning to see Dr._____. He's been my doctor for nine years.

b. He explained he can't give me Cytomel anymore, so he's giving me thyroid.

B-E-1, a. For heart attack, or cardiac arrest.

b. He showed me on that model exactly what had happened, which artery. He said a 'hole' had blown out, and what could happen. I have more questions to ask as I go along. Helps me to follow his orders.

B-E-2, a. Heart attack.

b. It will take six to eight months to get over, do just about like I've been doing, keep trying to do a little more, but don't push yourself.

B-E-3, a. The heart ran one to six; had a 'four' attack. If I'd been a smoker, I would be a goner.

b. Stay in bed, be quiet. This is difficult, my husband only wants to sit--I want him to pack. My daughter is helping.

B-E-4, a. Myocardial Infarction.

b. Turn the thermostat down. If I hadn't been here, I couldn't have made it. I could take this chair (a recliner) off my income tax. Spend eight weeks resting. Physical therapy every week. Take sleeping pills.

B-E-5, a. Coronary thrombosis.

b. I asked him, "I'm the last one in my family, and I want to know what you think about my illness." He said, "You had a pretty severe coronary thrombosis. Monday I wasn't much encouraged about it, but Tuesday and today you have improved much and I feel encouraged that you will recover from it."

B-E-6, a. Coronated heart.

b. See the doctor next Thursday. He hasn't said anything, and I haven't asked.

A-C-1, a. Diabetes and a heart condition.

b. He told how and showed how to care for diabetes. Take it easy, take half a Valium after meals and at bedtime, and take it easy until I see him tomorrow, Tuesday. I called him Thursday--he was out for the weekend.

A-C-2, a. A heart ailment called 'M.I.' and diabetes.

b. He says M.I., it's not a stoppage of the heart--where he had to start it again. It was an infection in the heart, kind of an injured part that causes trouble. He had been treating me for diabetes since 1962. He put me on Orinase then. Now, Diabenese, one year, and continue to diet, which I'm kind of lax in doing.

A-C-3, a. Heart, I guess. That's all I know.

b. He said the lower part was damaged, scar tissue, supposed to be healing. Not supposed to go up and down stairs. Walk ten minutes, rest, eat, no work for one month at least. A year ago I bought a power mower to prevent a heart attack.

A-C-4, a. Heart trouble.

b. It was not massive. Other than that, coming along fine. I don't pay much attention.

A-C-5, a. I'm recovering and rebuilding my heart. I had a coronary--the back of my heart's no longer there.

b. Depleted supply of blood that goes through coronary arteries that feeds the back of the heart. No orders, but asked me not to do some things.

A-C-6, a. I'm not ill. It's my heart. I had a heart attack--about six or seven percent.

b. He drew a diagram to show how it was damaged. Don't know why or what. In the hospital, Dr. _____ said "Be a vegetable." In the ward "bed rest" meant nothing to me. The second or third night, I was restless, couldn't sleep. I walked the halls, weighed myself, and so on. Then, the bed rail incident--then I asked questions! And I got answers! I carry this cane to remind myself to slow down.

B-C-1, a. Heart attack caused by clogging or blood clot on the exterior of my heart; caused severe pain. Then, after the pain, like a ruptured vessel and big bruise on my heart.

b. Eventually it will get small. Vessels will be built and restore part of the area, not all, where the damage was, and leave a scar.

B-C-2, a. The heart muscle's tore all apart--about one third is working, two thirds isn't.

b. Stay in bed, short walks first week. Second week increase walks slightly. Four weeks before I can touch a car, or drive. See him in about one month.

B-C-3, a. Heart attack.

b. I found out what "thrombose" means.

B-C-4, a. Coronary infarction.

b. He says there has been a clot block off part of the arteries that supply blood to the heart muscle itself, an insufficiency to the heart muscle itself. He said I could start walking and pace myself so I don't get tired; go out in the boat fishing, or from the bank, either one; go to the office a half day by August first or fifteenth. I can continue my drinking habits. I don't smoke.

B-C-5, a. It is a heart attack. I think that is basically it.

b. He is a very competent doctor, but he doesn't say more than two words. A visit took ten seconds. Doesn't talk. One of my complaints was--I didn't know you had pain with a heart attack. I wanted to know if my heart attack was serious or not.

B-C-6, a. Infarct.

b. Can't work until he tells me to. Fatty tissue blocked a heart artery, and that new arteries would be formed to supply the area until scar tissue forms.

Patient Responses to Question 8 of Interview Guide

Patient Number	Medication Name	Patient's Name for Medication	Patient Response to Question: "What does it do for you?"
A-C-1	Aspirin	Keeps anxiety and nervousness down.	Stimulant to keep my heart from working too fast.
A-C-2	Lanoxin	Don't know.	Don't know.
	Aldactazide	Don't know.	Bowel Softener.
	Coumadin	Don't know.	Blood thinner.
A-C-6	Pronestyl	Capsule	Don't know.
	Lanoxin	White one.	A man in the room with me told me it strengthens the heart.
	Chloral Hydrate	Sleeping pill.	It's no help.
B-C-1	Coumadin	7½ grain heart pill.	Haven't the slightest idea.
	Lanoxin	White heart pill.	Don't know.
	Lasix	Salt pill.	Helps reduce water in my system.
	Valium	Don't know.	Relaxer
B-C-2	Valium	Don't know.	When I'm upset, it calms me down.
B-C-3	Lanoxin	Don't know.	Don't know.
	Pronestyl	Don't know.	Don't know.
	Quinidine	Don't know.	Don't know.
	FerroSequels	Don't know.	Blood Builder.
B-C-4	Quinidine	Quinidine	Regulates rhythm of your heart.
	Lanoxin	Lanoxin	Regulates speed of your heart.
	Valium	Valium	Tranquilizer; causes me to sleep.
	Coumadin	Coumadin	Regulates coagulation time of blood.
	Seconal	Seconal	For sleep.
	Surfak	Surfak	Stool Softener.
B-C-5	Coumadin	Coumadin	Blood thinner. I learned about it at a fireworks display, from a retired pharmacist I met there.

Patient Number	Medication Name	Patient's Name for Medication	Patient Response to Question: "What does it do for you?"
A-E-1	Pronestyl	Heart helper and steadier.	Prevents PVC's.
	Valium	Some tranquilizer.	Muscle relaxant.
A-E-3	Isordil	Don't know	Helps keep chest pains out.
A-E-4	Valium	Don't know	Gets my mind off problems that accumulate.
A-E-5	Digoxin	Heart pill.	As a tonic for my heart to keep it going.
	Pronestyl	Capsule.	To regulate the beat of my heart.
A-E-6	Quinidine	Don't know.	I really don't know. (This patient complained of memory loss since M. I.)
B-E-2	Tolinase	For diabetes.	Helps something work.
	Meprobamate	Don't know.	For my nerves.
	Sorbitol	Don't know.	Don't know what it does. It's a long lasting Nitro.
	Premarin	Hormone.	For hot flashes.
B-E-3	Lanoxin	Heart pill.	Don't know that it does a thing.
	Valium	Yellow pill.	For tension.
	Lasix	Water retention pill.	Causes water loss.
	Quaalude	Sleep pill.	Makes me sleep.
B-E-4	Lanoxin	Lanoxin.	Slows my heart.
	Lasix	Lasix.	Helps me get rid of water.
	Kayciel	Potassium.	Replaces what I lose with my water pill.
	Nembutal	Nembutal.	I take it when I can't get to sleep.
B-E-5	Aldactazide	Aldactazide.	Keeps blood pressure down.
	Proloid	Proloid.	Don't know; I think it is a synthetic thyroid.
	Coumadin	Coumadin.	Thins my blood, to avoid clotting.
	Equanil	Tranquilizer.	A mild sedative, to relax.
	Darvon	Darvon.	For headaches.

AN ABSTRACT OF THE THESIS OF

Geraldine Reasor for the Master of Science in Nursing

Date of receiving this degree 7 June 1974

Title: A Comparison of Discharge Medication Orders With The Home Medication Regimen of Selected Post Coronary Patients.

Approved: _____

Evelyn Schindler, Thesis Advisor
(Professor in Charge of Thesis)

ABSTRACT

The incidence of self medication errors for a sample of twenty four post myocardial infarction subjects cared for by private physicians was investigated by a field experiment carried out in a West Coast metropolitan locale. Twelve subjects served as controls, while the independent variable of individualized instruction was applied to the experimental group of twelve subjects. Self medication errors made by both groups were determined during a post discharge interview which included three measures: a medication array, a report of daily medication schedule, and a count of remaining medications. Results showed that eight (66.7 per cent) of the control group subjects made twenty nine (80.6 per cent) of the total self medication errors, while four (33.3 per cent) of the experimental group made seven (19.4 per cent) errors. The difference in number of errors for the two groups was statistically significant, while the difference

in number of subjects making errors was not great enough to be significant. One very serious error was found and corrected. With respect to the sample size, the following conclusions were drawn: 1) non clinic patients under private physician care may often have home medication regimens which differ from those prescribed by their physicians; 2) some errors may be serious in nature; 3) there is reason to believe that most errors could be eliminated by appropriate intervention which includes teaching patients what not to do as well as what to do; and 4) patients may take unordered drugs.