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The Relationship Between Level of Knowledge and Instruction on Sublingual Nitroglycerin Use in Cardiac Patients

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THE RELATIONSHIP BETWEEN LEVEL OF KNOWLEDGE AND INSTRUCTION
ON SUBLINGUAL NITROGLYCERIN USE IN CARDIAC PATIENTS

By

Nancy Jean Rogers

A THESIS

Submitted to
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ABSTRACT

THE RELATIONSHIP BETWEEN LEVEL OF KNOWLEDGE AND INSTRUCTION ON SUBLINGUAL NITROGLYCERIN USE IN CARDIAC PATIENTS

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Nancy Jean Rogers

The purpose of this study was to investigate patients' level of knowledge of the use of sublingual Nitroglycerin (SL NTG) after receiving individually tailored pre-discharge instructions. The study tested the following hypothesis. There will be a difference in the knowledge level between patients who receive the usual SL NTG hospital teaching and those who receive individually tailored and structured SL NTG teaching. The study utilized a pretest-posttest comparison group design with a convenience sample of 40 patients admitted to a rural 368 bed hospital. Knowledge levels were not significantly higher for those in the intervention group than for those in the comparison group. Older subjects within the intervention group experienced a significant increase in knowledge suggesting that the use of individually tailored and structured teaching may be an effective intervention for older patients.

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CHAPTER 1

INTRODUCTION

Oral nitrates have been used for more than 100 years in the treatment of angina. Nitrate efficacy in ischemic heart disease is due to peripheral venous and arterial vasodilatation, that results in decreased myocardial oxygen consumption (Abrams, 1988). Sublingual Nitroglycerin (SL NTG) is commonly prescribed for self administration on an as needed basis for coronary artery disease, or even suspected coronary artery disease (Bassan, 1991).

Patients' misunderstanding of the proper use of SL NTG is an underlying cause of many adverse reactions to the drug. Common side effects of nitrate therapy include headache, nausea, dizziness, postural hypotension, and even occasionally, bradycardia and syncope (Rutherford, Braunwald & Cohn, 1988). Of great concern, is the finding that although patients may claim to know when to use SL NTG, a significant majority of them admitted that they had or would use it inappropriately for symptoms such as dizziness, weakness, rapid heart rate, or presyncope (Bassan, 1991).

Evidence suggests that inadequate communication about medications is one of the principle reasons why 30-50 % of patients deviate from their medical regimens (Department of Health and Human Services, 1990). Patient compliance with medication regimes improves with increased knowledge about the uses, side effects, and dosage of the medications (D'Altroy, Blissenbach, & Lutz, 1978; MacGuire, Preston, & Pines,

1987; Meguerdichian, 1983; Ruzicki, Bettesworth, & Steel, 1986; Youssef, 1983).

The greatest factor influencing SL NTG misuse is the lack of education regarding the proper use of the drug. When patients receive a SL NTG prescription in their health care provider's office, specific instructions are often given at the end of the visit. Some patients, when interviewed shortly after leaving the consulting room, have no recollection of the information they were given only a few minutes before (Ley, 1972).

In the acute care setting, shorter length of stays reduce the amount of time that nurses have to spend educating patients. Testing and procedures such as cardiac catheterization and percutaneous transluminal coronary angioplasty often take up the majority of the hospital stay. This refocuses the emphasis of the nurses' discharge teaching plan to post-procedural site care and activity restrictions. Although the patients' medications are reviewed and information handouts are given, limited time is spent counseling patients on the indications and side effects of SL NTG. Simply providing patients with a pre-printed handout on SL NTG does not ensure adequate knowledge of the drug or accurate understanding of the proper use.

The current health care environment demands cost effective therapy with an emphasis on reducing or preventing unnecessary hospital readmissions and medical costs. Proper instruction on SL NTG use can decrease potential health care costs accrued by those patients who misuse it and require care for the treatment of side effects. For example, patients who take SL NTG for symptoms of lightheadedness and shortly thereafter stand up, such as in a church service, frequently experience faintness or syncope. The cost for misuse of SL NTG in such cases may involve expensive

ambulance and emergency room fees.

Patient education of therapeutic measures for angina including proper use of SL NTG, is an especially significant aspect of nursing care. Cardiac nurses view the category of medications as the most important learning need of patients with cardiac disease (Gerard & Peterson, 1984; Karlick & Yarcheski, 1987; Karlick, Yarcheski, Braun, & Wu, 1990). Nursing has been very committed to patient education, and is well positioned to address the problem of SL NTG misuse.

Each patient has a unique perspective and understanding of his or her illness. Identifying areas of learning needs that are specific to the patient provides direction for the education session. The nurse's willingness to listen and show regard for the patient's concerns can have a motivating effect on the patient (Johannsen, 1992). Learning can be enhanced when patients perceive that the nurse is interested in them as individuals and takes the time to answer their questions.

Factors such as pain, anxiety, or fatigue may hinder the learning process by decreasing the learner's ability to concentrate. Environmental factors such as teaching in a group setting may not be conducive for learning for some patients who are easily distracted (Moss, 1994). In addition, group instruction does not allow for adequate assessment of the response of each individual to the teaching by the instructor.

Implementation of an educational program that is tailored to the individual's learning needs may enhance patient knowledge of the proper use of SL NTG and should contribute significantly toward reducing the misuse of the drug. The relationship between individually tailored SL NTG instruction and patients' level of knowledge of the

proper use of the drug requires evaluation. The purpose of this study is to investigate patients' level of knowledge of the use of SL NTG after receiving one-on-one, tailored pre-discharge instructions.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Conceptual Framework

Imogene M. King first introduced her conceptual framework for nursing in 1971, and later refined the concepts for presentation in her book A Theory For Nursing (1981). Her model (Appendix A) identifies three open interacting systems: individuals as personal systems, groups of two or more individuals as interpersonal systems, and larger groups or society as social systems. King (1981) bases this open systems model on the assumption that “the focus of nursing is human beings interacting with their environment leading to a state of health for individuals, which is an ability to function in social roles”(p. 143).

Personal systems are individuals. For example, a nurse as a person is a total system and a patient as a person is a total system (King, 1981). Two or more interacting individuals comprise an interpersonal system. In nursing, the interpersonal system usually includes the nurse and the patient. Family or other supportive persons may be included within this system. Larger groups with common interests and goals within a community or society are called social systems. Examples of social systems that nurses interact with are the educational, religious or belief, work, and health care systems.

From the interpersonal systems concept, King (1981) derived the theory of goal attainment. Using the dyad of the nurse and patient, King describes the dynamics of this

theory, “nurses purposefully interact with clients mutually to establish goals and to explore and agree on means to achieve goals” (King, 1981, p.142). During that interaction, information is gathered and shared, observations are made, questions are asked, and both participate in the process to set goals. She defines goals as “events that one values, wants, or desires” and states that “the results of attained goals are measurable outcomes” (p.145). This transaction is completed with the attainment of the goals.

There are nine major concepts of the theory of goal attainment. These are: interaction, perception, communication, transaction, self, role, stress, growth and development, and time and space (King, 1981). Use of selected concepts from the theory will provide structure for this study. Concepts related to patients receiving SL NTG pre-discharge instruction are interaction, perception, and communication. The concept of transaction relates to the attained goal of the patients experiencing an increased level of knowledge of proper SL NTG use.

Interaction

King (1981) defines interaction as “a process of perception and communication between person and environment and between person and person, represented by verbal and non-verbal behaviors that are goal-directed” (p.145). Each person participating in the interaction process has a different knowledge base, with individual needs, goals, past experience, and perceptions. According to King’s theory, the patient and the nurse come together in a clinical situation, perceive each other, make judgments about each other, and react based on the significance they attribute to the situation or their perception of it (King, 1981). When the nurse and patient first come together for the purpose of SL NTG

education, a relationship is established. Through this relationship they agree on the mutual goal of SL NTG education and the ways in which to achieve it. An assessment is made of the patient's level of knowledge by the nurse using the pretest during this phase.

Perception

Each person's representation of reality constitutes perception (King, 1981).

Perception is an awareness of persons, objects, and events. Past experiences, self concept, socioeconomic groups, genetics, and educational background all contribute to one's perceptual process (p. 146). Perception influences behavior, including the learning process. Perception of the situation and each other is the first step in the nurse-patient interaction process. The nurse takes the time to clarify the patient's perceptions in the individually tailored education session. When the patient feels that his or her thoughts are understood and considered, learning is enhanced. The nurse is able to individualize the teaching session based on an appreciation of the patient's perception.

Communication

"Communication is defined as a process whereby information is given from one person to another either directly in face-to-face meetings or indirectly through telephone, television, or the written word" (King, 1981, p. 146). King sees communication as the information component of the interaction process. The functions of the communication process are to transfer information from one to another as well as to establish the fundamental component of the nurse-client relationship (Sundeen, 1994). Nurses transfer health information to patients in the hope of influencing them to participate in making decisions and choices regarding their health. Within this study, the concept of

communication involves the verbal exchange of information between the nurse and patient regarding SL NTG use. The patient furnishes information regarding the level of knowledge he or she has during the pretest assessment while the nurse provides instruction on the proper use of the drug during the tailored teaching session.

Transaction

King (1981) defines transaction as observable behavior of human beings interacting with their environment. She maintains that goal setting is based on the nurse's assessment of the patient's perceptions of problems, and the sharing of information with patients and families for the purpose of collaborating on a plan for improved health. Goal attainment occurs when transactions are completed (King, 1981). This concept is represented within the study by the attainment of the mutual goal of increased patient knowledge of SL NTG use as measured by the posttest.

Current practice for communicating information to patients is to provide them with pre-printed handouts that list medication instructions and guides for care at home. Very little time, if any, may be spent discussing and clarifying the concepts of SL NTG use with patients before discharge. Within this modality, the nurse makes the assumption that since the handout was dispensed, the patient's knowledge level of the use of the drug is adequate.

An optimal transaction would include individually tailored teaching where direct communication between the nurse and the patient occurs in an open and trusting environment. Utilizing a structured format and approaching the patient as an individual with unique needs will serve to enhance the learning process. One-on-one instruction

helps to reduce the differences in emphasis and mode of reinforcement that can occur when multiple patients are involved in a teaching session. The timing of the instruction can be planned to accommodate both the nurse's schedule and that of the patient or significant other. Setting aside a planned time for the discussion prioritizes the importance of the education for both the patient and nurse. This type of transaction provides an opportunity for clarification of the information and allows the nurse to identify any additional educational needs that the patient may have.

King's theory of goal attainment highlights the nature of the nurse-patient relationship in an optimal situation such as the one described above. As the nurse and patient interact to explore the patient's level of knowledge of SL NTG use, they communicate with each other to identify perceptions and share information. Mutual goals are agreed upon based on the individual needs of the patient. When the interaction is designed and tailored according to what the patient needs, a transaction will be more likely to occur. Educating patients regarding the proper use of SL NTG and even providing them with pre-printed handouts that they can later refer to promotes participation. Patients will experience a higher state of health when they accurately understand and use SL NTG.

Literature Review

This literature review will examine the available information related to cardiac patients that specifically focus on the major concepts of this study; (a) knowledge of SL NTG use, (b) medication education, and (c) patient knowledge.

Knowledge of SL NTG Use

There is very little information in the literature regarding patient misuse of SL NTG. However, two studies have been published that specifically looked at patient's understanding of the proper use. Maclean et al. (1980) studied an outpatient population of 50 patients to determine their knowledge of the use, precautions, and ways in which they took the drug. Patients who used more than five SL NTG tablets per week were asked a series of questions when they presented their prescription to the pharmacy for renewal. Of the 50 patients, 49 admitted to using the drug for the relief of chest pain, but only 34 patients knew that the drug could be used to prevent chest pain. Twenty-one of the patients had experienced effects other than the relief of chest pain for which their physician had not prepared them. Seventy percent of patients knew that SL NTG deteriorated with time, however, knowledge of the factors that influence the rate of deterioration was lacking. The small sample size limits the generalization of the results.

Bassan (1991) surveyed 112 patients with a remote history of myocardial infarction (MI) from an outpatient cardiology clinic regarding their use of SL NTG. The instrument used for this study was a questionnaire. The results showed that 89% of the patients claimed to know when to use the drug, but, as many as 57% had used it or would use it for symptoms such as dizziness, rapid heart beat, or pre-syncope. The authors recommended that routine prescribing of SL NTG after an MI involves potential risks and, therefore, should be carefully considered in each individual patient. This study did not assess the use of SL NTG by patients who experience angina without a history of MI.

Medication Education

Patient education is one factor that enhances knowledge and promotes compliance (Linde & Janz, 1979). Although the literature reveals no studies specific to SL NTG patient education, there are numerous studies identifying medication education as an important learning need of cardiac patients.

Several studies have surveyed patients to identify their perceived learning needs. Gerard and Peterson (1984) examined two groups of patients with MI in the inpatient and outpatient setting. The study was conducted in a 537 bed privately owned hospital where 16 patients from the coronary care unit (CCU) and 15 post-discharged patients participated. Using two instruments, the Cardiac Patient Learning Need Inventory and the Educator Preference Tool (Gerard & Peterson, 1984), the patients were evaluated to determine what information they considered as important to learn. Patients ranked the category of medications as the second most important area next to risk factors about which they were interested in learning. As another component of the study, 36 nurses were also asked to rank the importance of the same items. Overall, the nurses felt that learning about medications was the most important concern that patients had.

Karlick and Yarcheski (1987) confirmed the findings of Gerard and Peterson (1984) with 30 post MI patients in a 416 bed university affiliated rural hospital, using the same design and instruments. In addition, 30 nurses were studied to assess their beliefs regarding the importance of learning needs of patients. The category of medications was ranked among the top three learning needs by both groups of patients and was listed as the number one priority by the nurses.

These results were again corroborated using the same tools and design with patients who experience angina (Karlick, Yarcheski, Braun, & Wu, 1990). As with the previous two studies, nurses were also surveyed for their views on importance of learning needs. Fifteen inpatients and 15 post-discharge patients with angina participated in this non-randomized design. Patients and nurses both rated medications as the top two priorities for learning.

Nicklin (1986), studied 217 post MI and cardiac surgery patients in a university cardiology clinic to identify areas about which patients had the most questions. Telephone calls received at the clinic were recorded and categorized into one of seven groups of symptoms. Patient calls concerning management of symptoms of chest pain accounted for the majority of the questions while those regarding medications comprised the second leading category. This study was limited because the sample was not a random sample of all discharged patients, only those who chose to use the callback system. In addition, no instruments with established reliability and validity were used to evaluate the responses.

Meyer and Latz (1979) used a questionnaire to survey 50 open heart surgery patients between one and nine months after surgery to identify what patients defined as their learning needs. Twenty-five patients were from a Veterans Administration hospital and the remaining twenty-five patients were from a group cardiology practice. Patients who returned to their physician's office for follow-up care participated in this non-randomized study. Results suggested that they considered the area of medication education to be the third most important learning need during recovery next to activity

and pain management. The authors identified limitations of this study including the small sample size, and inconsistency with the teaching programs. No information regarding the reliability and validity of the instrument was given.

In surveying 100 cardiovascular surgical patients, Grady et al. (1988) found that patients viewed the area of medication side effects as the single most important area to receive information about before discharge. The authors used a tool developed for the study which was tested for reliability and validity. Patients were surveyed at five to ten days after surgery and one to four weeks after discharge. The importance placed on learning more about medications and their side effects by patients indicated a need to improve this aspect of the teaching program. In addition, the authors recommended that patient education should be structured, individualized, and available at a time when the patient is ready to learn. Generalization of the results are limited due to the non-random design, single institution setting, and the fact that the sample was mostly male.

Patients in both the outpatient and inpatient setting consistently identify the areas of risk factors and medications as important to learn. Nurses view medication education as being the top priority for patient learning. Patient education is an important aspect of nursing care. Information regarding SL NTG use can provide a basis for meaningful interventions for patient education. The literature related to the importance of medication education suffers from common limitations including small sample sizes, non-randomized designs, single institution settings, and homogenous samples.

Patient Knowledge

A search of the literature reveals that many studies have been conducted to measure the effectiveness of inpatient cardiac education programs and their ability to enhance patient knowledge. In a summary of the related research, Duryee (1992) found that there were statistically significant increases in patient knowledge following the implementation of formal, structured educational programs. These programs used certain methods of education such as slide presentations, booklets, videotapes, and prepared scripts to teach the cardiac patient.

In one of the largest studies, Barbarowicz, Nelson, DeBusk, and Haskell (1980) randomized 230 post-op coronary artery bypass (CABG) patients from three hospitals into an experimental design that compared hospital teaching approaches. The study sought to determine the effectiveness of the approaches in increasing knowledge about coronary artery disease and associated treatment. Patients were assigned to either the experimental formal slide-sound teaching program or the hospital's usual teaching method which consisted of informal, unstructured, and individual contact provided by a nurse. Knowledge was increased by 17.7% in the experimental group as compared to an increase of 7.8% in the control group. Increased knowledge scores were maintained throughout the three month evaluation.

Maeland and Havik (1987) conducted a non-randomized study with 252 MI patients from four hospitals in a quasi-experimental design that also used structured versus usual teaching groups. The structured teaching consisted of three 15-minute sound-slide tapes on coronary disease and risk factors whereas the usual care group

received informal unstructured teaching by nurses. Statistically significant increases in knowledge scores occurred both at 12 days and six months after discharge in the experimental group ($p < 0.001$ and $p < 0.005$ respectively).

In a randomized trial conducted at a large Veterans Administration medical center, Mills, Barnes, Rodell, and Terry (1985) studied 277 patients with ischemic heart disease to see what effect an inpatient education program had on their knowledge level. A program of five one hour education classes on coronary artery disease and management was administered in a group setting by an education team to all of the participants. They found that knowledge levels increased significantly related to the patient education program. An examination of predictors of overall compliance in these patients revealed that indicators of motivation and posttest knowledge were significantly correlated with postdischarge compliance.

Steele (1987) evaluated 76 CABG patients at a 615 bed institution to determine whether an existing inpatient cardiac teaching program was effective in raising knowledge levels. A separate sample pretest-posttest design was used in this study to control for the influence of the pretest scores on the posttest. Thirty-eight subjects took the pretest before surgery and 38 different subjects completed the same test after surgery. All patients received individual and group teaching with audiovisual aids and booklets. The data suggested that patients learned priority information necessary for safe and adequate functioning after discharge. Knowledge levels were increased and patients reported feeling confident that they would comply with the medical regime post-discharge. Compliance continued for six months following discharge. Study limitations

include the lack of a control group, the single institution setting, and the pretest-posttest design for different groups.

Scalzi, Burke, and Greenland (1980) investigated the effect of a formal educational program for 32 patients with MI in an 800 bed hospital. Patients in the experimental group participated in an organized program designed to increase their knowledge of coronary heart disease and risk reduction taught by the nurse investigator and supplemented by audiotapes and pre-printed materials. Patients in the control group received only the usual teaching which did not include individual instruction or printed educational material. Knowledge and compliance were measured over a two year period with an experimental time series design. The authors found that posttest scores did not initially increase during hospitalization after the educational program was introduced. Continued instruction after discharge improved knowledge and compliance in most areas including medications. The small sample size of the study does not permit generalization of the results.

In summary, cardiac patients identify that medications are a topic that they would like to learn more about. The majority of studies specific to cardiac patient knowledge supports a direct relationship between formal, structured patient education programs and specific knowledge gain. The use of formal education programs increases knowledge and in many cases, enhances compliance post-discharge. Many studies employed a teaching method that involved one nurse instructing one patient using a structured format. Limitations of the studies include small sample sizes, single institution settings, non-randomized designs. Although an important recommendation of some authors

studying cardiac patient education is that information programs should be individualized to the patient's specific needs, no studies can be found in the literature that examine individualized teaching with cardiac patients (Casey, O'Connell, & Price, 1984; Murray, 1989).

Each patient has a unique perspective on his or her own illness and medical regimen. Identifying the particular learning needs of the patient allows the nurse to focus and expand on specific outcomes of the teaching plan, thus "tailoring" the plan to the individual patient. The gap in the available cardiac literature regarding the use of individualization as a method for instruction suggests that it is worthy of further study especially as it relates to SL NTG instruction.

Research Hypothesis

This study tested the following hypothesis: There will be a difference in the level of medication knowledge between patients who receive the usual SL NTG hospital teaching and those who receive individually tailored and structured SL NTG teaching.

Definition of Terms

Several concepts and terms that have significant relevance for this study are defined as follows:

1. Knowledge is knowing something, usually certain facts or beliefs and is the outcome of learning. It is stored information within our memories for the purpose of recall (Woolfolk, 1993).
2. Medication Instruction is the transference of information regarding medication facts from one person to another for the purpose of learning.

3. SL NTG Use is the administration of the drug Nitroglycerin under the tongue (or sublingual) for relief of anginal discomfort.
4. Individually tailored instruction refers to the expanded focus of one-on-one teaching for each subject that is based on the assessment of that individuals' knowledge of SL NTG use and consideration of any barriers to learning.
5. Structured instruction refers to a teaching program that follows a definite format or outline.
6. Usual hospital teaching method is used in practice at Munson Medical Center and consists of the provision of a printed SL NTG information sheet to the patient with simple, brief instructions. The dialog between the nurse and patient is unstructured and varies in terms of content.

CHAPTER 3

METHODS

Research Design

This study utilized a pretest-posttest comparison group design that measured cardiac patients' level of knowledge of SL NTG use. Subjects were assigned alternately to either the comparison group that received the usual SL NTG instruction from the hospital staff nurses or the treatment group that received individually tailored, structured instruction from the researcher on the proper use of SL NTG. Both groups received the same pretest and posttest.

Sample and Setting

The setting was a 368 bed acute care medical center located in northwestern Michigan. The hospital is a tertiary referral center servicing a five county area. Admissions for chest pain average about 40 per month.

A convenience sample of 40 patients who met the eligibility criteria were sought. Subjects were eligible if they (a) were admitted with a primary diagnosis of chest pain, unstable angina, or coronary artery disease, (b) were prescribed SL NTG at home and/or were to be maintained on it at discharge, (c) spoke English, (d) consented to participate in the study, (e) were 21 years of age or older, and (f) did not have concomitant illnesses that prohibited them from participating, such as stroke or mental impairment. Subjects

were alternately assigned to the intervention group. Data collection for the pretest took place in the subject's hospital room. Posttest data collection consisted of telephone interviews by the researcher. All but one of the subjects were able to respond to the questions during the phone interview. One subject was unable to participate in the phone interview because of a deteriorating health condition requiring placement in a nursing home. Therefore, the final number of subjects was 40.

A summary of demographic characteristics is presented in Table I. Of the 40 participants, sixty-two percent ($n = 25$) were male and thirty-eight percent ($n = 15$) were female. The age of the participants ranged from 45 to 86 with a mean of 67.0 years ($SD = 11.0$). Sixty-five percent ($n = 26$) of the sample were married and all participants were caucasian. Educational levels of the participants ranged from six to 18 years with a mean of 12.8 years ($SD = 2.97$). Prior to receiving either type of teaching, ninety-five percent ($n = 38$) of the subjects reported that they had received previous instruction on the use of SL NTG and five percent ($n = 2$) received no previous instruction. Of those receiving prior instruction, eighty percent ($n = 32$) reported that the instruction was given to them by a physician and fifteen percent ($n = 6$) received prior instruction from a nurse.

Table I

Subject Demographic Characteristics ($n = 40$)

| Characteristics | Frequency | Percent |
|-----------------|-----------|---------|
| <u>Gender</u> | | |
| Male | 25 | 62.0 |
| Female | 15 | 38.0 |

Table I

Subject Demographic Characteristics (continued)

| Characteristics | Frequency | Percent |
|--------------------------|-----------|---------|
| <u>Marital Status</u> | | |
| Single | 2 | 5.0 |
| Married | 26 | 65.0 |
| Divorced | 4 | 10.0 |
| Widowed | 7 | 17.1 |
| Separated | 1 | 2.5 |
| <u>Education</u> | | |
| Grades 0-12 | 18 | 45.0 |
| College-graduate degree | 22 | 55.0 |
| <u>Prior Instruction</u> | | |
| Yes | 38 | 95.0 |
| No | 2 | 5.0 |
| <u>Prior Instructor</u> | | |
| Physician | 32 | 80.0 |
| Nurse | 6 | 15.0 |

While there were no significant differences in characteristics between the intervention and comparison groups, the intervention group was comprised of more men than women. Table 2 presents the demographic characteristics by groups.

Table 2

Subject Demographic Characteristics by Groups

| | Intervention (n=19) | Comparison (n= 21) |
|-----------------------|------------------------|-----------------------|
| Characteristics | Frequency (Percent) | Frequency (Percent) |
| <u>Gender</u> | | |
| Male | 15 (78.9) | 10 (47.6) |
| Female | 4 (21.1) | 11 (52.4) |
| <u>Marital Status</u> | | |
| Single | 0 (0.0) | 2 (9.5) |
| Married | 13 (68.4) | 13 (61.9) |
| Divorced | 1 (5.3) | 3 (14.3) |
| Widowed | 4 (21.1) | 3 (14.3) |
| Separated | 1 (5.3) | 0 (0.0) |

Table 2

Subject Demographic Characteristics by Groups (continued)

| | Intervention (n=19) | Comparison (n= 21) |
|-----------------------------------|------------------------|-----------------------|
| Characteristics | Frequency (Percent) | Frequency (Percent) |
| <u>Education</u> | | |
| Grades 0-12 | 8 (42.1) | 10 (47.6) |
| College-graduate degree | 11 (57.9) | 11 (52.3) |
| <u>Prior Instruction</u> | | |
| Yes | 19 (100) | 19 (90.5) |
| No | 0 (0.0) | 2 (9.5) |
| <u>Prior Instructor</u> | | |
| Physician | 18 (94.7) | 14 (66.7) |
| Nurse | 1 (5.3) | 5 (23.8) |
| <u>Length of Time Taking Drug</u> | | |
| < 6 mo | 5 (26.3) | 5 (23.8) |
| 6 mo- 2 yr | 2 (10.5) | 1 (4.8) |
| > 2 yr | 12 (63.2) | 15 (71.4) |

Instruments

Medication Knowledge

The instrument selected to assess and measure the level of knowledge was the Medication Knowledge Tool (Appendix B) developed by Taira (1991). Verbal permission for use from the author was granted to this investigator. The original format consisted of an open ended questionnaire comprised of 15 objectives. The tool was developed based on a review of the literature and on the investigator's experience in rehabilitation nursing. According to Taira, content validity was established through a panel of three doctorally prepared nurses with expertise in gerontological nursing and client input about the clarity of the questions and helpfulness of the information. In addition, an interrater reliability test was conducted by the investigator and a graduate student research assistant who independently coded the responses of five subjects. There was agreement in rating all five subjects with the exception of one objective. The question was then reworded for clarity.

For this study, the tool was modified slightly with the permission of the author, omitting original Objectives 1, 13, 14, and 15 which do not specifically relate to the use of SL NTG (Appendix C). Objective 2 lists a selection that identifies the length of time taking the drug as "off and on for ____ days, months, years" which has been deleted in the final version. In addition, Objectives 7 and 8 each have subsets of questions that contain qualitative responses that were not included in the final computation. The subset of questions for Objective 10 were included in the total score. Responses are categorized as "yes" (correct), "no", (incorrect), or "does not know". For example, Objective 4 asks

“How does SL NTG help your chest discomfort ?” Correct responses include statements such as “it relieves my chest ache” or “it takes the pain away”. Incorrect responses include statements such as “it gives me relief from that feeling that I’m going to faint” or “it stops my heart from palpating”. Each correct or “yes” response is worth two points while each incorrect or “no” response is worth no points. No credit is given for Objective 1. The total number of Objectives in the modified version is 14. Objective 10 is comprised of five subset questions, each worth two points. The total possible score is 36.

Internal consistency of the modified instrument was established in this study. Using a Kuder Richardson 20 (KR 20), the reliability coefficients were .70 for the pretest and .72 for the posttest. In addition, a Pearson correlation for test-retest reliability was performed and found to be sufficient at .72. According to Polit and Hungler (1995), reliability coefficients exceeding .70 are sufficient for making group comparisons.

Demographic Data Form

Demographic data was collected by the investigator on a separate form (Appendix D). This form collected information regarding age, gender, marital status, race, and education level. These data were selected because previous knowledge or age of the subjects may impact the results of the study. Support from a spouse can help to improve the accuracy of how medications are taken, therefore, this variable was chosen. Also included was a question about whether previous SL NTG instruction had been given and if so, by whom.

Procedure

Pretest Procedure

Data for this study was collected by the primary investigator who approached individuals who were admitted to the hospital's cardiology units with the diagnosis of chest pain, unstable angina, or coronary artery disease. The researcher introduced herself and provided subjects with a brief explanation of the purpose of the study, risks, potential benefits, voluntary participation and withdrawal, and confidentiality before informed consent was obtained (Appendix E). The introductory paragraph of the informed consent served as the standard format for introduction.

Before data collection was begun, the proposal was submitted for approval to the Grand Valley State University Human Research Review Committee as well as to the Internal Review Board at Munson Medical Center. There were no expected risks to the subjects in this study. Fatigue or boredom may have been a factor during the questioning, however, pretest interviewing was a brief procedure lasting approximately 15 minutes. None of the subjects voiced any concern of this nature.

Subjects who agreed to participate were interviewed individually by the investigator who completed the demographic data form and questionnaire for them at a convenient time as soon as possible after admission. A list of interview prompts was developed and used by the investigator to assure that the instrument was administered in a consistent manner (Appendix F).

For those patients who were enrolled in the intervention arm of the study, the results of the individual pre-test was reviewed by the researcher prior to the teaching. An individual teaching plan was developed which consisted of a structured outline with an emphasis on the identified area(s) of knowledge deficits. The researcher made several notes on the individual pretest which indicated the specific areas that needed instruction. Based on a review of the pre-test assessment, this group of patients received a structured, individually tailored teaching session regarding the proper use of SL NTG, it's side effects, and indications. Patients were also given the hospital's standard printed informational handout that reinforces the concepts of SL NTG use. A sample teaching program and medication handout is provided in Appendix G. During the teaching session, additional emphasis was placed on the areas of knowledge deficit identified in the pretest. Subjects were asked to repeat the correct information after the session. For example, after instruction, subjects were asked to state how they should correctly take SL NTG, or what they needed to do before taking the drug. The teaching session lasted no longer than 30 minutes for each subject. An appointment was scheduled with the patient at a convenient time before discharge to perform the teaching session. The teaching session was held in the patient's hospital room. Occasionally, visitors were present. However, this did not interrupt the teaching session. If visitors were present, the subjects were given the option of rescheduling the session. None of the teaching sessions were delayed because of visitors.

Subjects who received the usual hospital teaching method were instructed by the staff nurses and received the same SL NTG handout prior to discharge. Instruction

occurred per the usual hospital routine at the patient's bedside at a time which was convenient for the staff. The nurse assigned to care for the patient was responsible for the instruction. The instruction was usually given to the patient and his or her family member in the hour just prior to discharge. This instruction included a review of the names of the medications, a brief rationale of their purpose, and pertinent side effects. Since there was no formal teaching outline, the actual content of the instruction varied between nurses.

Posttest Procedure

All of the subjects were contacted by telephone at one week post-discharge by the investigator. The investigator re-introduced herself over the phone and briefly described the procedure for the posttest. The posttest was then administered over the phone. It was not suggested that subjects refer to their medication handout during the phone interview. This telephone interview lasted approximately five minutes.

CHAPTER 4

RESULTS

The purpose of this study was to investigate patients' level of knowledge of the use of SL NTG after receiving either the usual hospital teaching, or individually, tailored teaching. The statistical analysis used the Statistical Package for the Social Studies (SPSS). Significance was set at $p < .05$ for all tests. The original sample consisted of 41 subjects. One subject was unable to complete the posttest study questions due to an unexpected change in health status requiring nursing home placement. Therefore, the attrition rate for this study was two percent.

Knowledge

The mean knowledge scores were examined for the intervention and comparison groups. Table 3 contains the mean knowledge scores for the two groups. Pretest mean scores for the comparison group were higher than for the intervention group. However, the subjects in the intervention group, scored higher on the posttest than those subjects in the comparison group.

Table 3

Knowledge Scores by Group

| Knowledge | Intervention (n= 19) | | Comparison (n= 21) | |
|-----------|-------------------------|------|-----------------------|------|
| | M | SD | M | SD |
| Pretest | 17.26 | 4.82 | 18.00 | 5.47 |
| Posttest | 20.63 | 5.12 | 19.33 | 5.41 |

Hypothesis Testing

This study tested the following hypothesis: There will be a difference in the level of medication knowledge between patients who receive the usual SL NTG hospital teaching and those who receive individually tailored and structured SL NTG teaching. The hypothesis was analyzed using t-tests and a two group analysis of covariance (ANCOVA) with the pretest as the covariate. Using paired t-tests, the pretest and posttest means were examined within the groups for significance. There was a statistically significant difference between the pretest mean scores and the posttest mean scores in the intervention group ($t = 3.14$, $df = 18$, $p = .006$). In addition, there was a statistically significant difference between the mean scores from the pretest to posttest within the comparison group ($t = 2.2$, $df = 20$, $p = .04$). It is important to note that while there was a significant difference between the mean pretest and posttest scores of both groups, there was a greater gain in knowledge in the intervention group.

Analysis of covariance (ANCOVA) was used to test the research hypothesis. To

ascertain the effect of the intervention on knowledge gain, the pretest scores were used as the covariate. By controlling for the pretest scores error variance is reduced, thus increasing the power of the analysis to detect differences in the posttest knowledge scores. The results of the ANCOVA did not indicate a difference between the groups ($f = .11$; $p = .742$). However, the coefficient of determination demonstrated that 54 % of the variation in knowledge scores could be attributed to the intervention ($r = .540$). While a large amount of variation was attributed to the intervention, the research hypothesis of this study was not supported. Table 4 provides the ANCOVA results.

Table 4

ANCOVA for Level of Knowledge With Pretest As The Covariate

| Source of Variation | df | MS | F | p |
|---------------------|----|--------|-------|------|
| Within Groups | 37 | 14.93 | | |
| Covariate | 1 | 649.17 | 43.48 | .000 |
| Between Groups | 1 | 1.64 | .11 | .742 |

($r\text{-squared} = .540$)

Further Analysis

In an attempt to delineate the variation in knowledge scores, additional correlation analyses were performed. This was done to determine if significant relationships existed between the demographic characteristics and knowledge scores. A Pearson R correlation coefficient was used to evaluate the relationship between age and education with level of medication knowledge. While no relationship was found

between the variables of education and level of knowledge, a significant negative relationship was found between age and pretest knowledge scores ($r = -.366$; $p = .019$). Further analysis demonstrated a shift in the magnitude of this relationship with the posttest knowledge scores. A significant relationship was not found between age and posttest knowledge scores ($r = -.268$; $p = .094$).

As a result of these findings, the participants were divided into two groups. Though social science research typically uses the age of 65 as a determinant of older age classification, the median age (69 years) of the entire sample was used. The use of the median age facilitated the division of the sample into two relatively equal groups. Table 5 displays the age distribution of the groups.

Table 5

Age Distribution Among Groups

| | Intervention (n = 19) | Comparison (n = 21) |
|-------|--------------------------|------------------------|
| Age | Frequency (Percent) | Frequency (Percent) |
| 45-68 | 7 (36.8) | 13 (61.9) |
| 69-86 | 12 (63.2) | 8 (38.1) |

A Chi-Square analysis was performed to determine if the distribution of age was different between the intervention and comparison groups. While a greater proportion of the intervention group was in the older age bracket, there was not a significant difference in the two groups based on age ($X^2 = 2.97$; $df = 1$; $p = .08$).

There were no differences in mean pretest knowledge scores between the intervention and comparison groups by age bracket. Subjects in the older age bracket had lower pretest scores than those in the younger age bracket. Table 6 contains the results of the mean pretest knowledge scores of the age groups.

Table 6

Comparison of Pretest Knowledge Scores by Age

| Age Group | Intervention | | Comparison | |
|-----------|--------------|------|------------|------|
| | M | SD | M | SD |
| 45-68 | 20.00 | 6.00 | 19.54 | 5.61 |
| 69-86 | 15.67 | 3.28 | 15.50 | 4.50 |

There were no differences in mean posttest knowledge scores of the younger and older subjects between the groups. Older subjects in the intervention group had higher mean posttest knowledge scores than those the comparison group, however, a statistically significant difference was not found. Table 7 displays the posttest knowledge scores by age.

Table 7

Comparison of Posttest Knowledge Scores by Age

| Age Group | Intervention | | Comparison | |
|-----------|--------------|------|------------|------|
| | M | SD | M | SD |
| 45-68 | 21.14 | 5.64 | 20.77 | 5.07 |
| 69-86 | 20.33 | 5.03 | 17.00 | 5.45 |

It is important to note the difference between the pretest and posttest scores of the subjects in the older age bracket. Older subjects in the intervention group demonstrated a marked improvement in their level of SL NTG knowledge. To evaluate whether these improvements were significant, paired t-tests were performed. A significant difference was found between the pretest and posttest knowledge scores of the older subjects in the intervention group ($t = 4.10$; $df = 11$; $p = .002$). Though there was an improvement in the level of knowledge in the older subjects of the comparison group from 15.50 to 17.00, it was not significant.

The scores for each objective in the intervention group were examined to determine whether certain areas of medication knowledge were more or less amenable to change than others. Improvements were found in the posttest scores of each of the objectives with the exception of two that related to side effects. There were two objectives that appeared to exhibit a greater tendency towards improvement on posttest scores as compared to the others. Objective 5 asked the question "How much SL NTG do you take?". Eight subjects correctly responded on the pretest, while 14 correctly

responded on the posttest. Also, for objective 8, five subjects incorrectly responded to the question “Are there times when you increase or decrease the amount of nitroglycerine you take?”. No incorrect answers were given on the posttest.

Pretest and posttest scores remained the same for Objective 10 which asked the question “are there any side effects SL NTG may have?”. Of those who answered the question correctly on the pretest, 73% answered it correctly on the posttest. No improvements in posttest scores were noted in the subset of questions that asked subjects to identify the side effects by name. In addition, pretest and posttest scores remained the same for Objective 13 which asked “for which of these side effects would you call your doctor or nurse?”. Fifty-seven percent of the subjects who answered correctly on the pretest also answered correctly on the posttest. Table 8 displays the pretest and posttest scores for Objectives 5, 8,10, and 13.

Table 8

Intervention Group Scores for Objectives 5, 8, 10, and 13

| | Pretest | Posttest |
|--------------------|---------------------|---------------------|
| Objective | Frequency (Percent) | Frequency (Percent) |
| <u>Objective 5</u> | | |
| Correct | 8 (42.1) | 14 (70.0) |
| Does not know | 11 (57.9) | 5 (25.0) |

Table 8
Intervention Group Scores for Objectives 5, 8, 10, and 13(continued)

| | Pretest | Posttest |
|---------------------|---------------------|---------------------|
| Objective | Frequency (Percent) | Frequency (Percent) |
| <u>Objective 8</u> | | |
| Yes | 5 (26.3) | 0 (0.0) |
| No | 14 (73.7) | 19 (95.0) |
| <u>Objective 10</u> | | |
| Yes | 10 (52.6) | 10 (50.0) |
| No | 9 (47.4) | 9 (45.0) |
| <u>Objective 13</u> | | |
| Correct | 7 (36.8) | 7 (35.0) |
| Does not know | 12 (63.2) | 12 (60.0) |

In summary, there was no difference in posttest knowledge scores regarding SL NTG use between the intervention and comparison groups. Therefore, the hypothesis was not supported. Knowledge scores improved markedly within the intervention group as demonstrated by statistically significant differences between the pretest and posttest scores. Within the comparison group, there was an increase in knowledge, however, this was not found to be statistically significant.

When controlling for the pretest, it was revealed that 54% of the variance in posttest knowledge scores was attributed to the intervention. Those subjects age 69 and

older had the greatest improvement in posttest scores. This study demonstrated that the intervention had a significant impact on the posttest knowledge scores of the older subjects.

There was no significant relationship found between the variable of education and the intervention. In the intervention group, two of the objectives that were related to drug dosage and modification demonstrated more of an improvement on posttest scores than did any of the others. Conversely, there were two objectives associated with side effects that appeared resistant to change on posttest scores within the intervention group.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

Discussion

The relationship between individually tailored SL NTG instruction and patients' level of knowledge of the proper use of the drug was examined in this study. The findings of the study did not support the hypothesis that there would be a difference in the medication knowledge levels between patients who received the usual SL NTG hospital teaching and those who received individually tailored and structured SL NTG teaching.

Subjects in the comparison group had a higher level of knowledge at pretest than did subjects in the intervention group. Although not significantly different between groups, mean scores did increase for both groups. In the intervention group, mean scores increased from 17.26 at pretest to 20.63 at posttest, while comparison group scores were 18.00 at pretest and increased to 19.33 at posttest.

Analyzing the data further revealed that age was related to the test scores. Subjects were divided into two age groups at the median. The intervention group was comprised of a greater percentage (63.2%) of subjects 69 and older, while the comparison group included only 38 percent in the older range. The findings of the study revealed that, overall, younger subjects had higher levels of knowledge at the pretest than

did older subjects. However, there was a significant increase in the level of knowledge from pretest to posttest of the older participants in the intervention group. This was not true for the comparison group. This finding is interesting and may suggest that older patients can learn more effectively with an individually tailored and structured teaching format than can those who are younger.

Unlike in the comparison group, in the intervention group there were two specific areas of knowledge that were more amenable to change than others. These included knowledge about the correct drug dosage and the decision not to modify how the drug is used. Forty-two percent of the subjects did not know the correct dosage of the drug prior to instruction. After instruction, seventy percent of the subjects knew the proper dose of the drug. Twenty-six percent of the subjects reported that they sometimes altered either the amount or the way in which they took the drug. There was improvement in knowledge of this concept after instruction. None of the subjects reported that they would alter the way in which they should use the drug after the individually tailored instruction. Because these concepts were similar in that they focussed on the correct dose and method of administration, there was reinforcement of them during the teaching session. In addition, patients may recall these concepts easier since there are only a few to remember.

Knowledge about side effects was the most difficult for subjects in both groups to learn. In the intervention group, only 50% of the subjects were able to recognize that there were any side effects of SL NTG after teaching. In the comparison group, only 45% were able to identify that fact after teaching. There was no improvement in the

subjects' ability to name actual side effects such as headache, dizziness, rapid heart beat, or flushed feeling. In addition, subjects were not able to identify which side effects would require a call to their doctor or nurse. A possible reason for the difficulty in this area could be that remembering several different side effects is too much for the patient at one sitting. Patients may not be able to commit more than one or two concepts to memory while in the hospital. This study suggests that the topic of side effects is difficult for patients to learn, therefore, it should be a strong focus for patient education.

Relationship of Findings to Conceptual Framework

Imogene King's theory of goal attainment provided the conceptual framework for this study. Goal attainment occurs when the nurse and patient purposefully interact to mutually establish goals and agree on a means to achieve them (King, 1981). The goal of enhanced SL NTG knowledge was met through this study as demonstrated by increased posttest knowledge scores.

According to the study results, individually tailoring the education process for the elderly tends to have a greater impact on knowledge than does providing education in a standardized format. The study findings support King's theory and selected concepts including: interaction, perception, communication, and transaction.

Interaction. King (1981) defines interaction as a "process of perception and communication between person and person, represented by verbal and non-verbal behaviors that are goal-directed" (p.145). It was essential that a relationship be established between the nurse and the patient in order to meet the goal of enhancing the patient's medication knowledge base. The individual sessions provided the environment

for the interaction to take place between the nurse and patient. This interaction allowed the assessment of the patient's level of knowledge to take place during the pretest phase of the study.

Perception. According to King, "each person's representation of reality constitutes perception" (1981, p.146). Past experiences, judgements of events and people, and personal expectations all contribute to the perception process. Perception can influence the learning process. In the hospital setting, perceptions of the nurse may be different from that of the patient. For example, a patient may not feel that it is important to take medications at the correct time intervals. The nurse caring for this patient understands the physical effects of the medication and places more importance on this. If the nurse does not attempt to discover what the patient thinks about taking medications on schedule, he or she may miss an opportunity to share information that could influence the patient's behavior. Effort was made to clarify the patient's perception regarding the use of SL NTG during the individually tailored teaching session. Individualized teaching created an environment whereby both the teacher and the learner felt that their views were considered and understood. Learning was enhanced as demonstrated by the improved level of knowledge scores on the posttest.

Communication. King (1981) places importance on the communication process between the nurse and patient. She considers communication to be the information component of the interaction. Communication played a significant role in this study in that the transfer of information between the patient and the investigator occurred throughout each phase of the study. Effective communication allowed perceptions to be

clarified, and information to be shared. Reinforcement and emphasis on specific information was key to enhancing the knowledge outcomes of each patient. Direct communication took place in an open and trusting environment where the mutual goal of increased knowledge regarding SL NTG use was established.

Transaction. King (1981) describes transaction as observable behavior of human beings interacting with their environment. This includes collaborating on a plan for improved health through education. Transaction was evident throughout the entire study process in which full patient participation occurred with the exception of one patient who was unable to continue due to health deterioration. The tailored teaching format was targeted toward the learning needs of each patient, thus providing an appropriate emphasis on the individual's knowledge deficit(s). For example, if an individual's pretest identified drug dosage as an area of weakness, the teaching format was designed to place significance on this issue. The teaching session then included the clarification of perceptions, the sharing of information, and emphasis and reinforcement regarding drug dosage that resulted in the patient's knowing more about the proper dose to take.

According to King's theory, goal attainment occurs when transactions are completed. This study centered on the mutual goal of learning more about the use of SL NTG. King states that "the results of attained goals are measurable outcomes" (p.145). The measurable outcome selected for this study was the patient's level of knowledge regarding the use of SL NTG. Although an important outcome, enhanced learning is an intermediate goal. It is assumed that ultimately, enhanced knowledge will result in a change in behavior. This study demonstrated an optimal transaction between the patient

and investigator which resulted in enhanced learning. Support for the use of King's theory of goal attainment was evident in this study.

Relationship of Findings to Previous Research

The use of individually tailored instruction for cardiac patients has not been previously studied. Prior research with cardiac patients has focused on methods of instruction that include the use of structured, formal programs presented individually or in group settings (Barbarowicz, Nelson, DeBusk, & Haskell, 1980; Maeland & Havik, 1987; Mills, Barnes, Rodell, & Terry, 1985; and Steele, 1987). The focus of this current study was limited to certain aspects of the previous research such as the use of a structured format and one-on-one instruction.

The absence of significant knowledge gain with the use of structured teaching is a finding consistent with the work of Scalzi, Burke, and Greenland (1980). In this quasi experimental time-series design, data were collected during hospitalization and at one, three, six, twelve, eighteen, and twenty-four months following discharge on 32 cardiac patients. Patients participated in either the usual hospital teaching or a formal teaching program which included structured teaching and the use of printed handouts and cassette audiotapes. The teaching was not tailored for each individual. Instruction for those in the experimental group was initiated during hospitalization and continued throughout the two year follow-up period. Data collected during hospitalization revealed no increase in knowledge for both groups. Significant increases in both knowledge and compliance were noted throughout the post-hospital measurements of the experimental group as compared to the control group. Both the Scalzi and this current study suggest that

perhaps learning in the hospital setting is limited. This could be due to other factors such as anxiety, or the inability of patients to process large amounts of information at a time when they are vulnerable.

Although the patient populations and focus of medications were different, this study did not support the previous research that utilized the same instrument. Taira (1981) examined 20 home care patients to assess their knowledge of medications before and after instruction. Using the pretest to determine areas of knowledge deficit, an individualized tailored teaching program was developed and administered to each patient. Taira found that only 40% of the patients were able to identify any side effects in the pretest phase of the study. Patients were allowed to refer to the medication handout to answer the posttest questions regarding side effects. No posttest measurement was reported regarding knowledge of specific side effects. However, overall medication knowledge improved with the individually tailored teaching program.

Age as a variable in learning has not been previously explored in regard to cardiac teaching. The results of this study suggest that individually tailored instruction for the older patient is a more effective method in increasing knowledge levels than it is for the younger patient. These results support the previous findings by Hussey (1994) in a study that also used a tailored teaching approach with a group of elderly patients. In that study, a convenience sample of 80 subjects from a geriatric outpatient clinic who were at least 65 years old and of low socioeconomic status were selected. Subjects were alternately placed into two groups. Subjects in group one received verbal medication teaching in a session that averaged 15 to 20 minutes. Group two subjects received verbal

teaching plus an individually tailored daily medication schedule. Knowledge and compliance were measured before the teaching and again after two weeks. Although knowledge increased in both groups, compliance significantly increased in the group that received the tailored teaching. The process of tailoring the teaching for elderly patients can increase both knowledge as well as compliance to medication regimes.

Limitations and Recommendations

There were several limitations to this study. First, factors that may have influenced the dependent variable of level of knowledge were anxiety from the hospitalization experience and prior habits of SL NTG use. There is a large body of literature that addresses the effects of anxiety on the learning process. Tools for measuring anxiety, such as the State-Trait anxiety scale (Spielberger, 1983) can be lengthy. In order to keep the study simple and less tiring for the patients, anxiety was not measured. Future studies involving SL NTG knowledge may need to explore this component as a possible influence.

Prior habits of SL NTG use has not been previously reported in the literature as an influencing factor. However, even after proper instruction, patients often answered the posttest questions beginning with the phrase "I usually ...". This has lead the investigator to suspect that patients may possibly be influenced by long-standing habits. For example, if a patient has been in the routine of taking SL NTG 15 minutes apart for the past 10 years, he or she may be resistant to learning the new information such as waiting only five minutes between doses. Both groups were similar in the length of time that they used the drug, with the majority of subjects using it for over two years.

Analysis of the length of time patients used the drug did not reveal any significant relationships. Perhaps a more appropriate approach would be to reinforce the change in medication use over time utilizing the home care services for teaching and support. Future studies that examine the knowledge between patients who are given a new prescription for SL NTG and those who have used the drug for an extended period of time would be useful.

The small sample size of 40 limits generalization of the results to the population. Even though there was very little missing data, it may have been difficult to detect statistical significance between groups. Larger studies with long-term follow-up are needed to evaluate the effects of individually tailored and structured teaching with cardiac patients.

In addition, a main limitation of the study is the convenience sampling. According to Polit and Hungler, (1995), in convenience sampling, subjects who were available for a study may have been atypical of the population with regard to the variables being measured. Generalization of the study results cannot be made to the entire population of cardiac patients. Random sampling with larger sample sizes would strengthen the generalizability.

The sample was relatively homogeneous in that all were caucasian, and most were male (61%). Also, the sample was drawn from one research site. Therefore, the results cannot be generalized to entire population. A more heterogeneous sample drawn from multiple centers would be desirable for future study.

An instrument that specifically measures NTG knowledge does not exist.

Therefore, the medication knowledge tool was used. This tool was developed to measure general knowledge of medications and was adapted for the study. Threats to internal and external validity were considered minimal based on previous reports by Taira (1991). For this study, internal reliability of the modified instrument was established at .70 for the pretest and .72 for the posttest. Test-retest reliability estimates were considered sufficient at .72. However, there were certain limitations of the tool that may have weakened the results. For example, question number 14 asks, “Are you aware of any special things that you have to do before taking nitroglycerin?” This question was used to explore responses that indicated the patient knew to sit or lay down prior to taking the drug. The wording of this question may not have effectively reflected that idea. In addition, the tool lacked specific questions related to the renewal of NTG prescriptions and proper storage of the drug. These factors need to be incorporated in a measurement tool to strengthen the results of a future study.

Although the results of this study revealed significant increases in knowledge for the older patients in the intervention group, there was no assessment of how this may influence medication compliance. Factors other than knowledge are involved in achieving medication compliance. For example, personal belief systems, motivation, and barriers will influence the patient’s ability or desire to comply (Champion, 1994). Future research needs to focus on the effects of individualized tailored instruction on compliance with the medication regimen.

Finally, this study did not evaluate how long the increase in knowledge lasted with the older patients. The posttest was conducted one week after discharge which is

too soon to evaluate lasting knowledge benefit. Testing patients at one, six, and twelve weeks would yield more information regarding long-term knowledge gain.

Implications for Nursing

When considering educational interventions for patients, it is important that nurses target populations with special needs. Learning principles are different based on individual growth maturation, age, educational background and many other factors. Teaching interventions may need to be different for older and younger patients. This study demonstrated that younger patients had a higher level of knowledge prior to the teaching and did not gain as much with the tailored teaching method of instruction. Conversely, older patients had a lower level of knowledge prior to the individually tailored instruction and experienced significant gains in knowledge. Older patients may respond more effectively to an individualized approach where the instruction is focused on specific areas of knowledge deficit. Age-related changes have the potential to affect an elderly person's ability to learn new material. For example, alterations in short term memory or sensory impairments may make it difficult for an older person to learn and retain new information. Modification of traditional teaching approaches to address special needs of the older patient will enhance the effectiveness of the teaching. Reinforcement of key concepts presented in small increments at frequent intervals may help to facilitate the learning process. The use of teaching aides that have pictures and few words would help to enhance recall.

When instructing older patients, nurses must take into consideration these factors as well as the principles of adult learning. For example, adults become more and more

self-directed regarding learning as they mature (Knowles, 1980). Prior experiences, developmental level, and social position can be a resource for learning. Adults are motivated to learn when the outcome of learning has an immediate application for them. Many older patients have had experience with changing health behaviors, therefore, evaluating methods that were helpful in the past provides a basis for the teaching intervention.

A focus on side effects and what action to take if they occur is important to include in any medication education. Side effects are difficult for patients to understand and remember because there are usually multiple side effects for each drug. The elderly patient usually takes many medications for chronic diseases. Because of the complexity, one teaching session may not be adequate for instruction on this topic. Follow-up phone calls could help to answer questions and assess proper understanding of medications and their side effects. Nurses must develop innovative methods to provide this education with follow up to ensure proper knowledge of side effects and what to do if they occur.

Nurse educators should incorporate the concept of individualized tailored teaching for the older patient into nursing programs. Nursing students need to become more skilled at using this approach as well as other methods of instruction in order to enhance their teaching skills. Assessment of learning needs and style should already be an integral part of any nursing program. Discussions regarding the nursing research already published on the subject can help to give the nursing students an appreciation for the value of individually tailoring the teaching sessions.

Support for this type of teaching method needs to come from nursing

administration in order to provide the necessary resources to the staff nurse. Budgeting to allow for the appropriate amount of time needed for bedside teaching ensures that the nurse can adequately implement this method. In addition, the proper tools necessary for instruction should be available such as booklets, audiovisual aids, and flip charts.

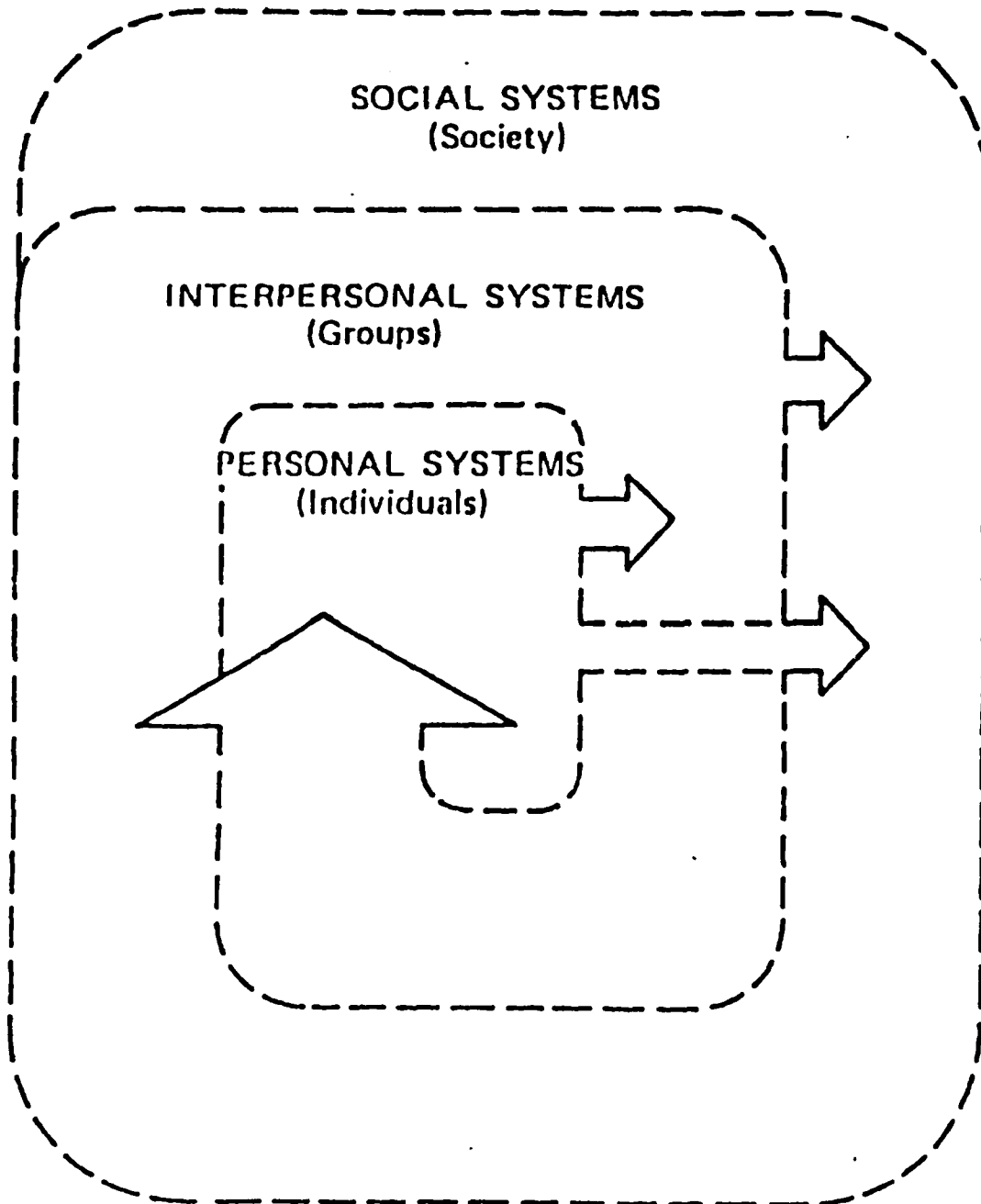
Nurses need to target and utilize a variety of approaches to enhance the effectiveness of education. Research in this area can focus on positive health outcomes that result from the increased knowledge of properly using SL NTG. Since there has been very little information published in this area, further nursing research on the effects of SL NTG tailored teaching and patient compliance is recommended. Larger randomized studies that also address cost savings due to fewer hospital visits and other positive outcomes is necessary.

Conclusion

Patient's misunderstanding of the proper use of SL NTG has contributed to many adverse reactions to the drug. Educational programs that address this issue are vital to enhance patient awareness and prevent misuse. As patient education becomes more of a challenge in the hospital setting, creative and flexible methods are needed to ensure that learning outcomes are achieved.

In every health care facility, older patients have become the primary consumers of care. This study suggests that older patients' level of knowledge regarding SL NTG use can be increased with the use of individually tailored and structured teaching prior to discharge from the hospital. Nurses who adopt this method of teaching for their older patients can significantly enhance the learning process.

Appendix A
Imogene King's Conceptual Model



From "A Conceptual framework for nursing: dynamic interacting systems," by I. M. King, 1971, *Toward a theory for nursing*, p.20. New York: John Wiley & Sons.

Appendix B

Medication Knowledge Questionnaire

Many people take many different kinds of medicine. I'd like to talk with you about the medicine that your doctor(s) have prescribed for you to take.

Objective 1. Name:

Tell me the name of the medicine(s) you are taking.

1. Correct
2. Does not know

Objective 2. Length of time:

How long have you been taking (this medicine)?

1. Under 6 months
2. Six months to 2 years
3. Over 2 years
4. Off and on for _____ days, months, years

Objective 3. Health problem:

What are you taking (this medicine) for?

1. Correct
2. Does not know

Objective 4. Benefits:

How does (this medicine) help (your symptoms)?

1. Correct
2. Does not know

Objective 5. Noncompliance:

What will happen if you do not take (your medicine)?

1. Correct
2. Does not know

Objective 6. Dosage:

How much (medicine) do you take?

1. Correct
2. Does not know

Objective 7. Time:

When do you take (your medicine)?

1. Correct
2. Does not know

Objective 8. Interfering factors:

Some people have told me that it is difficult to take their medicine because of many reasons. Are there times when you do not take (your medicine)?

1. Correct
2. Does not know

Why not?

- Physical factors (manipulative container)
- Structural factors (mobility and access)
- Individual factors (sensory deficits, memory)
- Environmental factors (refills)
- Financial factors (living on social security)

Objective 9. Modifying medication taking:

Sometimes people tell me that they change how much medicine they take or how often they take their medicine. Are there times when you increase or decrease the amount of (medicine) you take?

1. Yes
2. No

If yes,

Tell me about them _____
 Prompt for special instructions related to: food, activities, other medications.

1. Correct
2. Does not know

Objective 10. Resources:

Some people call their doctor or nurse for special instructions about their medicines. Who would you call if you had questions about (your medicine)?

1. Correct
2. Does not know

Objective 11. Side effects:

Sometimes medicine affects different people in different ways. Are there any side effects (this medicine) might have?

1. Yes
2. No

If yes,

What are they? _____

1. Correct

2. Does not know

What would you do about these (side effects)?

1. Correct

2. Does not know

What would you do to decrease these (side effects)?

1. Correct

2. Does not know

For which of these side effects would you call your doctor or nurse?

1. Correct

2. Does not know

Now let's change topics a little bit and talk about the things you may need to do before taking your medicine.

Objective 12. Pre-medication activities:

Are you aware of any special things you have to do before taking your medicine?

1. Correct
2. Does not know

Objective 13. Materials/equipment:

Sometimes people need special equipment or materials to take their medicine with. What materials or equipment do you need to take your medicine?

1. Correct
2. Does not know

Objective 14. Care of equipment:

How do you care for your equipment?

1. Correct
2. Does not know

Objective 15. Schedule:

How do you fit taking medicine into your daily routine?

1. Correct
2. Does not know

Evaluation

Objective 1.

Correctly states name of medication.

Objective 2.

Correctly states how long he/she has been taking medication.

Objective 3.

Describes relevant health problem.

Objective 4.

Gives a specific statement of benefit to his/her health from taking medication.

Objective 5.

States a negative consequence of not taking medication.

Objective 6.

States correct dosage of medication.

Objective 7.

States appropriate times to take medication.

Objective 8.

Identifies factors that may interfere with taking medication.

Objective 9.

Describes situations where modification in amount, timing, or elimination of taking medication are appropriate.

Objective 10.

Describes how to contact MD/RN for further information or special instructions related to food, activities, or other medications required while taking this medication.

Objective 11.

Identifies a major side-effect.

Objective 12.

Identifies any activities required before taking medication.

Objective 13.

Identifies material/equipment needed for medication administration.

Objective 14.

Describes appropriate care for medication/equipment/materials.

Objective 15.

Describes how they incorporate medication administration into daily schedule.

Appendix C
Medication Knowledge Tool
Interview and Assessment

I'd like to talk to you about the medication nitroglycerin that your doctor has prescribed for you to take.

(14)Objective 1. Length of time:

How long have you been taking nitroglycerin?

1. Under 6 months
2. Six months to 2 years
3. Over 2 years

(15)Objective 2. Health problem:

What are you taking nitroglycerin for?

1. Correct
2. Does not know

(16)Objective 3. Benefits:

How does nitroglycerin help your symptoms?

1. Correct
2. Does not know

(17)Objective 4. Noncompliance:

What will happen if you do not take the nitroglycerin?

1. Correct
2. Does not know

(18)Objective 5. Dosage:

How much nitroglycerin do you take?

1. Correct
2. Does not know

(19)Objective 6. Time:

When do you take nitroglycerin?

1. Correct
2. Does not know

(20a)Objective 7. Interfering factors:

Some people have told me that it is difficult to take their nitroglycerin because of many reasons.

Are there times when you do not take nitroglycerin?

1. Correct
2. Does not know

(20b)Why not? _____

- (1)Physical factors (manipulative container)
- (2)Structural factors (mobility and access)
- (3)Individual factors (sensory deficits, memory)
- (4)Environmental factors (refills)
- (5)Financial factors (living on social security)

(21a)Objective 8. Modifying medication taking:

Sometimes people tell me that they change how much medicine they take or how often they take their medicine. Are there times when you increase or decrease the amount of nitroglycerin you take?

1. Yes
2. No

(21b)Tell me about them _____

- (1)Takes > 1 tablet at time
- (2)Takes > 3 tablets for relief
- (3)Takes total of 1or 2 tablets without relief

(22)Objective 9. Resources:

Some people call their doctor or nurse for special instructions about their medicines. Who would you call if you had questions about your nitroglycerin?

1. Correct
2. Does not know

(23a)Objective 10. Side effects:

Sometimes medicine affects different people in different ways. Are there any side effects nitroglycerin may have?

1. Yes
2. No

(23b)If yes, what are they? _____

- (1)Headache
- (2)Dizziness
- (3)Rapid heart beat
- (4)Flushed feeling
- (5)Does not know

(24)Objective 11. Side effects:

What would you do about these (side effects)?

1. Correct
2. Does not know

(25)Objective 12. Side effects:

What would you do to decrease these (side effects)?

1. Correct
2. Does not know

(26)Objective 13. For which of these side effects would you call your doctor or nurse?

1. Correct
2. Does not know

(27)Objective 14. Pre-medication activities:

Are you aware of any special things that you have to do before taking nitroglycerin?

1. Correct
2. Does not know

Appendix D
Demographic Data Sheet

ID# _____

1. Age _____

2. Gender: Male___ Female___

3. Single___ Married___ Divorced___ Widowed___ Separated___

4. Ethnic race: Caucasian___ Black___ Native American___ Asian___ Hispanic___

5. What is the highest grade or year of school you have completed?

| | <u>years completed</u> |
|---------------------------------|-------------------------|
| None | 00 |
| Elementary | 01 02 03 04 05 06 07 08 |
| High school | 09 10 11 12 |
| College/technical school | 13 14 15 16 |
| Some graduate school | 17 |
| Graduate or professional degree | 18 |

6. Have you had instruction in how to take SL NTG? Yes___ No___

If yes, by whom?

Physician___

Nurse___

Pharmacist___

Office staff___

Appendix E Informed Consent

The study in which you are being asked to participate in is designed to learn more about the ways in which patients understand the use of sublingual (under the tongue) Nitroglycerin. The information gained is expected to help nurses provide the kind of medication teaching that patients need. This study is being conducted by Nancy Rogers, RN, a graduate nursing student at Grand Valley State University. The Grand valley State University Human Subject Review chairperson is Dr. Stein.

If you are willing to participate, please read and sign the following statement:

1. Participation in this study will involve two sessions where you will be asked to answer 14 questions by Nancy Rogers. The first session will take place while you are in the hospital, and the second session will involve a phone call one week after you go home.
2. It is not anticipated that this study will lead to physical or emotional risk to yourself.
3. The information you provide will be kept strictly confidential and identification of individual participants will not be possible.
4. A summary of the results will be made available to you upon your request.

I acknowledge that:

“ I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction.”

“ In giving my consent, I understand that my participation in this study is voluntary and that I may withdraw at any time without affecting the care I receive from my physician or the staff at Munson Medical Center.”

“ The investigator, Nancy Rogers, has my permission to review my hospital record.”

“ I hereby authorize the investigator to release the information obtained in this study to scientific literature. I understand that I will not be identified by name.”

“ I have been given the phone number of Nancy Rogers so that I may contact her at any time if I have questions.”

“ I acknowledge that I have read and understand the above information, and that I agree to participate in this study.”

Witness

Participant Signature

Date

Date

☐ I am interested in receiving a summary of the study results.

Appendix F
List of interview prompts

- Objective 1. How many years have you been taking (or have had a prescription for)SL NTG?
- Objective 2. What was the reason your doctor prescribed it for you?
- Objective 3. How does the Nitroglycerin help you to feel?
- Objective 4. Will you feel differently if you do not take the Nitroglycerin?
- Objective 5. How many tablets do you take?
- Objective 6. At what times do you take the Nitroglycerin?
- Objective 7. Are there times when you have difficulty with taking it or chose not to when maybe you should?
- Objective 8. Do you take it in a different way than was originally instructed?
- Objective 9. If you had questions about how or when to take your Nitroglycerin, who would you call?
- Objective 10. Are you aware of any uncomfortable side effects with Nitroglycerin?
- Objective 11. If you developed any side effects from it what would you do?
- Objective 12. What kinds of things could you do to lessen the side effects?
- Objective 13. When would you call the doctor or nurse if you experienced any side effects?
- Objective 14. Do you need to do anything before taking it?

Appendix G

Nitroglycerin Teaching Tool

I. Reasons for SL NTG use

Every patient is unique, and has a specific reason for needing SL NTG. Patients may experience chest pain that is sharp, dull, or heavy. They may describe chest discomfort that is not painful such as an ache or feeling of fullness. Some patients experience respiratory discomfort such as shortness of breath that indicates a need for SL NTG. Sometimes the discomfort travels to the arm or neck or back. It is common for patients with coronary artery disease to receive a prescription for SL NTG to help control symptoms of angina or chest pain or discomfort.

(discuss and clarify the reason(s) this patient has a SL NTG prescription. Identify the specific symptoms that the patient experiences.)

II. How SL NTG works

SL NTG relaxes the heart's blood vessels to allow more blood and oxygen to get to your heart. This keeps your heart from working too hard. SL NTG works quickly (usually within 3-5 minutes) to relieve angina, chest pain or discomfort.

III. When to take SL NTG

Only take SL NTG when you have chest pain or discomfort, (or patients anginal equivalent).

It is very important that you take the drug as your doctor prescribed it for you. Some patients are instructed to take SL NTG 10-15 minutes before certain activities that bring on symptoms such as walking, climbing up stairs, or sexual activity. (Discuss the instructions that the patient received). **Do not** take SL NTG for symptoms such as a weak, fast or strong heart beat, palpitations, dizziness, fainting, or sudden weakness. Also, do not take it for unusual symptoms for you such as shortness of breath.

IV. How to take SL NTG

As soon as you feel chest discomfort or pain (or patients anginal equivalent), ***SIT or LAY DOWN*** first, and put 1 pill under your tongue, and wait for it to dissolve. Do not swallow or chew the pill. Do not eat, drink, or smoke while the NTG is in your mouth. Effects should begin in 1-3 minutes. If the pain doesn't stop after 5 minutes, put another pill under your tongue. Continue to sit or lay down and wait 5 minutes. If there is no relief after taking 3 SL NTG pills, call your doctor or go to the nearest hospital emergency room. ***Do not drive yourself.*** If you take SL NTG before activity, take it just the way your physician told you (discuss and clarify specific instructions).

V. What happens if you don't take SL NTG when you need it

Some patients decide not to take SL NTG for their symptoms and experience long episodes of discomfort. If you ignore or don't treat your symptoms, you may be placing yourself at risk for prolonged discomfort and even heart damage.

VI. Modifying the dose or frequency

Do not take SL NTG any other way than how we just talked about it. For example, do not take 2 pills at a time, take it more than 5 minutes apart, take more than 3 pills, take it while eating, or stop at 1 or 2 pills when 3 are needed. SL NTG can be taken at any time of the day that you experience symptoms and will not interfere with your other medications.

VII. Side effects and what to do

Some people have experienced uncomfortable side effects of SL NTG such as a slight headache, a warm, flushing feeling, dizziness, or rapid heart beat. If you get a headache, after taking SL NTG, your doctor may tell you to take tylenol or other over-the-counter mild pain reliever. Try lying down in a quiet place. Call your doctor if the headache won't go away. The flushing feeling will go away on it's own. To keep from feeling dizzy, stand or sit up slowly. If you get dizzy anyway, or feel rapid heart beats, lie down until the symptoms go away. To reduce the chances for side effects: a) unless you are on a fluid restriction (clarify with patient), be sure to drink plenty of fluids throughout the day, b) always sit or lay down before taking SL NTG, c) do not take for other symptoms that are not related to your chest pain or discomfort.

VIII. Special instructions

Always keep SL NTG with you in case you experience chest discomfort or pain (or patient's anginal equivalent). Take enough with you when you travel, and for weekends and holidays.

This drug is for you only - do not share it with anyone else. Use it only as your doctor prescribed. Keep this and all other drugs away from children. Keep the drug in the original bottle, but throw the cotton plug away. Don't use outdated SL NTG. Check the date on the label. SL NTG loses it's strength after 6 months. Write the date you opened the bottle on the label so you know when 6 months is up. The pills may produce a tingling, sweet, or slight burning sensation under the tongue when used. This is normal and means that the drug still has strength. One sign of outdated drug is the lack of this sensation. Store the bottle in a dark, dry place - but not in the refrigerator or bathroom.

IX. Who to call for questions

If you have questions or concerns about how to use SL NTG, call your doctor's office. Someone at the office will see to it that you receive the information you need. Call your doctor right away if you experience fainting or extreme dizziness, trouble breathing, a feeling of extreme pressure or pounding in your head, seizures, weak or fast heartbeat, blurry eyesight, a rash or fever.

INFORMATION ABOUT YOUR MEDICATION

Munson Medical Center
Pharmacy
1105 Sixth Street
Traverse City, Michigan 49684
(616) 935-6580

Prepared For:

Medication: NITROGLYCERIN TAB SUBL 0.4

Date:

Prescriber:

NITRATES TABLETS - SUBLINGUAL

USES: Nitroglycerin relaxes blood vessels allowing more blood to flow through. This reduces the workload on the heart and improves blood flow to the heart. Sublingual nitroglycerin tablets act quickly to relieve angina (chest pain).

HOW TO TAKE THIS MEDICATION: At the first sign of chest pain, sit down and place one tablet under the tongue or between your cheek and gum allowing it to dissolve. The drug is absorbed directly through the lining of the mouth. Do not chew or swallow the tablet. Do not eat, drink or smoke while the nitroglycerin is in your mouth. Effects should begin in 1 to 3 minutes. If after 5 minutes there is no relief of chest pain, take another tablet. If there is no relief after taking three tablets, call your doctor immediately or go to a hospital emergency room.

SIDE EFFECTS: Headache, dizziness, flushing, and rapid heartbeat may occur. These effects may subside as your body adjusts to the medication.

The sublingual tablets may produce a sweet and slight burning sensation when placed under the tongue.

PRECAUTIONS: This drug appears to be safe when used during pregnancy, but should be used only if clearly needed. It is not known if nitroglycerin appears in breast milk. Consult your doctor before breast-feeding. Avoid excessive amounts of alcohol as this may worsen side effects. Do not smoke!

DRUG INTERACTIONS: Inform your doctor about all the medicines you use especially if you take medicine to treat high blood pressure, drugs to dilate your blood vessels or drugs to treat migraines (ergot alkaloids) as your dose may need to be adjusted.

NOTES: Carry this medication with you at all times. Remove the cotton from the bottle when first opened and discard it. Replacing the cotton can lead to loss of potency of the drug.

MISSED DOSE: This medication is used only at the onset of an attack of chest pain or 10 to 15 minutes before engaging in an activity that may cause chest pain. This medication is not for routine use.

STORAGE: Store this medication at room temperature away from heat and moisture. Keep out of sunlight. Store in its original glass bottle. The tablets are effective for only 6 months after opening. Do not store in the bathroom.

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