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THE DEVELOPMENT OF A HOME ENTERAL NUTRITION SELF-CARE
EDUCATION INSTRUMENT WITH MODIFIED READABILITY LEVEL,
AND DESIGN OF A PILOT STUDY TO EXPLORE ITS RELATIONSHIP
TO PATIENT/SIGNIFICANT OTHER RECALL AND COMPREHENSION

Volume I

By

Debra L. Schipper

A SCHOLARLY PROJECT

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Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE IN NURSING

COLLEGE OF NURSING

1988

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ABSTRACT

THE DEVELOPMENT OF A HOME ENTERAL NUTRITION SELF-CARE EDUCATION INSTRUMENT WITH MODIFIED READABILITY LEVEL, AND DESIGN OF A PILOT STUDY TO EXPLORE ITS RELATIONSHIP TO PATIENT/SIGNIFICANT OTHER RECALL AND COMPREHENSION.

By

Debra L. Schipper

A Home Enteral Nutrition patient/significant other education manual was developed, with a readability level of the fifth grade or below, and an experimental pilot study was designed to explore the relationship between the readability of study instruments and learner recall and comprehension of information provided. This instrument will be compared to a similar patient education manual, with a tenth to twelfth grade readability level. Tool development was based on a review of pertinent literature and the author's experience. Data from the Medical Record Review, the Sociodemographic Survey and study post-tests would provide answers to the research question presented. Potential analysis of data includes the use of descriptive and inferential statistics. Significant study findings would assist the Family Clinical Nurse Specialist in developing Home Enteral Nutrition educational materials and teaching strategies, which facilitate learner recall and comprehension, so that the highest possible level of self-care may be achieved.

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I would like to express my deep appreciation to my committee chairperson, Jackie Wright, and committee persons, Brigid Warren and Patti Peak for their assistance and encouragement in completing this scholarly project. I would also like to thank my husband, Roger, for his patience and support, and my daughter, Angie Cederquist, who acted as project photographer.

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CHAPTER I

THE PROBLEM

Introduction

Enteral feedings have been established as a safe, effective, and inexpensive method of providing nutritional support for persons who have functioning gastrointestinal tracts but are unable to consume adequate nutrients by mouth (Chrysomilides and Kaminski, 1981; Dobbie and Butterick, 1977; Kaminski, 1976).

A natural extension of in-hospital enteral nutritional support is Home Enteral Nutritional Support. Statistics on home care indicate that approximately 7,500 persons receive Home Enteral Nutrition, which is projected to have a 27% increase in the next three to five years (Rucker and Holmstedt, 1984).

Multiple factors have influenced the recent increased emphasis on this method for maintaining adequate nutrition. Greene, et al. (1981) note the importance of nutrition in total management of patients diagnosed with chronic disease. The authors propose

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continuous home enteral feedings to combat disease related malnutrition in these patients.

As the mean age of the population increases, so does the number of individuals who may benefit from this therapy. By the year 2030, it is expected that the number of persons over age 65 will double, from 1980's figure of 24.5 million to 55 million (United States Senate, 1981). 95% of the people, age 65 or older live in the community (Neely and Patrick, 1968; Schwartz, et al., 1962). Little information on the management and effects of enteral nutrition in this population is available, because elderly persons have frequently been excluded from major nutrition studies (Sherman, et al., 1983).

There is also an increase in the number of children with chronic diseases secondary to advances in medical technology (Elbert, 1980; Pless, 1971). It is estimated that 10 (Pless, Roghman, and Haggerty, 1972), to 30 or 40 percent (Mattsson, 1972) of the children in America, age birth to 18 years, are afflicted with chronic conditions.

Changes in health care provision and practices secondary to the adaptation of the Prospective Payment System (PPS) or Diagnosis Related Groups (DRG's) by the

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Federal Government have also influenced the increased interest in Home Enteral Nutrition. This program places emphasis on earlier patient discharge to decrease hospital length of stay (Mandel and Worthley, 1986). The outcome is that patients now leave the acute-care setting earlier and sicker, often with complicated medical regimens and equipment (Feldman and Goldhaber, 1984; Kittleberger, Foltz and Shields-Kyle, 1985). Under this plan, Joel (1983) states that our primary concerns become the development of community and family support systems, teaching, counselling, and functional ability and self-care (p. 563).

"For home tube feedings to succeed, the patient (or someone the patient is close to) must be capable of and committed to learning and carrying out the prescribed nutritional plan" (Bayer, Scholl, and Ford, 1983, p. 1321). Two problems which interfere with the ability of the patient/significant other to be taught and to learn information and procedures necessary for safe and effective Home Enteral Nutrition are: (1) there are currently no standards for patient education materials and outcome measurement; and (2) reviews of the readability of written health information for patients indicate that material is written above the

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eighth grade reading level (Doak and Doak, 1980; Liquori, 1978; Spadero, Robinson and Smith, 1980), while comprehension tests indicate that 50% of the learners have difficulty with or cannot read materials written at the fifth grade level (Doak and Doak, 1980).

The purpose of this project is to: (1) develop a self-care education booklet, with learner-adjusted readability, for Home Enteral Nutrition patient education; and (2) design a pilot study to explore the relationship of this Home Enteral Nutrition Self-Care Education instrument with patient/significant other recall and comprehension of the principles and procedures of Home Enteral Nutrition.

Background

The use of tube feedings for "the restoration and maintenance of an adequate nutritional status in patients unable to eat by mouth" (Boles and Zollinger, 1952, p. 358) is not a new concept. Bliss (1882) reports the use of nutrient enemas by early Egyptians to preserve health. A tube feeding method was described by Aquapendente in 1677, including a picture of a feeding tube (Pareira, 1954).

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and formulas have been modified to decrease the complications associated with historic feedings and to increase the effectiveness of enteral feedings (Cataldo and Smith, 1982).

Although much progress has occurred in the refinement of techniques, serious complications continue to exist, of a mechanical, gastrointestinal, or metabolic nature (Haynes-Johnson, 1986; Slater and Goldfarb, 1984; Torosian and Rombeau, 1980). The type, frequency, etiology, and severity of complications in Home Enteral Nutrition are relatively unknown. "Comprehensive patient education and adherence to defined procedures" (Jensen, 1982, p. 20), may minimize the complications of Home Enteral Nutrition.

Historically, clinicians have measured compliance/adherence to medical regimens in assessing the effectiveness of patient education. Studies demonstrating noncompliance rates of 20 to 60% (Glanz and Scholl, 1982) have led health care professionals to deduce that Patients are rarely motivated to carry out self-care Practices (Taylor, Sheldon, and Czajkowski, 1982). "Motivational explanations of noncompliance may have merits but this may also represent a tendency to overattribute motivational causes to observed behavior"

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(Taylor, Shelton and Czajkowski, 1982, p. 305). Taylor, et al. (1982) contend that misunderstanding or lack of understanding concerning the requirements and rationale of treatment is a more plausible reason for noncompliance than considering patients as intentionally engaging in behaviors which are self destructive.

Many researchers are now addressing patient education, knowledge and comprehension as variables influencing adherence. Non-comprehension of patient education information (Parkin, Henney, Quirk, and Crooks, 1976), has been associated with non-adherence. A decrease in recall and comprehension have been related to increased complexity of the information and length of teaching/learning sessions (Kishi, 1982); whereas, recall, comprehension, and adherence were increased when written advice was provided to the learner (Ellis, Hopkin, Leitch, and Crofton, 1979; Ley, Jain, Skilbeck, 1976). Many patients have been unable to demonstrate knowledge and skills following patient education programs (Miller, et al., 1972). This lack of recall and comprehension may be related to the use of medical terminology and/or the readability of patient education materials. Approximately 75% of the persons in need of patient education may be only fairly knowledgeable or

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Doak and Doak (1980) note that most written educational materials are designed at the eighth grade level or above, which is an unsuitably high level for comprehension by the majority of patients. This problem is especially poignant when considering that at least 20% of the persons living in the United States are not able to read written material at the fourth or fifth grade level (Bormuth, 1973-1974; Harman, 1970). In 1974, the National Institute of Education reported that 12 million persons, aged 14 and older, were not able to read as well as most fourth grade students (Eaton, 1974). The older learner's reading ability may be affected by less years of formal education (Beal, 1980).

Significant differences have been reported between stated years of education and actual reading comprehension (Streiff, 1986). Recall and comprehension of educational information are increased when the readability level of written information is modified (Eaton and Holloway, 1980). Eaton and Holloway (1980) conclude that information "should be written in the simplest manner possible in order that it be understood and judged as understandable by patients" (p. 242).

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A readability assessment of a convenient sample of five Home Enteral Nutrition patient teaching materials was performed by this author, utilizing the Flesch Readability Formula (Spadero, 1983). The reading ease of these materials varied from grade level 7 to the college level, with four of the five patient teaching instruments at the 8th grade level or above. These results are consistent with the aforementioned statistics on readability of patient health education materials. A significant finding was that reading levels varied throughout each text, often to a remarkable degree, which supports Spadero's (1983) findings. In the teaching materials, there was often a poor correlation between the number of technical terms included and the assessed reading level. It is this author's opinion that the assessed materials are representative of the state of the art in Home Enteral Nutrition patient education materials, exemplifying the need for modification and simplification of the reading levels of written material.

Nurses have a professional and legal responsibility to provide patient education, which has been established by the American Nurses' Association (1954), the New York State Nurse Practice Act (Bullough, 1977),

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From a legal perspective, Creighton (1985) states that, "for the prevention of accidents and disease, for the maintenance in optimum condition of many persons with chronic illnesses and for the restoration to their optimum condition of the injured and those with disabling conditions such as strokes, patient teaching by nurses is most necessary" (p. 12). Brent (1985), Creighton (1985) and Cushing (1984) discuss the legal aspects of patient education, and its impact on professional nursing practice. These authors cite several court cases in which nurses were held liable for the sequela of inadequate patient education. As a result of the noted litigation, they recommend providing written instructions for the client as an adjunct to verbal explanations and discussion, especially when instructions are extensive or complex.

As the nurse has responsibility for patient education, the patient has the right to education as established in the American Hospital Associations' (1973) publication, A Patient's Bill of Rights, and hospital regulation (Griner and Ford).

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rights precipitated a change in health care professionals and society's views of patients' responsibilities. Naisbett (1982) in Megatrends, notes that we are currently at the midpoint between an industrial society and an information-giving society. Inherent in this shift is the change from "Institutional Help" to "Self Help," which emphasizes patient education. An outcome of this process, as stated by Anthony (1985), is that "the shift from Short-Term to Long-Term implies the movement from short-term treatment of illness to the long-term attainment of wellness" (p. 24).

The literature notes several educational programs which emphasize self-care (Graham and Schubert, 1985; Green, Werlin, Schauffler, and Avery, 1977; Kubly and McClellan, 1984; Lorig, Lauren, and Gines, 1984; Maternity Center Association, New York City, 1978; Perras and Zappacosta, 1982; Sehnert, 1974). Reported benefits related to self-care education include an increased sense of patient satisfaction and prevention of complications (Perras and Zappacosta, 1982); decreased emergency room visits for symptom control (Green, Werlin, Schauffler, and Avery, 1971); increased knowledge and decreased pain, disability and physician visits (Lorig, Lauren, and Gines, 1984); and decreased

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Self-care is implicit in Home Enteral Nutrition. Though the term self-care is not used, authors (Bayer, Scholl and Ford, 1983; Jensen, 1982; Slater and Goldfarb, 1984) cite the need for patient education concerning: (1) care and maintenance of the feeding tube; (2) preparation, storage and infusion of the enteral feeding formula; (3) techniques of managing the feeding pump; and (4) identification of potential mechanical, gastrointestinal and metabolic complications and intervention techniques. As the patient and significant other ultimately manage the therapy at home, and are expected to identify and report significant problems, they are practicing self-care.

The outcome of self-care education in Home Enteral Nutrition has not been specifically studied. Most researchers report the rate of complications, as previously addressed and alterations in nutritional status. Home Enteral Nutrition studies demonstrate the effectiveness of this therapy in decreasing gastrointestinal symptoms, improving metabolic status, and in improving physical endurance (Heymsfield, Smith-Andrews, and Hirsch, 1983). This and other research

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support acceptance of Home Enteral Nutrition as an effective method of treatment, however, it does not clearly delineate the impact of self-care patient education.

Many patients who are potential candidates for Home Enteral Nutrition have chronic or terminal diseases. This complicated moral and legal issue may significantly impact that population's access to treatment, maintenance of therapy and follow-up.

In conclusion, Home Enteral Nutrition is a form of therapy which may potentially benefit a growing population of persons with chronic disease by improving their nutritional status and quality of life. Patient self-care education is paramount in the success of this therapeutic modality. Defining and altering the methods of written instruction may be a key component in improving patient comprehension, compliance, and satisfaction. This modification has the potential for decreasing complications associated with enteral feeding and increasing the self-care abilities of the patient/significant other. While this form of therapy is shrouded by many legal, ethical, and moral issues, the right of the patient to be educated has been well established.

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Problem Background

The methods and content of Home Enteral Nutrition patient teaching vary from institution to institution and nurse to nurse. The hospital in which this project booklet will be utilized practices primary care nursing with most patient education being provided by the primary nurse. An enteral patient teaching booklet produced by a dietary company (readability level 8-9th grade, bordering 10-12th grade level) is available to the nurses through the Nutritional Support Services, however, the nurse coordinator of this specialty reports that it is rarely utilized. The disuse of this educational tool is primarily a result of the opinion of the users that it is too lengthy, covers much materials not pertinent to specific patients and excludes other information which is felt to be necessary for comprehensive patient education.

The number of patients participating in this program is unknown. The Nutrition Support Coordinator perceives that the number of patients discharged on enteral feeding is small, however, lack of interaction

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with this group of patients may provide a deflated estimate of the population of patients served. The University Hospital has 651 beds with many specialty services, including long-term care, cardiology, nephrology, neuromuscular, medical and surgical oncology, neonatology, pediatrics, and high-risk obstetrics, plus a large radiology and oncology outpatient clinic.

Few publications note the number of patients receiving Home Enteral Nutrition from their institution. Those providing statistics on patient populations often do not indicate the size of their hospital and specialty services, which makes estimating potential patients numbers by correlation difficult. A review of the literature indicated that Home Enteral Nutrition is commonly employed in: (1) gastrointestinal diseases, i.e., inflammatory bowel disease, pancreatitis, fistulas, and malabsorptive syndromes, (Heymsfield, Horowitz, and Lawson, 1986; Heymsfield, Smith-Andrews and Hirsch, 1983); (2) Oncology, especially head and neck tumors (Rains, 1981); and (3) Neurologic impairment with dysphagia and/or altered gastrointestinal motility (Nelson, Palumbo and O'Brien, 1986). The congruity of the University Hospital patient

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specialties and documented specialties utilizing Home Enteral Nutrition Support suggest that there is a great potential for the employment of this therapy and educational program.

Problem Statement

Through review of the literature and personal experience, the following problems have been identified related to Home Enteral Nutrition patient education: (1) there is currently a lack of available educational instruments, which have learner-adjusted readability; and (2) no information exists concerning the relationship between patient education tools and the recall and comprehension of the learner.

Although this therapy has been deemed safe and effective, significant complications continue to be reported, and many questions remain unanswered. If, as suggested by several authors, recall and comprehension are increased by modifying the reading level of written materials, and complications are decreased, then designing a Home Enteral Nutrition teaching manual based on this principle should be beneficial to patients/significant others in improving recall and comprehension. This acquisition of knowledge and

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skills may lead to increased self-care skills, increased adherence to therapeutic regimen by patient and significant other, decreased nutrition-related complications, and increased patient/significant other satisfaction.

The major question which arises from current research, experience, or lack of both is:

1. Does altering the readability level of written Home Enteral Nutrition patient education materials to the fifth grade level or below increase learner recall and comprehension?

Hypotheses

1. Altering the readability level of written Home Enteral Nutrition patient education materials from the 10th-12th grade level to the 5th grade or below level will significantly increase learner recall of information provided.
2. Altering the readability level of written Home Enteral Nutrition patient education materials from the 10th-12th grade level to the 5th grade or below level will significantly increase learner comprehension of information provided.

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Purpose of the Study

The purpose of this project is to develop a Home Enteral Nutrition Self-Care Education manual, with learner-adjusted readability, and design a pilot study to implement the instrument. Study instruments will be developed and/or adapted, and possible analyses suggested to explore the relationship between the Home Enteral Nutrition Self-Care Education manual and patient/significant other recall and comprehension of information presented.

Definition of Concepts

The variables which will be addressed in this project include: (1) Home Enteral Nutrition patient education; (2) readability of patient education materials; (3) recall of information taught in the Home Enteral Nutrition patient education instrument; and (4) comprehension of Home Enteral Nutrition patient education material.

Home Enteral Nutrition Patient Education. In this study, Home Enteral Nutrition refers to all patients who are discharged from the hospital to their home (or a significant other's) with a feeding tube, through which required nutrients are provided. The definition of patient education in these patients will be consistent

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with the literature, which utilizes the term to represent "any activity by which the nurse helps her clients...to learn or understand the various aspects of health and illness" (Pohl, 1965, p. 5). It also includes "the plan of action designed to bring about learning or that allows it to occur" (Kittleberger, Foltz, and Shields-Kyle, 1985, p. 35).

Readability. "Readability may be defined as all the elements of written material that affect the extent to which readers understand it, read it at an optimum speed, and find it interesting. Such elements of written material include primary structural elements such as vocabulary, sentence length and grammatical complexity, and design elements such as page and type size, line spacing, margins, contrast, color and illustrations or graphics. These elements interact to affect readability" (Liquori, 1978, p. 712, 714).

Recall. Recall refers to the person's ability to remember information provided. It may be distinguished from comprehension in that it is related to rote learning or memorization of content and does not include translation, interpretation or extrapolation of the information presented.

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Comprehension. Although several authors have studied patient comprehension, they uniformly fail to define the term. For the purposes of this study, comprehension will refer to the "capacity for understanding ideas, facts, etc." (Guralnik, 1974, p. 292), "such that the individual knows what is being communicated and can make use of the material...beyond the data given to determine implications, consequences, corollaries, effects, and so forth which are in accordance with the conditions of the original communication" (Smith, 1987, p. 140).

Assumptions Related to Instrument Development

1. Home Enteral Nutrition is a form of therapy which is associated with serious complications.
2. Decreasing the complications secondary to Home Enteral Nutrition may improve the quantity and quality of the recipient's life.
3. There are currently no studies which have evaluated patient/significant other comprehension of Home Enteral Nutrition teaching materials. Thus, the effectiveness of educational materials and methods is unknown.
4. Patients/significant others may fail to comprehend written materials for reasons other than poor design

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Assumptions

1. All subjects are receiving Home Enteral Nutrition via feeding tubes as a method of nutritional support.
2. All subjects are able to read at the fifth grade level.
3. All subjects will honestly answer designed questions.
4. The teaching booklet is consistent with established methods of patient teaching.
5. Instruments are sensitive enough to measure recall and comprehension.
6. Patients/significant others desire information related to their illness, its treatment and expected outcome.
7. Patient education is necessary and beneficial.
8. All nurses are teachers.

Limitations

1. This research project will not be implemented at this time.
2. Patient education materials were designed for a 651 bed northeastern university hospital. Although this

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booklet reflects concepts in patient education and Home Enteral Nutrition, it may not be consistent with the perceived instructional needs of patients in other settings.

3. The instruments have not been tested, and therefore, lack reliability and validity. Their components, however, reflect an overview of the literature and this author's twelve years experience in Home Enteral Nutrition.

4. There are currently no standards regarding the readability of Home Enteral Nutrition patient education materials. Factors affecting reading ease, which are not measured in the study, may negatively impact outcomes, i.e., unfamiliar terminology.

5. Design of the instrument was based on the assumed needs of the patient population as indicated by the literature and this author's experience, and may not be consistent with the actual learning needs.

6. Patients/significant others who participate in the study may differ from those who decline, which may influence assumptions concerning recall and comprehension of written educational materials.

7. Other variables not identified by the researcher may be more significantly related to learner recall and

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8. Readability formulas may not measure all factors impacting the ease with which materials are read, however, their use is accepted in the literature.

Overview of Chapters

This project is explored in five chapters. Chapter I includes the introduction to the topic being studied, background information related to the subject, identification of the problem and purpose of the study with problem statement, definition of concepts, assumptions, and limitations of the study. In Chapter II a conceptual framework is presented as well as the relationship of nursing and learning theories to clinical practice. A review of related literature and research is presented in Chapter III. Chapter IV includes a description of the research design, methods and rationale. A summary is provided in Chapter V, which includes implications of the project for advanced nursing practice and primary care nursing.

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CHAPTER II

CONCEPTUAL FRAMEWORK

Overview

This chapter will address the concepts of Home Enteral Nutrition patient education and the related Concepts of recall, comprehension, and readability. Proposed relationships between concepts will be delineated, as well as the relation of concepts to theory. Dortha Orem's (1980) self-care theory provides a pragmatic, clinically oriented, and well-defined method for examination, explication, and application of related concepts. The importance of patient education in self-care is noted frequently by Orem (1980); however, self-care education has not been fully conceptualized by the author. There is currently no known theory of Home Enteral Nutrition self-care education or conceptual framework. As it is implied (Orem, 1980) or stated (Hill and Smith, 1985; Levin, 1978) that self-care and patient education differ significantly in their focus, construction of a conceptual framework of Home Enteral Nutrition self-care education is

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imperative for comprehensive understanding of concepts and their relationships. A conceptual framework for Home Enteral Nutrition self-care education will be proposed, based on learning and self-care theories. The relationships of these theories, the proposed conceptual framework, and concepts will be discussed, embracing their application to nursing practice.

Relationships of Concepts

Home Enteral Nutrition Patient Education refers to "any activity by which the nurse helps her clients...to learn or understand the various aspects of health and illness" (Pohl, 1965, p. 5). This process also included "the plan of action designed to bring about learning or that allows it to occur" (Kittleberger, Foltz, and Shields-Kyle, 1985, p. 35). Recipients of this education are all persons who will be discharged from the hospital to their home (or a significant other's) with a feeding tube, through which required nutrients are provided. Following hospital discharge, the patient/significant other is responsible for performing feeding-related techniques and self-monitoring in the home.

There is currently no conceptual framework for Home Enteral Nutrition patient education. The field of

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specialized nutritional support and home nutritional support was established little more than a decade ago. Nursing research related to nutrition is in its neophyte state, with Home Enteral studies primarily of a descriptive or exploratory nature.

Patient education is presently undergoing conceptual changes related to the recent trend of self-care. Several authors have attempted to differentiate patient education from self-care education. The most simplistic and understandable response to this query is provided by Levin (1978), who states that "patient education focuses on what the professional thinks is good for the patient, whereas self-care education is determined by what the learner perceives as his needs and goals" (p. 170). Patient education is viewed as illness-oriented, rather than wellness-oriented. Further, Rankin and Duffy (1983) discuss the differences between patient teaching and patient education, emphasizing that patient teaching refers only to one element of the educational process, providing information to the learner. In contrast, patient education is a process with many components, which is holistic in nature, considering patient needs, mutual goal setting, and evaluation of learning benefits to the patient.

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Components of self-care have been incorporated, in varying degrees, in patient education conceptual frameworks. An eclectic approach has been taken in the design of patient education conceptual frameworks. The theoretical basis appears to reflect personal ideation of the congruencies of various theories and individual beliefs, thus theoretical bases vary considerably.

Learning theory is commonly employed to provide organization and explain the dimensions of patient education. Smith proposes that the use of learning theories in patient education provides a basis for logical decision-making which increases the likelihood of behavioral change (1987). Learning theory-related instructional theories, such as cognitive construct instructional approaches and principles of learning instructional theories, have also been incorporated into patient education conceptual frameworks (Redman, 1984). Setting mutual educational goals and providing feedback assists the patient in becoming "self-directed" (Redman, 1984, p. 90) or in assuming self-care. The theory of adult education (Knowles, 1973) assists nurses in differentiating the adult from the child learning. Assumptions concerning the adult learner are pertinent to self-care: (1) he is self-directed and is

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capable of making decisions and assuming responsibility; (2) life experiences enrich assets for learning; (3) readiness to learn is related to tasks and social roles; (4) problem-oriented learning which can be used immediately is preferred; and (5) self-esteem is related to productiveness (Rankin and Duffy, 1983).

The self-care movement has added a new dimension to patient education conceptual frameworks. Based on the self-care theory (Orem, 1980), authors of patient education texts are moving from illness to wellness Orientation; questioning the concept of compliance; Focusing greater attention on mutual assessment, planning, and evaluation of patient education; and including persons with chronic illness in their teaching strategies. The goal of assisting the patient in becoming more self-directed is certainly consistent with goals of self-care intervention.

Self-care theory (Orem, 1980) and learning theories provide methods for analysis of Home Enteral Nutrition. Self-care theory focuses on the individual's ability to care for him/herself and dependent Others. Barriers to, and facilitators of, self-care are identified, as well as needs assessment of the patient. Orem (1980) clearly defines the role of the

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nurse, including when nursing is required, the degree of nursing intervention, and the outcome of nursing intervention. Education is stressed as a means of increasing self-care by eliminating knowledge deficits. In chronic care, the goal is to assist the patient in attaining his maximum level of wellness and self-care abilities. Current practice concepts in Home Enteral Nutrition blend well with self-care theoretical concepts.

Learning theories assist the nurse in identifying learning needs, selecting methods for enhancing learning, providing educational materials designed for the level of the learner, and increasing motivation through patient oriented goal-setting (Kittleberger, Foltz and Shields-Kyle, 1985). The current methodology of patient education in Home Enteral Nutrition appears to follow the approach of cognitive construct instructional theories (Smith, 1987), which focus on learning, the structure of information, sequencing of information and the character and rate of rewards and punishments. This technique is proposed as a method of increasing desire and willingness to learn, and of enhancing understanding of educational material.

Recall and comprehension of Home Enteral Nutrition

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patient education materials have not been addressed in the literature. Both concepts are outcomes of patient education, which must be measured to establish effect teaching. Multiple factors may affect the learner's recall and comprehension of written education materials, including stress, physical illness, fatigue, age, previous learning experiences, and psychomotor disturbances. A review of the literature indicates that many patients may be affected by these factors, but that the aged are most vulnerable. Hearing and visual losses, decreased reaction time, a decline in short-term memory, and decreased ability to control environmental stimuli may significantly affect patient education interventions and outcomes. This problem is compounded by the fact that elderly persons frequently have fewer years of formal education than younger persons. The complexity and amount of instruction given affect recall and comprehension in all age groups. Based on this finding, the literature recommends providing written patient education materials, in their most simplistic form, as an adjunct to verbal instructions.

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literature. However, this concept has been addressed in other patient education studies, which have demonstrated that inappropriately high readability levels negatively affect learner recall and comprehension.

Recall and Comprehension refer to the cognitive domain of learning. Recall is the person's ability to remember information provided. It is the lowest level of knowledge. Recall includes short-term and long-term memory involving: (1) knowledge of specific facts or terminology; (2) sequences, criteria, methodology and classification of the specific facts or terminology; and (3) generalizations, principles, structures and theories concerning the abstractions and universals in a field. Short-term memory relies on rehearsal, while in long-term memory the elements of organization, meaning and context are most important (Whitman, Graham, Gleit, and Boyd, 1986). Comprehension is the lowest level of understanding in the cognitive domain. It may be defined as the "capacity for understanding ideas, facts, etc." (Gualnik, 1974, p. 292), "such that the individual knows what is being communicated and can make use of the material...beyond the data given to determine implications, consequences, corollaries, effects and so forth which are in accordance with the

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Cognitive learning theories began to address the definition of levels of behavior related to complexity of learning and establishing terms for these levels in the 1940's. One of the major impetuses for this movement was to establish the relationship between educating and evaluating (Redman, 1984). Behaviors were classified in three domains: (1) cognitive; (2) affective, and (3) psychomotor. Each category was then ranked in order of complexity. Guinee (1978) notes that these cognitive and psychomotor responses are made without conscious thought, however, in a learning situation, conscious thought is involved. Proponents of this theory feel that determining levels of behavior and learning are necessary for evaluation of patient education (Guinee, 1978). Problem-solving has been documented as an area in which many persons have difficulty (Ross and Mico, 1980). The higher cognitive levels of analysis, synthesis and evaluation are necessary for adequate problem solving (Whitman, Graham, Gleit and Boyd, 1986). Rankin and Duffy (1983) classify learning activities for patient education in each of the cognitive domains as follows:

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I. Cognitive (knowledge)

A. Learning facts

- * 1. lecture
- * 2. demonstration
- * 3. independent-study format
- * 4. tests
- 5. discussion-questions and answer
- 6. practice
- 7. simulation

B. Visual identification

- * 1. demonstration
- * 2. simulation
- * 3. tests
- * 4. practice
- 5. independent study

C. Understanding and applying knowledge

- * 1. demonstration
- * 2. practice
- * 3. role play
- 4. discussion-question and answer
- 5. independent study
- 6. simulation
- 7. tests

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II. Affective (attitudes and appreciations)

- * 1. discussion-question and answer
- * 2. role play
- 3. simulation

III. Psychomotor (skills and performance)

- * 1. practice
- * 2. role play
- * 3. simulation
- * 4. demonstration
- * 5. tests
- 6. independent study (p. 169-170)

Asteriks represent learning activities deemed by the authors as very effective. Learning facts and visual identification represent recall, while understanding denotes comprehension. Application requires a higher cognitive level.

As previously noted, recall and comprehension of written educational materials have not been addressed in the field of Home Enteral Nutrition. A review of the literature indicates that learning activities include lecture, demonstration, practice and discussion. Methods of instruction indicate that recall and some level of comprehension, as well as increased psychomotor skills, are the expected outcomes of patient

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For this conceptual framework, an understanding of recall and comprehension, and factors which influence each, are a requisite for the nurse who is developing patient education materials. As the goal of nursing is to increase the patient's self-care abilities, educational tools must be developed which suit the needs of the learner. Decreased adherence to therapeutic regimens and an increase in symptoms and complications have been noted in the literature secondary to lack of comprehension of patient education information. Again, this reinforces the need to measure recall and comprehension of Home Enteral Nutrition patient education materials.

Readability, or ease of reading related to patient education materials significantly affects recall and comprehension. Higher reading levels are associated with decreased recall and comprehension, whereas lower reading levels positively influence recall and comprehension (Mohammed, 1964).

Readability may be defined as all the elements of written material that effect the extent to which readers understand it, read it in an optimum speed, and find it interesting. Such elements of written material

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include primary structural elements such as vocabulary, sentence length and grammatical complexity, and design elements such as page and type size, line spacing, margins, contrast, color and illustration or graphics. These elements interact to affect readability" (Liquori, 1978), p. 712, 714).

Reading level assessment can help health care professionals predict the degree of difficulty which learners may have in reading a specific piece of educational material (Whitman, Graham, Gleit and Boyd, 1986). The readability of printed material may be calculated with the use of one or more of the available readability formulas: (1) Flesch formula, for determining readability levels between fifth grade and college students; (2) Fog formula, for assessing reading level grades four through college; and (3) SMOG formula, depicting grade levels four through college (Spadero, 1983; Whitman, Graham, Gleit and Boyd, 1986). Determination of reading level is based on sentence length, and the number of polysyllabic words.

Readability is an important concern in patient education--if the learner cannot read and comprehend written health-related materials, learning will not occur. The news media abounds with statements

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concerning how many Americans are illiterate (read on or below the fourth grade level). There is currently no consensus concerning an appropriate reading level for written health-education materials. Authors suggest grade five (Eaton and Holloway, 1980) to grades eight or nine (Spadero, Robinson and Smith, 1980) as suitable for patient comprehension.

There is no conceptual framework for readability. Few patient education texts or articles attend to this element of learning. The theory base which appears most appropriate is the cognitive learning theory. Redman (1984) points out that all life forms require organization and simplification in their environments. Concepts are created, which through the use of symbols change, condense and order sensations. Clear thinking necessitates clear definitions for concepts, "since reasoning is done by associating and rearranging verbal symbols" (Redman, 1984, p. 93). It may be assumed that if the reading level of educational material is above the learners level of reading and comprehension, concepts will be unclear and the cognitive processes of associating and rearranging will not occur. The outcome then, is failure to learn.

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may assist health care professionals in designing or selecting materials which are better suited to the patients' needs (Whitman, Graham, Gleit and Boyd, 1986). Hautman (1979) asserts that determining the patient's reading level and that of educational material prior to the learning experience will "increase the client's desire to learn, ensure greater understanding of the health problems of the patient, and foster the development of more adaptive behaviors" (p. 414).

Non-compliance to therapeutic regimens as a result of lack of understanding of requirements has been proposed by Taylor, Skeleton, and Czajkowski (1982). These authors found that approximately 30% of their patient education materials exceeded the median eleventh grade educational level. As a result of this finding, they recommend that readability levels be adjusted to the learner to facilitate comprehension and decrease non-compliance.

Older Americans represent a population with greater educational needs related to chronic illness. As noted previously, this group may have sensory perception and cognitive changes which negatively affect their ability to learn. Compounding this

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problem is the fact that they generally have fewer years of formal education than today's younger population (Beal, 1980). Print size, color, and complexity of written materials may significantly impact the older adult's comprehension of information.

The readability of Home Enteral Nutrition patient education materials has not been discussed in the literature; however, in a representative sample of teaching materials in the field, this author assessed the reading levels, utilizing the Flesch formula (Spadero, Robinson and Smith, 1980), and determined that readability varied from the seventh grade level to the college level. As there have been no studies related to comprehension, learning, etc., the impact of reading level is unknown.

In summary, based on current research, theories, and professional experience, the relationships of the concepts in this project may be described as presented in figure 1. Illness or injury may result in self-care deficits which present informational needs for Home Enteral Nutrition. Home Enteral Nutrition patient education is deemed necessary to promote self-care for the individual. The outcome of patient education is recall and comprehension of information provided, which

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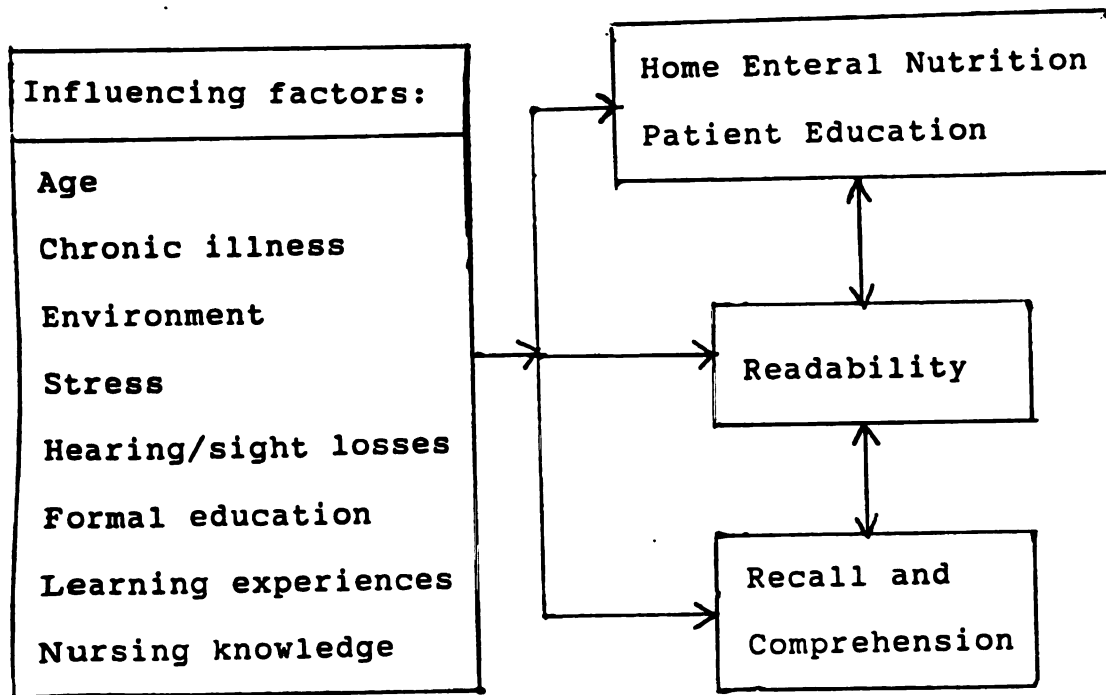


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are affected positively or negatively by the readability of the educational instrument. Factors which affect the development and implementation of Home Enteral Nutrition patient education tools, readability of such instruments, and recall and comprehension of information provided are: (1) the age of the learner; (2) chronic illness; (3) environmental elements, such as noise, poor lighting, lack of privacy; (4) stress; (5) hearing/sight losses; (6) years of formal education; (7) previous learning experiences; and (8) nursing knowledge.

All of the concepts noted are integrated into self-care theory (Orem, 1980) and learning theories, which explicate their dimensions and applications.

Nursing Theory

Orem's self-care theory (1980) provides an excellent model for designing a Home Enteral Nutrition patient education instrument, and planning implementation of the tool, with outcome measurement. The entire process focuses on collaboration between the nurse, patient and/or significant other, with defined responsibilities for all participants in the achievement and maintenance of the self-care abilities of the individual.

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Orem's (1980) theory describes the relationship of the nurse to person(s) for whom she/he cares. Three theoretical constructs are proposed, which facilitate understanding of this relationship, under what circumstances it occurs, and factors that require manipulation to achieve desired outcomes. These constructs include:

1. The theory that self-care deficits and deficits for dependent care when health-derived or health-related, are predictive of nursing requirements denotes the proper object of focus of nursing in social groups and provides criterion measures for identifying those who need nursing. It also explains when and why nursing is required.
2. The theory that self-care and dependent care are systemized, deliberate actions--that, when continuously and effectively engaged in regulate structural integrity, human functioning and human development (sometimes through the control of environmental factors) explains why these forms of care are necessary for the continuance of life.
3. The theory that the product of nursing practice is a nursing system(s) through which the capability of patients to engage in self-care is

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The primary thought in Orem's (1980) theory of self-care deficit or dependent-care deficit is that nursing can be beneficial to the individual because health-related limitations occur, which make the person unable to perform consistent self-care or dependent-care, resulting in ineffective care. Self-care deficits occur when self-care demands are greater than self-care abilities. Orem (1980) perceives man as having "specialized capabilities for action" in providing self-care or dependent-care, which are influenced by health, age, life experience, developmental state, available resources, and sociocultural orientation (p. 27). A value may be placed on self-care abilities and self-care demands to establish their relationship in terms of whether one is equal to, greater, or less than the other. A measured self-care deficit creates "states of social dependency" which legitimizes nursing (p. 27).

The central idea of the theory of self-care (Orem, 1980) is: "Self-care and care of dependent family members are learned behaviors that purposely regulate

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human structural integrity, functioning, and human development. The theory of self-care denotes the relationship between the deliberate self-care actions of mature and maturing members of social groups and their own development and functioning as well as the relationship of the continuing care of dependent family members to their functioning and development" (p. 28). Orem (1980) proposes that self-care behaviors are learned through interaction and communication with society and are performed sequentially to meet known needs for self-care or dependent-care. Requisites or requirements for self-care are inherent in all human beings, some of which are common to all persons and others which are related to the health and/or the developmental state of the individual. Age, health, sex and developmental state may alter the common or universal self-care requisites and methods of meeting needs. Other self-care requisites may require specific technology to meet self-care needs. The self-care process or system occurs when persons deliberately use specific technologies or processes to meet self-care needs. Knowledge in self-care results from observing the actions of others or deliberate recall and sequencing of behaviors performed. Self-care and dependent-

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care are negatively affected by lack of material resources, skill and knowledge, and by unwillingness to care for others.

The person who actually provides the self-care is called the self-care agent, or in the case of providing self-care for a child, infant or dependent adult, dependent-care agent. "Self-care is the practice of activities the individuals initiate and perform on their own behalf in maintaining life, health, and well-being" (Orem, 1980, p. 35). Caring for him/herself is an adult's "continuous contribution" to his/her own life, health, and well-being, while care for dependent others is his/her "continuous contribution" to their life, health and well-being (Orem, 1980, p. 36-37). The age, developmental stage and physical state of the person influences the degree of self-care or dependent-care. Effective self-care has an orderly plan which, when executed, benefits "human structural integrity, human functioning and human development" (Orem, 1980, p. 37).

Self-care requisites or requirements are classified as universal, developmental and health deviation. Universal self-care requisites are common to all persons and include: (1) sufficient air, water, food;

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(2) care of elimination process and excrements; (3) balance between activity and rest; (4) balance between solitude and social interaction; (5) prevention of hazards to life and well-being; and (6) being normal (Orem, 1980, p. 42). Effective regulation of universal requirements promotes metabolism and energy production, facilitates organ integrity, controls energy expenditure and environmental stimulation and promotes a feeling of well-being. Developmental self-care requisites are either specialized expressions of universal self-care requisites that have been particularized for developmental processes or they are new requisites derived from a condition (e.g., pregnancy) or associated with an event (e.g., loss of a spouse or a parent)" (Orem, 1980, p. 47). They may be categorized as: (1) promoting or maintaining an environment which enhances life processes and development; and (2) providing care which prevents problems that may affect development. Effective developmental self-care promotes growth of human potential and prevention of injury and illness. Health-deviation self-care requisites "exist for persons who are ill, injured, and have specific forms of pathology including defects and disabilities, and who are under medical

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diagnosis and treatment" (Orem, 1980, p. 48). Health status changes which produce total or nearly total dependence on others for health and well-being move the person from the position of self-care agent to that of patient or receiver of care. It is important to note that this is considered as a negotiated position in which the individual agrees to allow others to be the provider of care and also agrees to be the recipient of care. Health deviation self-care requisites include: (1) noting or regulating the side effects of complications of prescribed therapy; (2) adapting to the effects of the illness and treatment in a way which promotes continued development; (3) adhering to prescribed therapeutic regimens; (4) noting the effects of illness, and taking appropriate action; (5) seeking and attaining medical attention when exposed to disease producing situations, or when there is evidence of pathology; and (6) adapting self-image and self-concept to the change in health and required intervention. Effective health-deviation self-care regulates the effects of injury or illness and contributes to the care of the illness.

Therapeutic self-care demands refer to "the totality of self-care actions to be performed for some

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duration in order to meet known self-care requisites by using valued methods and related sets of operations or actions" (Orem, 1980, p. 39). Therapeutic self-care demands may be calculated by the nurse and patient through: (1) identification of actual or potential universal, developmental and health-deviation self-care requisites, factors that affect the way needs are met, and interrelationships between requisites; (2) determining how specific methods of action may affect self-care requisites; and (3) planning a short-term and long-term course of action.

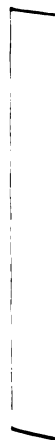
In Figure 2, the balance between self-care abilities and self-care demand is explained. In a well person, Part A reflects the balance between self-care requirements and self-care ability. Man is able to perform tasks necessary to prevent illness and promote well-being. When health deviation self-care demands are added in Part B, this balance remains if self-care abilities are diverse enough to meet the new needs plus the primary needs. If self-care abilities are insufficient to meet additional demands, a self-care deficit exists, at which point nursing intervention becomes necessary, as demonstrated in Part C. Effective intervention results in a balance between demands and



Part 1



Part 2

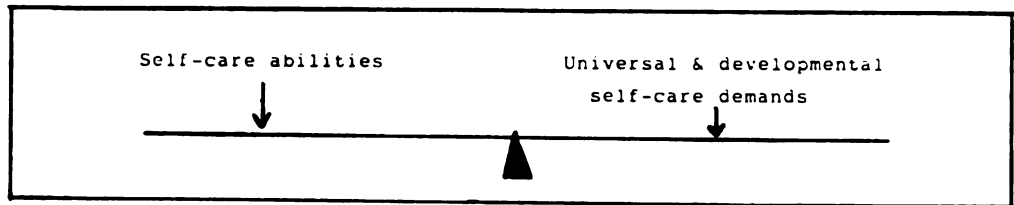


Part 3

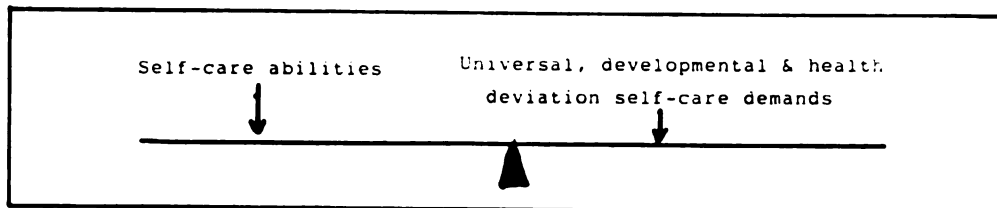


Part 4

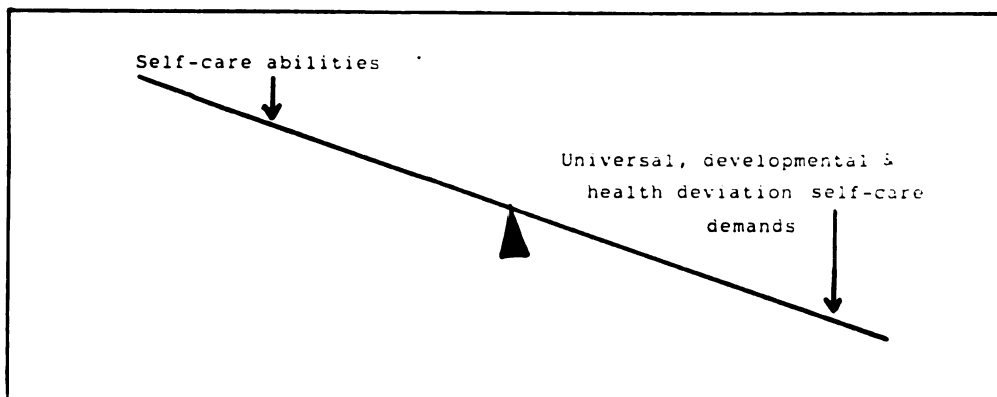
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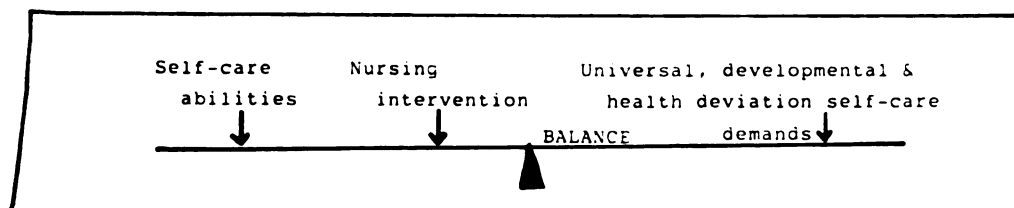
Part a: healthy individual: self-care agent



Part b: an individual subject to injury, disease, or illness



Part c: self-care deficits: need for nursing intervention



Part d: an individual in receipt of nursing intervention

Figure 2. Balance between self-care ability and self-care demand.
Adapted from "Orem's Self-Care Model" by P. Aggelton and H. Chambers,
1985, Nursing Times, 81, p. 37

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abilities, as noted in Part D. Self-care is therapeutic to the degree that it promotes attainment of these results: "(1) support of life processes and promotion of normal functioning; (2) maintenance of normal growth, development, and maturation; (3) prevention, control, or cure of disease processes and injury; and (4) prevention of or compensation for disability" (Orem, 1980, p. 40).

Orem's (1980) main idea concerning nursing systems is that they "are formed when nurses use their abilities to prescribe, design, and provide nursing for legitimate patients (as individuals or groups) by performing discrete actions and systems of action. These actions or systems regulate the value of or the exercise of individuals' capabilities to engage in self-care and meet the self-care requisites of the individual therapeutically" (Orem, 1980, p. 29). "The person who has self-care agency and activates it in the performance of particular self-care operations can be said to be a regulator. Such a person is a good regulator if his or her self-care actions bring about internal and external conditions necessary to maintain life processes, integrity of human structure, and functioning and human developmental processes" (Orem,

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1980, p. 124). Legitimate patients have current or potential self-care requisites, which they are unable or potentially unable to meet. Nursing intervention occurs to assist the patient in areas of self-care deficit. The nurse and patient collaborate to assess self-care requisites and capabilities, and establish roles in the planning, execution, and regulation of the patient's self-care abilities.

Nursing is viewed by Orem (1980) as a helping service which acts deliberately for some period of time to aid others. Man is viewed as needing "continuous self-maintenance and self-regulation through...self-care" (Orem, 1980, p. 32). To help others, nurses must possess the skills, knowledge and attitudes required to motivate the individual to achieve optimal wellness and well-being.

In helping situations, the nurse's behavior should complement the patient's behavior. The patient's needs for nursing include "actions to accomplish self-care and actions to compensate for or to overcome an inability or limited ability to engage in care" (Orem, 1980, p. 58). Orem (1980) states that "the provision of nursing to individual men, women and children or to multiperson units such as families, requires that

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nurses have specialized abilities that enable them to provide care that compensates for or aids in overcoming the health-derived or health-related self-care or dependent care deficits of others" (p. 87). These specialized abilities are referred to as nursing agency, which is analogous to self-care agency. Nurses may provide help to others or compensate for their inabilities by: (1) doing or acting for the other person; (2) guiding the individual in decision making; (3) providing the emotional or physical support necessary to encourage the patient to begin or continue behavior; (4) changing the environment so that it is more consistent with the needs of the person; and (5) teaching the patient the skills and knowledge required to meet self-care demands. One or more of these methods may be used at a specific time to help the patient.

The types of nursing systems utilized to help patients meet their self-care demands are: the wholly compensatory nursing systems, partly compensatory nursing systems, and supportive-educative systems. Figure 3 notes nurses' actions as they relate to each system. In the wholly compensatory system, the nurse acts for the patient, who is unable to act for himself secondary to deficits in psychomotor ability, or who should not

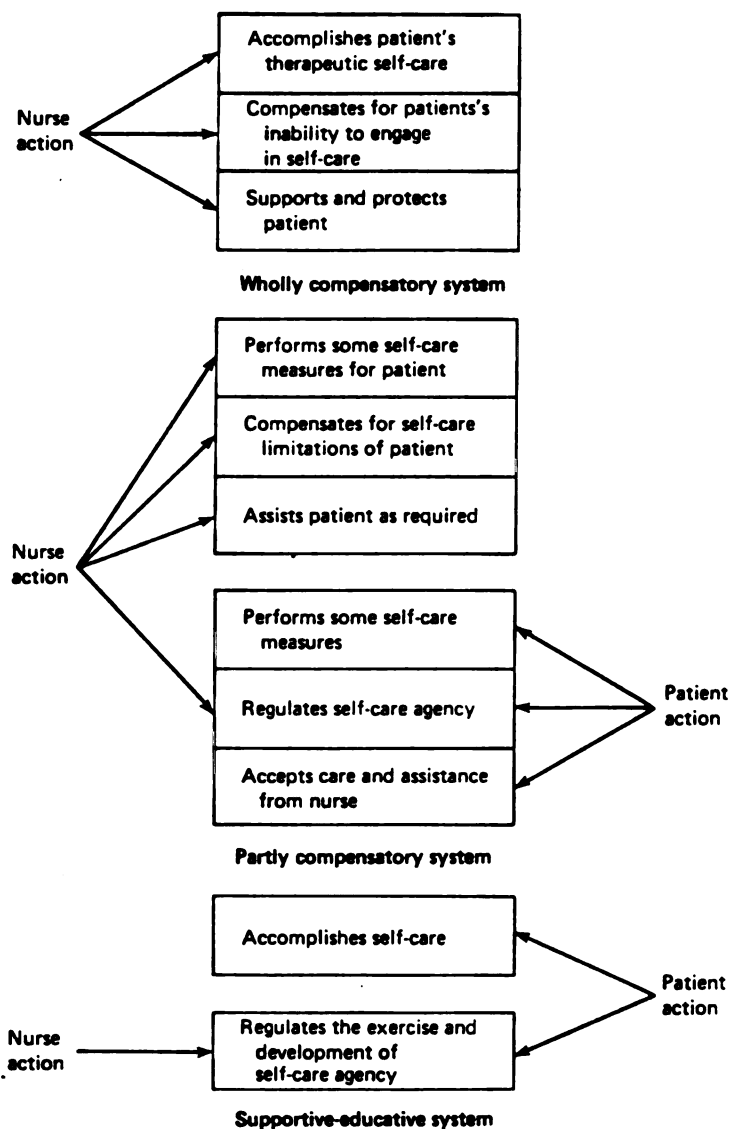


Figure 3. Basic Nursing systems. From Nursing: Concepts of Practice (p. 98), D. Orem, 1980, New York: McGraw-Hill Book Company.

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act or do for himself related to illness. Additional methods of helping include providing support, guiding and directing, and enhancing the environment based on the patient's cognitive level. The partly compensatory system involves action on the part of the nurse and the patient to meet self-care requisites. As the person's physical health improves, he assumes more responsibility for self-care. All five of the noted helping methods are used in this phase. Supportive-educative systems provide help for the patient through guidance, support, provision of a developmental environment and teaching. It is the only system in which the patient's requirements are for knowledge, skills, and decision-making abilities.

Orem (1980) describes nursing as "the complex ability to accomplish or to contribute to the accomplishment of a person's usual and therapeutic self-care by compensating for or aiding in overcoming the conditions or disabilities that cause the person: (1) to be unable to act; (2) to refrain from acting; or (3) to act ineffectively in self-care" (p. 126). The focus of nursing in providing this health care has several components as illustrated in Figure 4: (1) the Patient's perspective of the health situation; (2) the

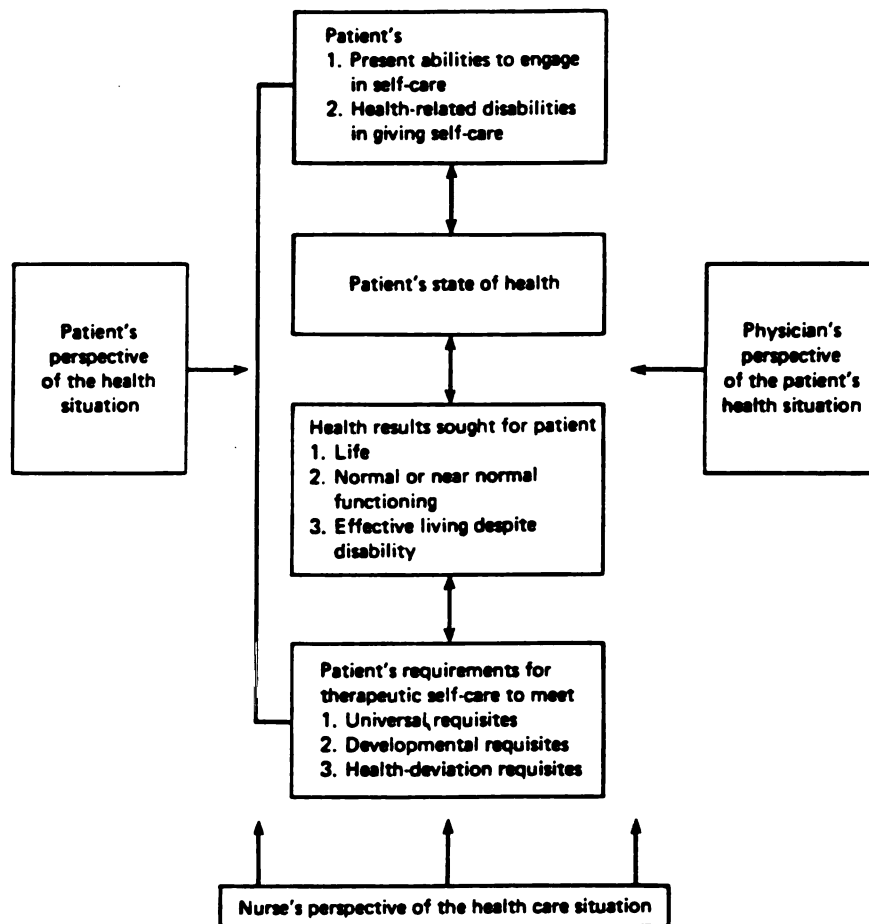


Figure 4. The parts of a nursing focus. From Nursing: Concepts of Practice (p. 129), D. Orem, 1980, New York: McGraw-Hill Book Company.

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patient's state of health; (3) the health results sought; (4) the therapeutic self-care demand; and (5) the present abilities and disabilities to engage in self-care (Orem, 1980, p. 128). The main components are viewed as interrelated and impacted on by the patient's perception of the health situation. Description and identification of these components assists the nurse in maintaining a health-related patient focus.

Orem (1980) notes the levels of health care prevention as primary, secondary, and tertiary:

1. Primary prevention is appropriate before the onset of disease and is directed to the maintenance and promotion of health and the prevention of specific diseases.

2. Secondary prevention is appropriate after the onset of disease and is directed to the prevention of complications (diseases that occur concurrently with other disease) and of sequelae (disorders of structure or function that follow or are caused by an attack of a disease) and prevention of prolonged disability.

3. Tertiary prevention is appropriate when there is disability with a demand to function in society with limited human capacities. It is directed toward bringing about effective and satisfying human

functioning in accord with existing powers for human functioning. Care at the primary level is perceived as existing throughout life, while secondary and tertiary levels of prevention occur with injury or illness. Effective secondary health prevention includes control or cure of the disease, prevention of complications, and prevention of spread of the disease. Rehabilitation or preservation of remaining ability are effective outcomes in tertiary care. Health-deviation self-care exists at both the secondary and tertiary levels of preventive health care.

Orem's (1980) phases of self-care correlate with the steps of the nursing process: assessment, planning, implementing and evaluating (Yura and Walsh, 1978). Phase one of Orem's (1980) self-care nursing process is diagnosis and prescription. In this phase the nurse makes judgements about what has been done and what could or should be done in the current health situation. Self-care demands, self-care deficits, and the potential for self-care are evaluated. Phase one ends when a decision is made concerning actions which will be taken or avoided. Phase one then, is comparable to the assessment stage of the nursing process (Yura and Walsh, 1978). The second phase of the self-care

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nursing process (Orem, 1980) is designing and planning. "Nursing care is designed to contribute to client's achievement of health (Hill and Smith, 1985, p. 49), by compensating for or overcoming the individual's self-care deficits. The family is involved in this and other phases to assist the person in achieving self-care. Knowledge concerning externally oriented and internally oriented self-care behaviors is necessary for the nurse in designing self-care. As noted in Table 1, internally oriented behaviors are related to awareness of oneself and the environment, and to knowledge about self-care. Externally oriented self-care behaviors seek to satisfy needs associated with the environment. Planning further develops the designs of the nursing system by establishing roles and sequence, place, and time of activities. Phase two is equivalent to the planning stage of the nursing process (Yura and Walsh, 1978). Producing and managing care (Hill and Smith, 1985, p. 49) is the final phase of the self-care nursing process (Orem, 1980). This phase involves: "the initiation, conduction, and control of assisting actions to (1) compensate for the patient's self-care limitations to ensure that self-care is given and is therapeutic and to enable the patient to adapt his or

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Table 1

Behaviors Requested for Self-Care	
<u>Internally Oriented</u>	<u>Externally Oriented</u>
1. Learning activities related to the development of self-care knowledge, attitudes and skills. 2. Application of knowledge in initiating, performing and controlling self-care activities. 3. Self-care action to control behavior, such as controlling an emotional reaction, facing the reality of one's state of health or disability, or restricting one's activities in order to rest or keep a part of the body immobilized. 4. Action to monitor one's condition or responses.	1. Knowledge-seeking activity directed to printed material or persons who possess knowledge about health, disease and effective self-care practices. 2. Resource-seeking activity related to securing equipment, materials, facilities and services necessary in self-care. 3. Resource-utilizing activities related to using supplies or equipment in performing self- care. 4. Activity to control factors in the external environment, for example, controlling of air, number of social contacts, or biological elements in the environment.

(table continues)

Table 1

<u>Internally Oriented</u>	<u>Externally Oriented</u>
	5. Activity to seek assistance to accomplish a self-care goal within an interpersonal situation for example, requesting help in performing a self-care task, seeking validation of a judgement or asking not to be left alone. 6. Expressive interpersonal activity, such as when a patient expresses feelings about health or self-care verbally or non-verbally but without a direct request for help. 7. Action to become aware of one's location in an environment or of environmental conditions.

Internally and externally oriented self-care behaviors.

Adapted from Nursing: Concepts of Practice (p. 213) by

D.E. Orem, 1980, New York: McGraw-Hill Book Company.

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her behavior to existing limitations; (2) overcome when possible, self-care limitations of the patient (or care limitations of the family) so that the patient's future short-term or long-term therapeutic self-care requisites can be met effectively; and (3) foster and protect the patient's self-care abilities and prevent the development of new self-care limitations" (Orem, 1980, p. 202). This final phase coincides with the implementing and evaluating stages of the nursing process (Yura and Walsh, 1978).

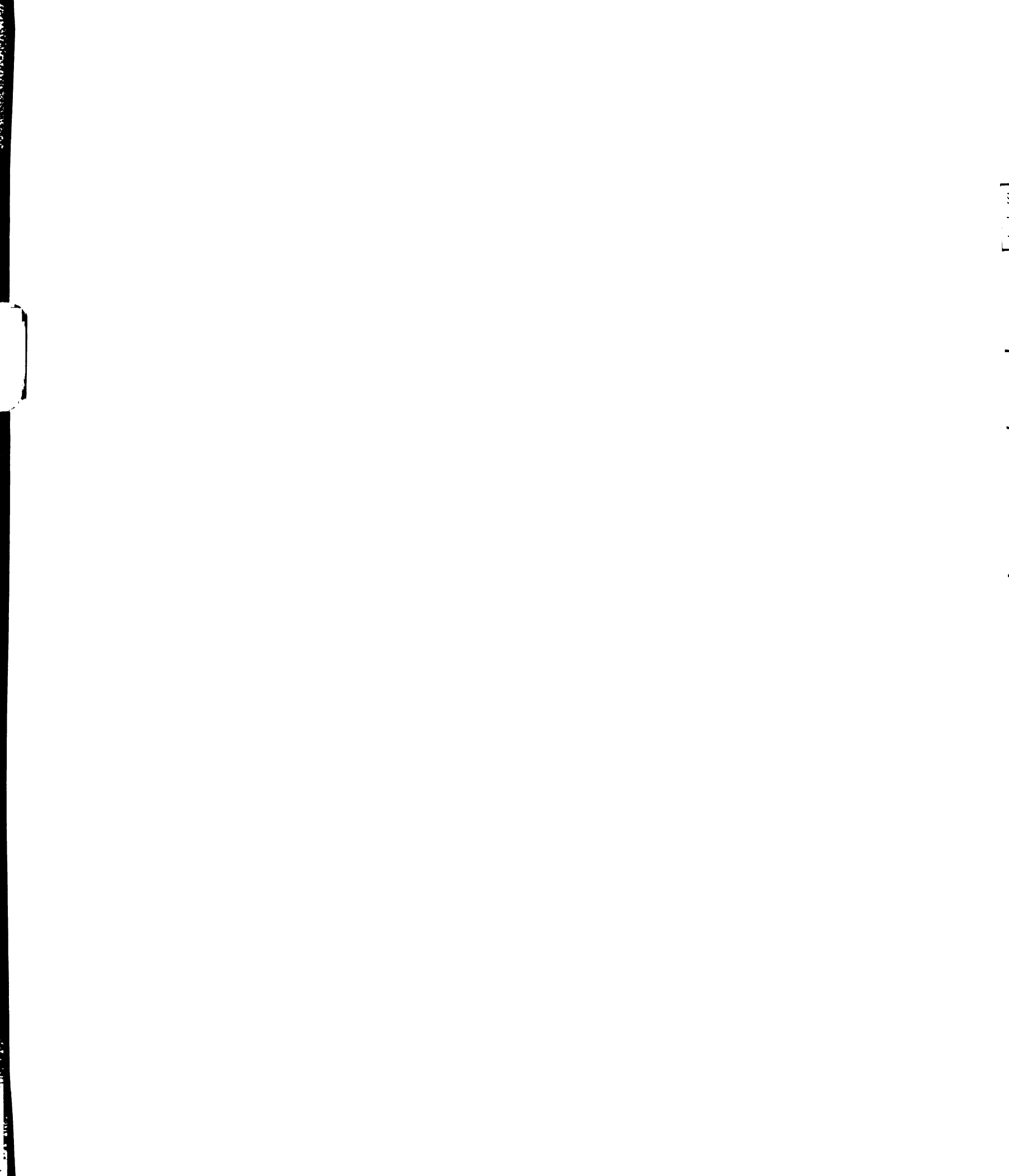
Orem's self-care theory (1980) may be employed to design a conceptual framework for Home Enteral Nutrition patient education. The primary focus in this model is learning Home Enteral Nutrition information necessary for the patient (significant other) to perform self-care.

The relationship of the family clinical nurse specialist (FCNS) to the individual is based on the occurrence of injury or illness, which produces self-care deficits. Nursing is required to compensate for the person's inability to perform necessary self-care measures. The goal of nursing is to assist the patient (dependent-care agent) in attaining the maximum level of wellness and self-integrity, preventing complica-

tions, and in assuming self-care actions.

The illness, often chronic in nature, causes changes in universal and developmental self-care demands and creates health-deviation self-care demands (refer to Figure 5). Therapeutic self-care demands are increased due to the knowledge and skills required to perform therapeutic activities. To perform Home Enteral Nutrition self-care activities, the patient/significant other must possess knowledge concerning basic nutrition, feeding tube placement and care, formula preparation and infusion, the recording of pertinent information, and problem-solving related to Home Enteral Nutrition. Orem (1980) states that knowledge of self-care activities is necessary to perform self-care behaviors. Few patients or family members have this knowledge or the necessary skills because they have not been exposed to this process in their environment. Orem (1980) notes that we learn self-care knowledge and skills from society or our environment. Exposure by observing others performing related tasks in the community or through public media systems is negligible.

The FCNS begins phase one of the self-care process (Orem), 1980) and assesses the self-care demands,



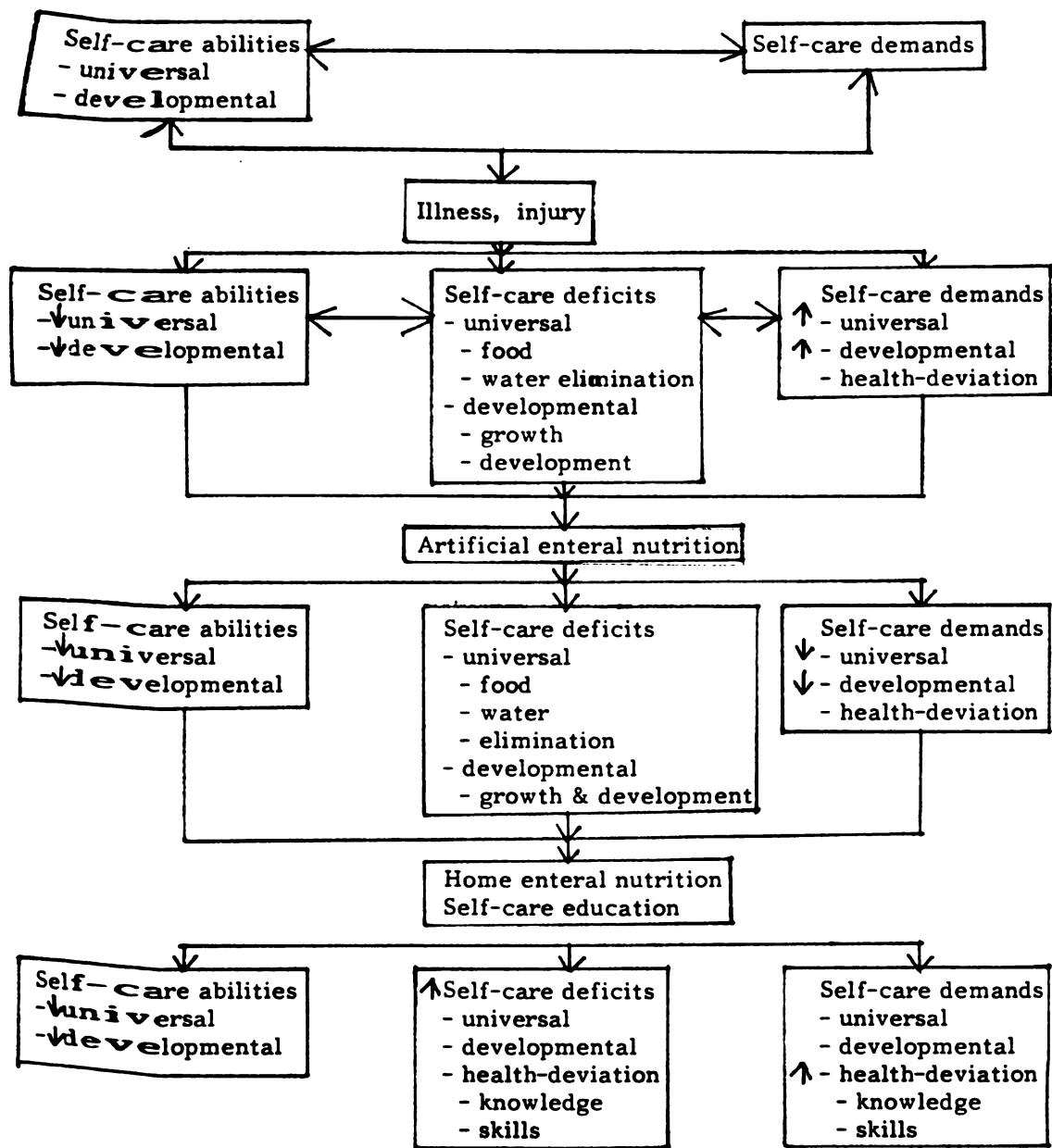


Figure 5. Phase one of the self-care nursing process; diagnosis and prescription.

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deficits and abilities of the learners, as well as what has been done, could be done, or should be done to assist the patient in achieving self-care. Specific factors which may influence the patient/significant other's ability and/or desire to learn Home Enteral Nutrition self-care techniques are: (1) age; (2) cognitive abilities; (3) experience with previous learning situations; (4) depression secondary to loss or chronic illness; (5) stress related to illness; (6) the expected disease outcome; (7) perceived social support; (8) the expected therapeutic outcome; (9) monetary costs of the therapy; (10) the "fit" between therapy and lifestyles; (11) potential duration of therapy; (12) manual dexterity; (13) sensory perception; (14) perception of health care providers and influential others concerning need for or efficacy of the therapy; (15) interpersonal relationships with the health care providers; (16) developmental state; and (17) readability of educational materials. Assessment of factors which inhibit or facilitate self-care efforts is an important element in planning educational strategies.

The patient or significant other's motivation to participate in self-care activities may be influenced

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by many factors. Orem (1980) states:

"The accomplishment of the various kinds of universal, developmental, and health deviation self-care requires expenditure of effort to satisfy the demands for care as these demands are known and understood when action begins or as it proceeds. Effort will be demanded until specific results are achieved and as frequently as the result is required or until there is evidence that the effort is not productive. Effort is not random but deliberate. It is directed by the agent toward the result desired by following some standard technique or procedure or by adjusting the action to the factors in the situation that can be changed or controlled" (p. 81).

The nursing systems employed in helping the patient may vary with the degree of illness and debilitation. The patient may require wholly or partly compensatory systems, while family members who are providing dependent-care may require supportive educative systems. As the patient's physical, mental or psychological status improves, he may move to partly compensatory or supportive-educative systems. The FCNS helps the patient and family by: (1) performing tasks they are unable to perform because of lack of knowledge,

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skills, or physical ability; (2) providing physical and emotional support; and (3) guiding them in making decisions concerning the therapy and educational program. In applying specialized abilities to compensate for health-related self-care deficits, the FCNS exhibits nursing agency. As the FCNS has self-care agency, she/he is the regulator, or person whose actions bring about changes necessary "to maintain life processes, integrity of human structure and functioning and human developmental processes" (Orem, 1980, p. 124) .

In phase two of the self-care nursing process (Orem, 1980), designing and planning, the FCNS, patient and family collaborate to develop a plan for learning knowledge and skills required for Home Enteral Nutrition self-care (refer to Figure 6). Based on the self-care abilities, self-care deficits, and self-care demands identified in phase one, the collaborators establish: (1) roles which will be assumed in the teaching learning process and in home care; (2) the sequence in which information will be provided; (3) when and where learning sessions will occur; and (4) expected behavioral outcomes of the intervention.

In phase two, wholly and partly compensatory as

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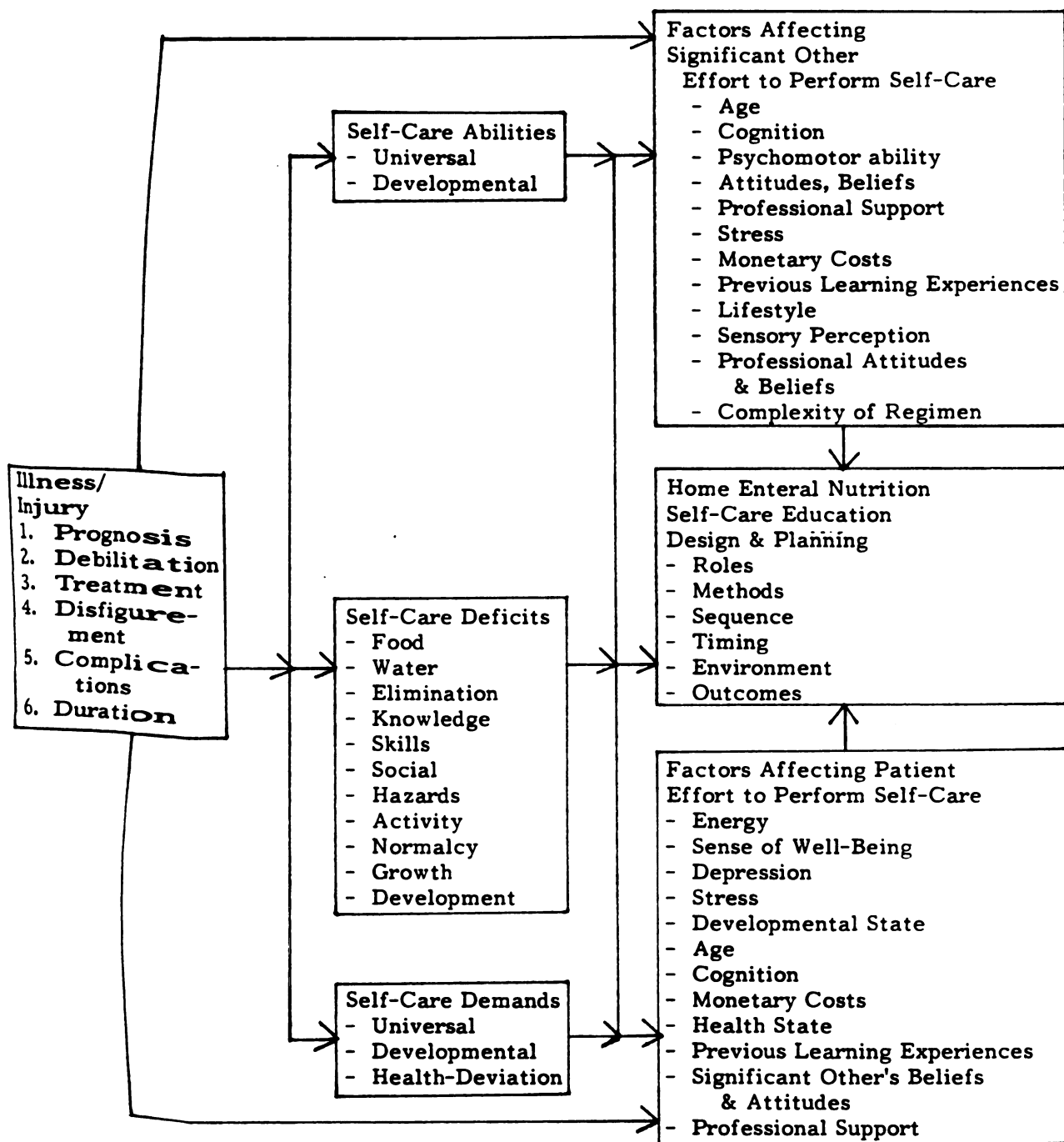


Figure 6. Phase two of self-care nursing process.

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well as supportive-educative nursing systems may continue to be used, based on need. All of the helping methods are employed, with increased focus on teaching necessary skills, altering the environment to facilitate learning, guiding in decision-making, and providing psychological support for the patient and family. Orem (1980) emphasizes that learning is a gradual process requiring knowledge and use of skills. Continued FCNS follow-up after hospital discharge reinforces skills and information and provides opportunities for patients to learn new skills. Chronic illnesses often have complex therapeutic regimens which the patient and family must perform. It is common for nursing to assume some of those complex self-care tasks, and gradually assist the patient and family in assuming self-care activities. The knowledge that continued support will be available in the home may significantly impact willingness to participate in self-care.

Phase three of the self-care nursing process (Orem, 1980), producing and managing care, involves teaching the patient and family required information and skills. As a new skill is learned, the patient/significant other assume that responsibility in the

hospital environment. At the completion of the educational intervention, the learner demonstrates acquisition of knowledge and skills through performance of required techniques and completion of written tests of recall and comprehension of information provided. When desired educational goals have been achieved, the patient is discharged. Self-care nursing systems (Orem, 1980) change to primarily supportive-educative with some partly compensatory nursing as required by illness or complexity of regimens. Helping methods include all five noted methods (Orem, 1980). The management of care is also a component of phase three, and involves how the patient/significant other adapt to the self-care requirements. The home care nurse is in an excellent position to evaluate performance of self-care activities, identify areas where self-care needs exist, and to encourage self-care abilities. Orem (1980) notes that this process is not stagnant, but dynamic. Health care needs change with illness or wellness and increased or decreased self-care abilities. Nursing intervention continues until the patient/family have achieved self-care agency. In Home Enteral Nutrition, most patients have chronic illnesses and ever-changing health needs. Preventive health care

involves primary, secondary and tertiary levels. The FCNS continues involvement with the patient/family related to health deviation self-care. Thus, involvement in managing care continues until the therapy is no longer required or the patient expires.

Effectiveness of the program can be assessed by measuring the degree to which: (1) actions compensate for the patient's self-care deficits and encourage adaptation to the therapy and disease-related limitations; (2) self-care limitations are overcome, allowing self-care requisites to be met; and (3) self-care abilities are preserved and new self-care limitations are prevented (refer to Figure 7).

Orem (1980) states that nursing's special concern is "the individual's need for self-care action and the provisions and management of it on a continuous basis in order to sustain life and health, recover from diseases or injury, and cope with their effects" (p. 6). A well designed and implemented Home Enteral Nutrition self-care educational program could significantly improve the patient's/family's self-care abilities.

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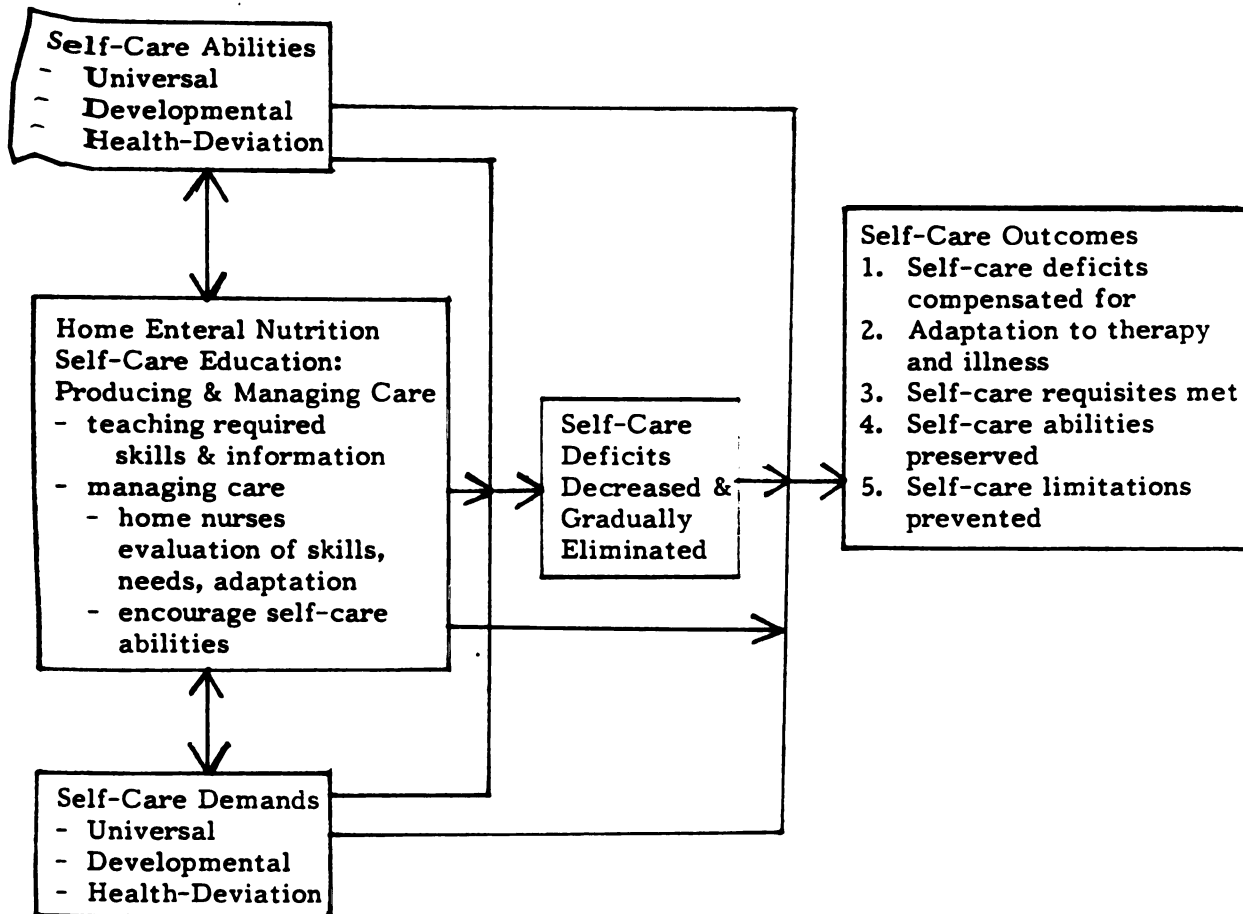


Figure 7. Phase three of the self-care nursing process.

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ADULT SELF-CARE EDUCATION CONCEPTUAL FRAMEWORK

A major component of Home Enteral Nutrition therapy is patient education. As noted by Orem (1980), this process does not end when the patient leaves the hospital, but is rather, an ongoing nursing service. Supportive-educative nursing systems are described by Orem (1980) as one of the ways in which the professional helps patients attain their maximum levels of wellness and self-care. Although patient/family education has been included in Orem's self-care theory (1980), there is no comprehensive conceptual framework for self-care education. Such a framework could benefit nursing and the patient by: (1) providing a clear picture of the process to aid in clinical application; (2) expand the dimension of patient education in self-care theory (Orem, 1980); (3) improve patient outcomes through increasing patient participation and knowledge; and (4) establish standards of patient education in self-care.

Peterson (1977) has established essential components of a conceptual framework as "nursing/nursing process, health, non-health or illness, nursing

practitioner, patient/client, care setting or environment" (p. 27). A well-structured conceptual framework should answer the following questions:

1. What is the nature of the service being provided to the client (consumer, patient) --that is, how do you describe nursing?
2. What is the goal or outcome to which the service is directed--that is, how do you view health or well-being?
3. Why does the client need the services nursing provides?
4. How do you describe the giver of the service--the nurse?
5. How is the client described?
6. How do you describe the context of the service? (Peterson, 1977, p. 25, 27)

This text will address those questions in relationship to adult self-care education and apply the conceptual framework to Home Enteral Nutrition.

The theoretical bases for this conceptual framework are Orem's (1980) self-care theory and learning theories. Self-care theory (Orem, 1980) provides a model for understanding: (1) the relationship of the FCNS to the individual and significant other; (2) under

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what circumstances services are needed; (3) the roles of the provider and client; (4) characteristics of the individual and the FCNS; and (5) the desired outcome of the service. Learning theories add the dimensions of: (1) definition of the process of patient education; (2) delineation of environmental factors which affect the process and outcome; (3) specific cognitive factors which influence the methods and results; (4) increased specificity of desired outcomes; and (5) expanded definition of nursing and FCNS roles.

Components of this framework include: (1) the characteristics of the client, patient or person receiving the service, (2) the characteristics of health professionals, (3) the process of patient education, (4) methods and instruments utilized in providing patient education, and (5) evaluation of outcomes.

Self-care theory (Orem, 1980) views man's internal psychosocial and physical nature in relationship to the environment, or elements which are external to man. A change in either system affects self-care. "Man's functioning is linked to his environment, and together, man and environment form an integrated functional whole or system" (Orem, 1971, p. 14). Man uses available

technology to regulate the environment so that needs are met. These needs are adapted to the features of the environment. Methods that the individual utilizes to meet needs are learned culturally, from family, friends, and significant persons in the environment. These behaviors are referred to as self-care and include care of oneself and dependent others. The purpose of self-care is to "regulate human structural integrity, functioning, and human development" (Orem, 1980, p. 28). This action is deliberate by mature and maturing individuals in society. Society is defined as "a body of people living together in the same district, city or area under the same laws" (The Nursing Theories Conference Group, 1980, p. 102). Self-reliance, responsibility for oneself and responsibility for the well-being of dependents are expected behaviors of adults in western society. "Self-care is a requirement of every person...when self-care is not maintained, illness, disease, or death will occur" (Orem, 1980, p. 6). "Health, in this context, refers to the state of wholeness and integrity of man's physiological, psychophysiological, and biological mechanisms and structures" (Orem, 1980, p. 118-119).

Man is viewed as having the capability to perform

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tasks necessary to meet universal and developmental self-care needs or requisites. Universal self-care requisites include: "(1) air, water, and food, (2) excrements, (3) activity and rest, (4) solitude and social interaction, (5) hazards to life and well-being, and (6) being normal" (The Nursing Theories Conference Group, 1980, p. 95). Developmental self-care requisites are: (1) promoting and maintaining circumstances that enhance life processes and "human progress toward higher levels of the organization of human structures and toward maturation" (Orem, 1980, p. 47) and (2) prevention of circumstances which affect development or actions to overcome the effects of these situations. Knowledge and skills are necessary for the performance of self-care activities. "Self-care and care of dependent members of social groups are adversely affected not only by the scarcity of material resources, such as food, but also by a lack of knowledge and skills and the absence of attitudes that foster the willingness to give of self by caring for others" (Orem, 1980, p. 33). Decisions to perform self-care behaviors are based on the amount of effort and energy required to perform the activity.

Health-deviation self-care requisites occur related to illness, injury, pathology and medical diagnosis and treatment. When the individual's self-care demands (the total of universal, developmental and health-deviation self-care requisites) are greater than his self-care abilities, self-care deficits arise.

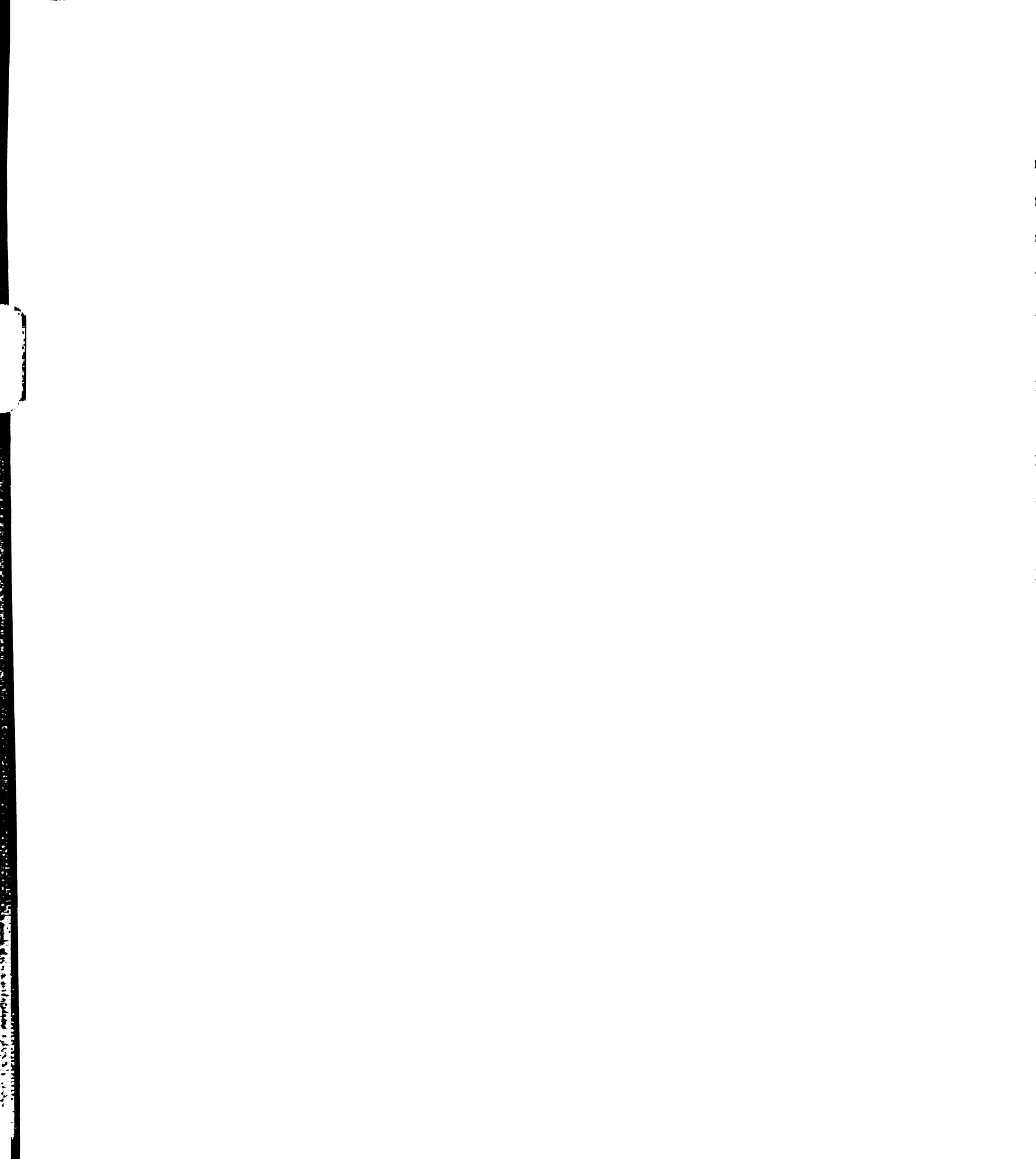
Nursing intervention is required to compensate for man's inability to perform self-care. The special concern of nursing is "the individual's need for self-care action and the provision and management of it on a continuous basis in order to sustain life and health, recover from disease or injury, and cope with their effects" (Orem, 1980, p. 6). The goal of nursing is to compensate for and assist the individual in assuming self-care responsibilities, which requires knowledge and "specialized abilities," referred to as nursing agency." It is this characteristic which legitimizes the status of nurse by society. "Nursing agency is developed and exercised for the benefit and well-being of others" (Orem, 1980, p. 88).

Orem (1980) views nursing systems as "all the actions and interactions of nurses and patients in nursing practice situations" (p. 92). The nurse helps the patient by acting for, guiding, providing physical

or emotional support, altering the environment to facilitate development, and by teaching (Orem, 1980, p. 95-96). Three nursing systems (Figure 5) have been identified to meet patient's self-care needs: (1) wholly compensatory, (2) partly compensatory, and (3) supportive-educative (Orem, 1980, p. 96). In wholly compensatory nursing systems, the individual is unable to, or should not care for him/herself, requiring care by others. The term patient refers to the recipient of care. The self-care agent or person who provides self-care activities required for maintenance of life, health and well-being may be the nurse or a significant other. A family member who provides self-care for an infant, child, or ill or debilitated adult is referred to as a dependent-care agent.

In the partly compensatory system, the FCNS acts for the patient/significant other by performing self-care tasks which they are unable to (or should not) perform related to physical or psychological disability and lack of necessary knowledge and skills. The patient/significant other perform some self-care skills, make decisions concerning care, and interact with the FCNS. As the patient improves, he assumes more self-care activities as able from a physiological

and knowledge standpoint. The dependent-care agent assumes responsibilities as knowledge and skills increase. The FCNS acts as a counselor, a person who helps patients and families "cope with changes, that is, deal with situations that are threatening in a manner that resolves uncomfortable feelings such as anxiety, anger, fear, grief, and guilt" (Smith, 1987, p. 99). Counseling provides emotional, psychological, and intellectual support to the patient/family, the goal of which is development of the patient/family (Redman, 1984). Part of the role of the counselor is guiding and directing the patient/family in making decisions concerning self-care. The FCNS also acts as a health educator, or a person who provides any "combination of learning experiences designed to facilitate voluntary adaptations of behavior conducive to health" (Green et al., 1980, p. 7). The primary focus of health education is the patient. The terms educator and teacher are viewed as synonymous. "Teaching is a process that facilitates learning. Teaching can be defined as imparting knowledge, assisting the learner to develop motivation to change, or guiding or interpreting the learner's experience" (Steiger and Lipson, 1985, p.103). As the FCNS/patient



relationship is of a contractual and complementary nature (Orem, 1980), the patient/family assume the role of learner. "Learning can be defined as the acquisition of knowledge, the initiation of behavioral, attitudinal or perceptual change, or integration of knowledge, new behaviors, or attitudes" (Steiger and Lipson, 1985, p. 103). Learning and teaching are interactive processes, with each influencing the other. Patient teaching is an integral part of professional nursing practice, which requires knowledge about: (1) the patient and family and (2) the psychological, physiological and social sciences, and human functioning (Whitman, Graham, Gleit, and Boyd, 1986). Learning is a process necessary for man to acquire the knowledge and skills required to enact self-care, which is viewed by society as his responsibility (Orem, 1980).

In the supportive-educative nursing system (Orem, 1980), the patient is either able to perform self-care or should learn self-care measures. The FCNS provides counseling (guidance and support) necessary to facilitate "decision-making, behavior control, and acquiring knowledge and skills" (Orem, 1980, p. 101).

The self-care education process may be categorized

in Orem's (1980) phases of self-care, or deliberate action: (1) events prior to the decision concerning what could or should be done, and (2) subsequent actions. The three steps in this process are: (1) diagnosis and prescription, (2) designing and planning, and (3) producing and regulating care (Orem, 1980).

In step one, the FCNS, patient and family interact to identify self-care abilities, self-care demands, and self-care deficits. As a counselor, the FCNS assesses attitudes, beliefs, fears, ideas, and other factors which may influence willingness to learn and readiness to learn. A comprehensive picture of the patient/family may be obtained by assessing: (1) the family make-up, ages, sexes, occupations, and health status; (2) physical and social resources available to the patient/family; (3) family education and learning abilities, life-style and cultural background, and self-concepts; (4) adequacy of family functioning; (5) patient and family knowledge and understanding of the current event (Rankin and Duffy, 1983, p. 117-118); (6) universal, developmental, and health deviation self-care requirements (Orem, 1980), and (7) barriers to learning self-care behaviors. Factors which may potentially interfere with learning self-care informa-

tion and skills can be related to the patient or his/her environment (all those factors external to the patient). An understanding of how adult learners differ from children is necessary for the FCNS in exploring the patient's/family's potential willingness to participate in self-care and ability to learn self-care techniques as illustrated in Table 2. Adults' readiness to learn is affected by the immediacy of problems, tasks, and application and relevance of educational materials (Tables 3 and 4). The adult is self-directed, with a wealth of prior learning experiences (Whitman, Graham, Gleit, and Boyd, 1986). Barriers to learning in the adult include: (1) work, family and social responsibilities which may interfere with the time and energy available for learning; (2) apprehension concerning self-image as a learner (Whitman, Graham, Gleit, and Boyd, 1986); (3) physical pain, anxiety, hunger or thirst; (4) lack of emotional support; (5) failure to relate learning to potential or actual patient problems, (6) delay between learning of information and application of knowledge, (7) failure to include the patient in planning and implementation of learning activities, (8) poor interpersonal relations and communication between the nurse and

COMPARISON OF LEARNER CHARACTERISTICS BETWEEN CHILDREN AND ADULTS		
Characteristics	Children	Adults
Readiness to learn	Based primarily on biological development	Determined by life tasks, roles and immediate problems
Application of learning	Postponed application; subject centered	Immediate application related to relevant problems
Orientation to learning	Dependent; other-directed learning	Independent; self-directed
Value of experiences	Experiences seen as external events	Experiences are internalized: they provide a foundation for further learning and may contribute resistance to change
Rate of learning	Quickly masters isolated facts and concepts	Resistant to learning nonrelevant material; the aging process increases the time needed to complete some learning tasks
Barriers to learning	Few competing responsibilities for learning time; accustomed to formal learning through school experiences	Family, work, or community responsibilities may compete for learning time and energy; anxieties about self-image as a learner may threaten

Table 2. From Teaching in Nursing Practice: A Professional Model, (p. 112), N. Whitman, B. Graham, C. Gleit, and M. Boyd, 1986, Norwalk, Connecticut: Appleton-Century-Crofts.

Table 3

Principles of Learning
1. Learning is more effective when a student is ready to learn. This readiness includes both experimental readiness and motivation. 2. Moderate anxiety is beneficial to learning and low or severe levels of anxiety detract from learning. 3. Stating objectives specifically helps the learner understand them and become self-directed. 4. Self-direction is also served by having the teacher explain the goals and provide a model of the correct behavior. 5. Feedback concerning how well the learner is doing provides reinforcement for desired behavior and makes efforts to correct errors quickly. 6. In order to maintain motivation and be truly self-directing, an individual must also receive satisfaction from learning. The teacher maximizes this by setting realistic goals with the aid of the learner. 7. Meaningful material to the individual is learned more readily and remembered longer than material that is not meaningful. 8. For material to become meaningful to him, the learner must also be able to discriminate one concept, skill or attitude from another. 9. The depth of meaning that the learner has attained can be tested by asking him to restate an idea in his own words, answer a question using the information, or give examples of a principle.

Table 3

10. Strengthening associations between ideas to make them meaningful enhances the ability to transfer knowledge or skill from a known situation to a new one.
11. The more interconnections a piece of learning has with a person's experience and the more active he has been in using the learning in different situations, the deeper the impact will be on his memory
12. Ideas are remembered for a long time, while facts are not!

Principles of adult learning. Adapted from The Process of Patient Education (p. 90-92), B. Redman, 1984, St. Louis: The C.V. Mosby Company.



Table 4

Knowles' Assumptions About the Adult Learner
As a person matures.... 1. His self-concept moves from one of being a dependent personality toward one of being a self-directing human being. 2. He accumulates a growing reservoir of experience that becomes an increasing resource for learning. 3. His readiness to learn becomes oriented increasingly to the developmental tasks of his social roles. 4. His time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly his orientation toward learning shifts from one of subject-centeredness to one of problem-centeredness.

Knowles's basic assumptions about adult learners.
Adapted from The Modern Practice of Adult Education
(p. 39).

M. Knowles, 1970, New York: Association Press.

patient/family (Rankin and Duffy, 1983), (9) the difficulty or complexity of the educational information, (10) learning disabilities, (11) secondary gains from illness and, (12) language and culturally-related beliefs and values (Smith, 1987). "Age, developmental state and health generally determine the scope of self-care activities a person can perform...adult values and goals also affect the selection and performance of self-care actions in health or in illness" (Orem, 1980, p. 71). Self-care techniques which are consistent with the individual's values and goals have a greater potential for being viewed as beneficial.

For decision-making concerning assisting patients in expanding their self-care abilities, the FCNS must be knowledgeable about the deliberate action concept in self-care (Table 1). These behaviors may be internally (dependent on self-motivation, interest and environment) or externally (need-fulfilling behaviors in the external environment) oriented (Orem, 1980, p. 213-214). Internally oriented behaviors are always related to knowledge of self-care practices and goals. Step one of the self-care educational process ends with the decision to follow a specific course in relation to self-care demands (Figure 8).

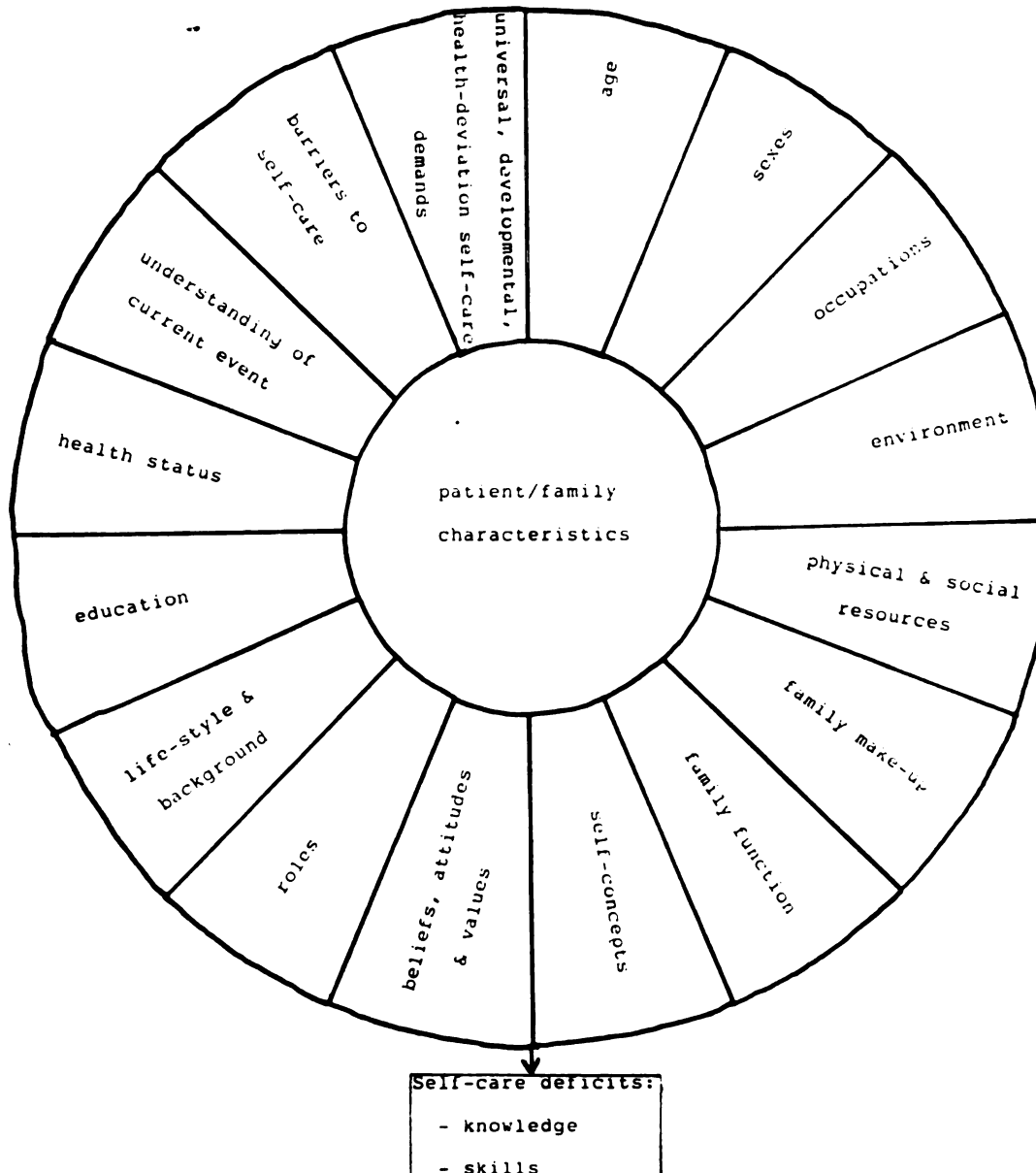
Mutual Assessment

Figure 8. Conceptual framework for adult self-care education. Step 1: diagnosis and prescription.

Step two of the self-care educational system is designing and planning the educational experience. This is an action phase which requires "expenditure of effort to satisfy the demands for care" (Orem, 1980, p. 81). Behavioral objectives for the educational program are set by the learner(s) and the FCNS. These objectives reflect educational needs identified by the FCNS and patient in step one and establish criteria for measuring outcome in step three. The mutually identified strengths (abilities), limitations, and requirements of the patient/family provide insight concerning which methods and strategies of teaching will be most beneficial in assisting the learner in achieving self-care. As with all phases and steps of the process, decision-making is a collaborative effort on the part of the FCNS and patient/family. Knowles (1973) emphasizes that "every individual tends to feel committed to a decision (or an activity) to the extent that he has participated in making it (or planning it)" (p. 42).

The FCNS must have knowledge concerning teaching methods and strategies to effectively counsel the patient/family in decision-making regarding the plan of action. Methods of teaching are dependent on the

following factors: (1) objectives, (2) domains of learning, (3) the learners, (4) physical resources, (5) time, and (6) the teacher (Narrow, 1979). Learning objectives establish the focus for the experience. General objectives may be well-suited to group situations, while more specific objectives may require individual learning sessions. Whether the nature of the information to be learned is cognitive, psychomotor or affective determines to a great extent which teaching methods will be most appropriate. The age and capability of the learner, as well as the number of learners influences choice of methods. Physical resources include available space, money, audiovisuals, and printed materials. Time refers to time constraints of the learner and the educator. Method, lastly is influenced by the capabilities, preference, and energy of the teacher.

Methods commonly employed in teaching are: (1) lecture, (2) group discussion, (3) explanations, (4) exploration, (5) demonstration, (6) role playing, and (7) role modeling (Narrow, 1979). Learning theories and models provide a basis for understanding methods and strategies employed in patient/family education. Social learning theory (Bandura, 1977) describes

modeling as learning by observing others. The primary focus of this theory is that learning new behaviors, changing behaviors and eliminating undesirable behaviors occurs in the social-learning facet of group interaction. Influence of social models and differential reinforcement are viewed as the most effective means of learning new behaviors. Imitation of others and identification with role models promote long-term life changes (Hill and Smith, 1985). In this method, the nurse acts as a role model for appropriate skills, behaviors, and attitudes.

Explanatory models (Kleinman, et al.,1978) provide a conceptual basis for the exploration method. This model explores the relationship of man's perceptions, experiences and coping ability in illness to his cultural group's definitions of illness. The nurse assists the patient in identifying related factors and communicates her own interpretation of these factors (Steiger and Lipson, 1985).

Cognitive learning theories (Bloom, 1956) arrange thinking or cognitive processes from most basic to most complex. All persons are viewed as desiring simplification and organization in their environment, which is the purpose of this model. Taxonomy's for cognitive,

affective and psychomotor domains have been developed, describing the increasing complexity of each (Redman, 1984). Table 5 denotes domains and methods of teaching which may be most suitable for meeting objectives (Rankin and Duffy p. 169-170).

Specific educational strategies for teaching adults include: (1) specificity in communicating information and behavioral change to increase retention, (2) repetition of information and skills to strengthen learning, (3) brevity in the amount of material presented during each teaching/learning session to facilitate retention and recall, (4) well organized and presented content to decrease confusion on the part of the learner, and (5) primacy, or presenting most important facts first, based on the premise that patients remember the first third of the communication best (Whitman, Graham, Gleit, and Boyd, 1986).

Behavioral strategies which are frequently employed are contracting, graduated behavior change, self-monitoring and tailoring (Whitman, Graham, Gleit, and Boyd, 1986). In contracting, rules concerning behavior are mutually set by the teacher and learner(s), denoting commitment to a change in behavior. Graduated behavioral change implies that the

Selecting Learning Activities for Patient Education	
I. Cognitive (Knowledge)	
A. Learning Facts	
* Lecture	
* Demonstration	
* Independent-Study Format	
* Tests	
Discussion—Questions and Answers	
Practice	
Simulation	
B. Visual Identification	
* Demonstration	
* Simulation	
* Tests	
Practice	
Independent Study	
C. Understanding and Applying Knowledge	
* Demonstration	
* Practice	
* Role Play	
Discussion—Questions and Answers	
Independent Study	
Simulation	
Tests	
II. Affective (Attitudes and Appreciations)	
* Discussion—Questions and Answers	
* Role Play	
Simulation	
III. Psychomotor (Skills and Performance)	
* Practice	
* Role Play	
* Simulation	
* Demonstration	
* Tests	
Independent Study	
* Very effective	

Table 5. From Patient Education: Issues, Principles, and Guidelines, (p. 169-170), S. Rankin and K. Duffy, 1983, New York: J.B. Lippincott Company.

expected outcome is a gradual change in behavior. This technique is often effective in making major life-style changes. Tailoring refers to the "fit" of the teaching plan to the person's needs, values, and beliefs. The better the "fit," the more likely the individual will be to participate in teaching/learning experiences and follow through on recommendations. Self-monitoring increases the individual's awareness of behaviors, which promotes behavioral change (Whitman, Graham, Gleit, and Boyd, 1986).

Teaching aids are also considered as strategies to increase learning. Increased readability of written materials improves comprehension and recall of information. Illustrations may stimulate interest and aid conceptualization, which influences recall and comprehension. Audiovisuals are well suited to persons with sensory perception and memory deficits, especially in teaching psychomotor skills. The use of models or equipment assists the person in grasping abstract thoughts and allows the use of senses to enhance learning. This technique is essential in learning psychomotor skills (Whitman, Graham, Gleit, and Boyd, 1986).

Step two of the self-care educational process ends

when the FCNS and patient/family complete the plan for increasing self-care abilities (Figure 9). This includes the methods and strategies which will be used, the sequence of information to be learned, when and where teaching/learning sessions will occur, and expected outcomes of the educational process.

Step three of the self-care educational process is producing and regulating care. The plan which has been designed by the FCNS and patient/family is implemented. The FCNS acts as a teacher, counselor and coordinator in this phase to facilitate attainment of the person's/family's maximum level of self-care. The patient/family fulfill their roles of learner through participation in the teaching/learning process and self-care (or dependent-care) agent by gaining knowledge and skills.

Evaluation of the process is based on the degree to which initial behavioral objectives have been met. The effectiveness of the therapeutic intervention is a measurement of its contribution to achievement of these results: "(1) support of life processes and promotion of normal functioning; (2) maintenance of normal growth, development, and maturation; (3) prevention, control, or cure of disease processes and injury; and

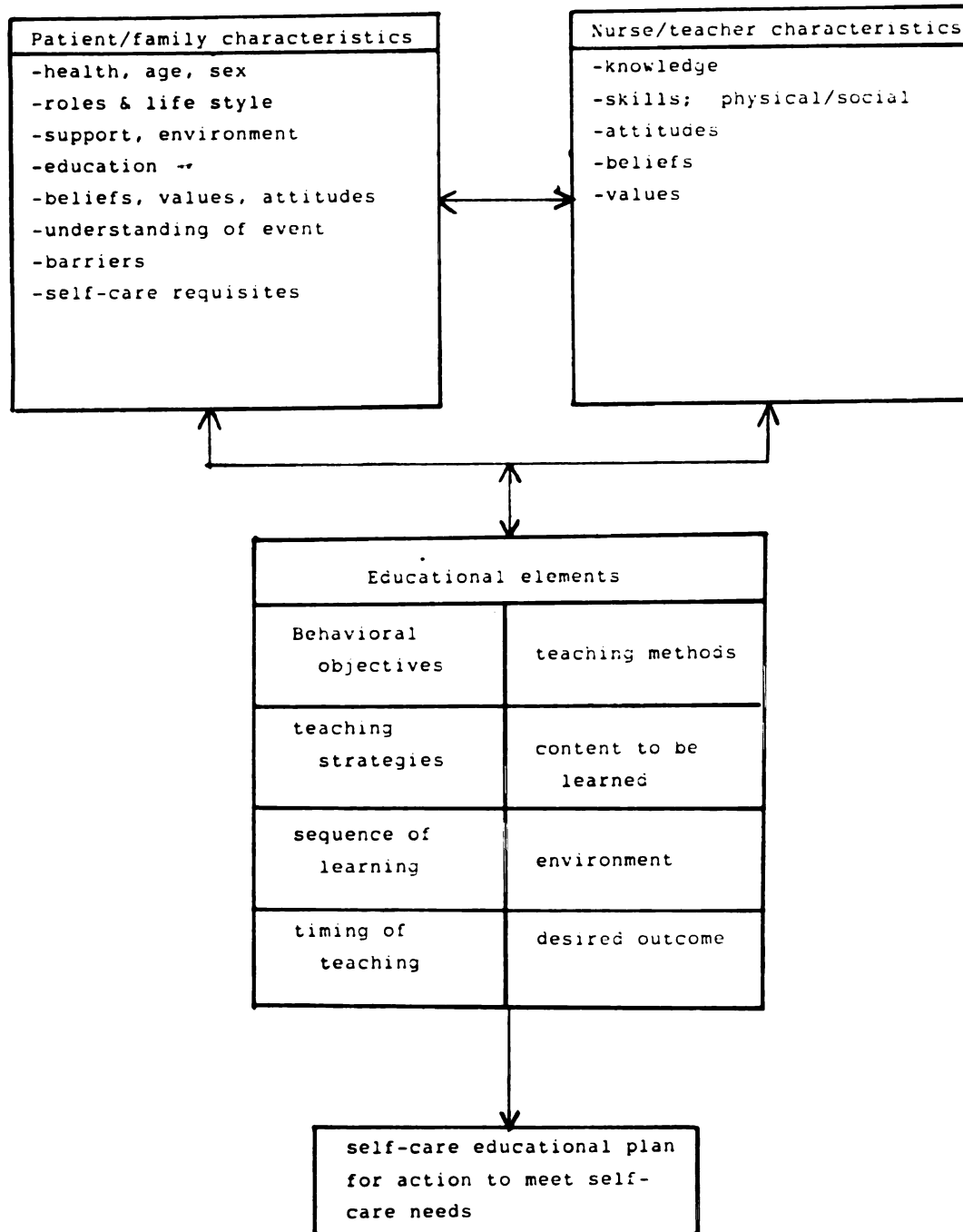
Plan for Intervention

Figure 9. Conceptual framework for adult self-care education. Step 2: Designing and planning.

(4) prevention of or compensation for disability" (Orem, 1980, p. 40). Objective evaluation of recall, comprehension and application of information provided may be accomplished through the use of pre and post educational tests, asking the learner questions pertaining to content, and the use of written or verbal vignettes related to the subject material. Changes in behavior, attitudes and psychomotor skills may be evaluated by observing these skills. The quality of the care or therapeutic intervention may be assessed by written or verbal measurement of patient/family satisfaction (Chang, 1980).

Learning does not occur immediately, but over a period of time (Orem, 1980, Redman, 1984). The process of regulating self-care activity through education continues until there are no known or potential knowledge deficits in self-care (Figure 10).

As emphasized by Orem (1980), "the central requisites for self-care are learning and the use of knowledge in performing...self-care actions" (p. 71-72). Man cannot fulfill his self-care needs and responsibilities without this knowledge. Nursing, as a helping service, assists man in achieving his goals of maintenance of life, health and personal integrity

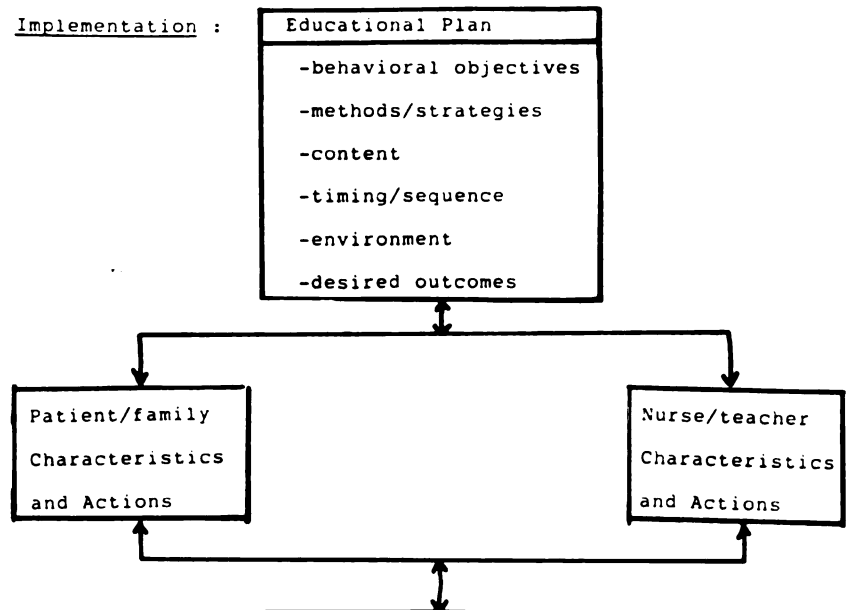
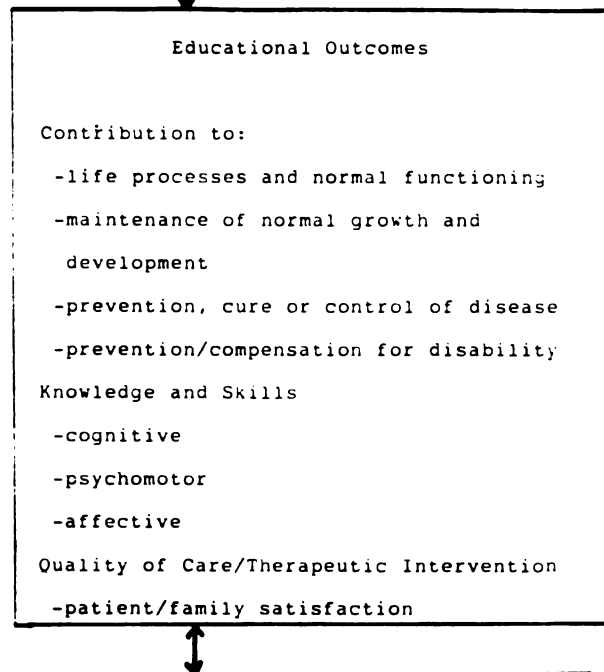
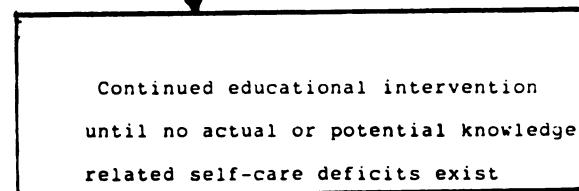
Implementation :Evaluation:Regulation:

Figure 10. Conceptual framework for adult self-care education. Step 3: Producing and regulating care.

through self-care actions. It is hoped that this conceptual framework will assist the FCNS in achieving this aspiration.

Smith (1987) quotes Epictetus (50 A.D.), the Greek philosopher as stating: "Only the educated are free" (p. introduction to chapter five).

The adult self-care education conceptual framework may easily be applied to Home Enteral Nutrition patient education. The ultimate goal is to increase the patient's/family's self-care abilities so they may achieve the maximum level of wellness and personal integrity possible under the circumstances of the disease.

The FCNS intervenes to provide self-care education when self-care deficits in knowledge and skill exist or may occur. Special knowledge and skills in principles and techniques of Home Enteral Nutrition, patient education and self-care are necessary nursing requirements. The FCNS acts as a counselor in assessing strengths, limitations, and self-care demands with the patient/family and in providing the support and guidance necessary for decision-making concerning methods of feeding, follow-up, education and role assumption. Coordination by the FCNS of learning

experiences and discharge planning is necessary to prevent confusion and discouragement which could negatively affect self-care or dependent-care efforts. Step one of the self-care education, diagnosis and prescripion, ends when a decision is made concerning self-care learning.

During step two, designing and planning, the FCNS and patient/family collaborate to form a plan of action based on the findings of the first step. The FCNS's knowledge of information and skills required for Home Enteral Nutrition aid the patient's/family's understanding of the therapeutic demands related to health deviation self-care, and teaching/learning methods which may be most beneficial in meeting immediate needs for self-care. The need for knowledge and psychomotor skills related to a complex therapeutic regimen suggests employing individual teaching/learning sessions of short duration, which begin with more simple constructs and advance to more complex thoughts. Provision of easy to read, illustrated written information reinforces the content of explaining sessions. Psychomotor skills are best learned by observing a role model (the FCNS) perform required techniques and by personally manipulating equipment. Repetition of the

technique facilitates remembering, as does verbal and non-verbal reinforcement by the role model. The use of pre and post test is a learning tool which establishes important facts to learn and allows the learner to see how well he/she has understood the information. It may also serve as a method for assessing further learning needs.

Patient/family participation in the educational process recognizes them as self-directing adults capable of making choices and acting on their own behalf to provide self-care. It also demonstrates that the FCNS "cares" about them and their needs and desires, which may facilitate willingness to engage in and perform self-care.

Mutual establishment of objectives, roles and expected outcomes between the patient/family reinforces the commitment on both parts to achieving a higher level of self-care for the patient.

Realizing that adults have work, family, and other commitment, the FCNS assists the learner(s) in scheduling teaching/learning events so they do not conflict with other elements, and at times when the learner has the energy to participate. Plans are discussed concerning altering the environment to reduce

unnecessary stimulation which may interfere with learning. In scheduling the sequence of learning sessions, learners may opt to begin with more familiar, less threatening information and skills to reduce anxiety and facilitate recall and comprehension. When the plan of action is complete, phase two ends.

Step three of the self-care educational process involves implementation and fulfillment of the educational plan. At the completion of the implementation phase, the FCNS and patient/family evaluate the degree to which new information and skills have been learned through written tests, demonstrating techniques and answering information-related questions.

As learning occurs gradually over a period of time and is reinforced by repetition and professional acknowledgement, the FCNS coordinates plans for continued nursing follow-up at home. The self-monitoring required of the patients at home increases awareness of self-care behaviors and enhances memory and recall. It may also serve as an educational tool for the home-care nurse to expand the patient's/family's self-care knowledge. This nursing intervention to assist the patient in increasing self-care skills and decreasing complications continues until

there are no potential or actual Home Enteral Nutrition self-care knowledge deficits. The entire process of Home Enteral Nutrition self-care education is diagrammed in Figure 11.

In summary, Orem's self-care theory (1980) provides a basis for nursing care which focuses on the needs, rights, responsibilities and well-being of the individual. Orem's (1980) model aids the nurse in: (1) assessing actual or potential needs of the patient, and the relationship of these needs to environmental factors; (2) formulating methods to assist the patient in achieving self-care; and (3) presents criteria for evaluation of the effectiveness of therapeutic intervention. Orem (1980) views knowledge and skills as primary requisites for self-care.

Learning theories facilitate the FCNS's understanding of elements related to gaining and applying knowledge, including cognitive and behavioral factors which impact learning, methods and techniques which enhance comprehension and recall, and essential factors in evaluating the effectiveness of teaching/learning interventions.

Neither theory, by itself, provides a comprehensive conceptual framework for self-care

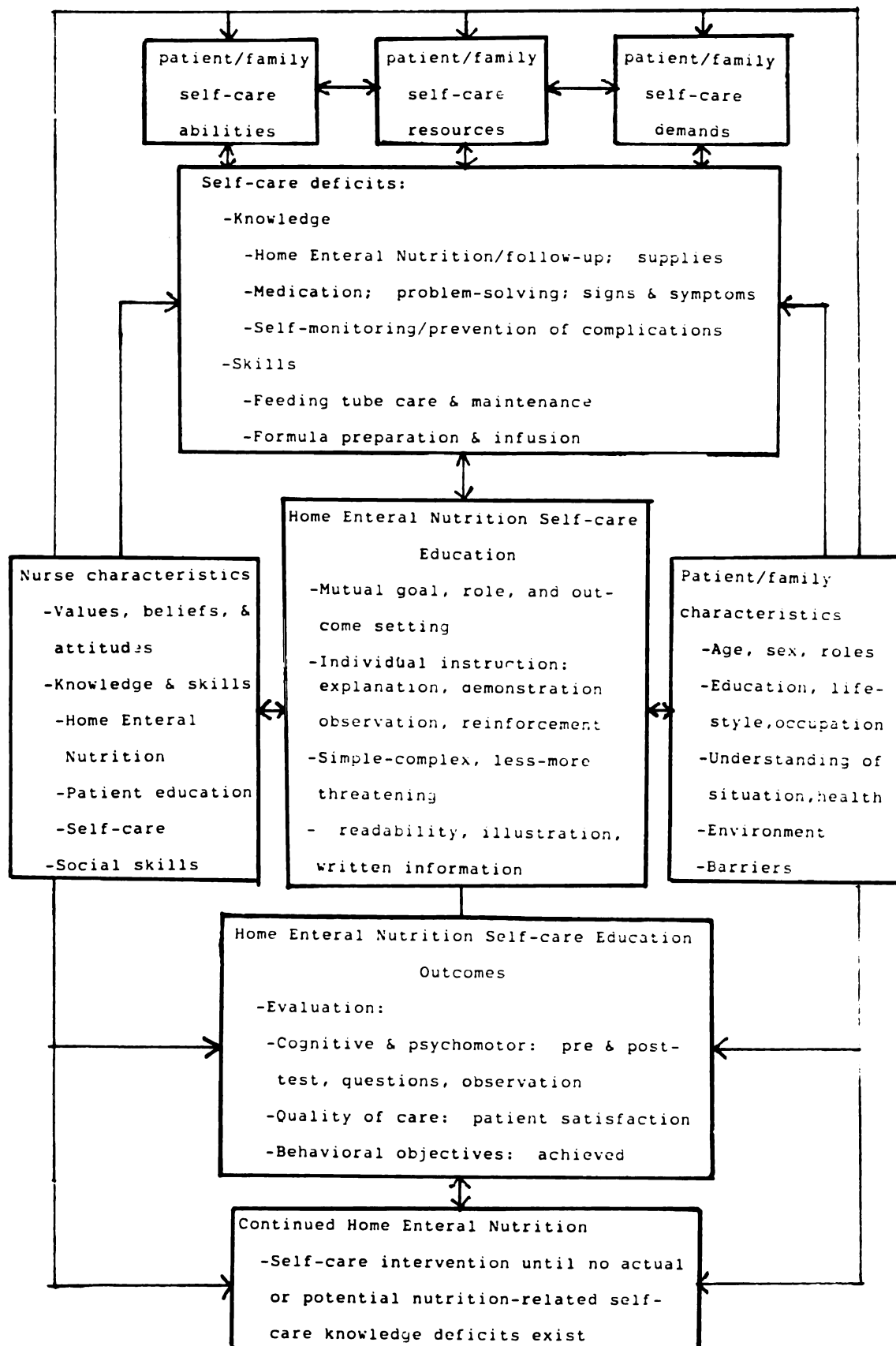


Figure 11. Home Enteral Nutrition Self-Care Education.

education in adults. Such a model is proposed by this author, which incorporates the essential components of self-care theory (Orem, 1908) and learning theories. It is hoped that this conceptual framework will expand on the supportive-educative nursing system proposed by Orem (1980), and assist the FCNS in understanding and applying this concept in practice.

Self-care theory (Orem, 1980) and learning theories may be individually applied to patient education in Home Enteral Nutrition, however, separately they cannot define all of the dimensions of the concept. The adult self-care education conceptual framework, a blend of both theories, allows formulation of a complete picture which can be applied to clinical practice.

Nursing implications related to these theories, and the proposed conceptual framework will be presented in Chapter V.

CHAPTER III

REVIEW OF THE LITERATURE

Overview

This chapter presents a review of recent pertinent literature concerning research and expert opinion in Home Enteral Nutrition patient education, and the related variables of recall and comprehension of written educational materials, and the readability of health teaching materials. Supportive literature for Home Enteral Nutrition self-care educational instruments presented in Chapter IV will also be provided. The purpose of this review is to familiarize the reader with recent research and its relationship to study variables.

Home Enteral Nutrition Patient Education Manual

The following review of the literature is designed to provide support for the methods and techniques incorporated in the Home Enteral Nutrition Patient Education Manual. The characteristics of patients receiving this therapy are also noted, including age, sex, and

disease state, factors which are relevant in planning patient education.

Enteral nutrition via feeding tube is recognized as a safe, therapeutic, convenient, and cost-effective method of maintaining adequate nutrition for extended periods of time in persons who are unable to consume nutrients orally (Chrysomilides and Kaminski, 1981; Sriram and Grey, 1984). These assumptions are based on current research in the field of Home Enteral Nutrition. Chrysomilides and Kaminski (1981) studied eighteen patients from four different hospitals in Chicago who required outpatient nutritional support by enteral and parenteral routes. Patients and families were taught catheter care, infusion techniques and prevention of complications prior to discharge. Follow-up and monitoring involved outpatient clinic visits one to two times per month. Patients were selected for participation by a prospective review comparing application of parenteral or enteral nutrition methods. Nine patients, aged 26 to 71 years received enteral nutrition through a modified feeding jejunostomy for two to fifteen months. The population consisted of seven males and three females, three of which were diagnosed with carcinoma of the floor of the mouth.

Malignant tumors at other sites necessitated enteral nutrition in five patients, and one patient required the therapy secondary to ingestion of a caustic chemical. Parenteral nutrition patients were aged 20 to 72 years and received support for three to thirty-two months. Primary diseases were cancer, Chron's disease and vomiting of unknown etiology. Results in Home Enteral Nutrition patients demonstrated a significant average weight gain of 9.9 Kg over the study period, which was supported by significant increases in triceps skinfold (TSF), arm muscle circumference (AMC) and serum albumin (SA) levels. Of the nine patients, six resolved nutritional deficits, while three continued to have mild to moderate deficits in two or more of the identified parameters. Parenteral nutrition patients gained an average of 8.5 Kgs and also significantly increased TSF, AMC, and SA. Four patients continued to experience mild to severe nutritional deficiencies. Complications reported related to enteral nutrition include: (1) accidental loss of the feeding tube in one patient, requiring hospitalization for replacement; (2) diarrhea and constipation in three patients, which was resolved by altering the formula and infusion rate; and (3) a stage

of depression and adjustment, lasting one to three months, in all patients. The authors (Chrysomilides and Kaminski, 1981) report that early adjustment was facilitated by "sustained interest and cooperation of the family members, in addition to obvious improvement in the patient's health and tolerance for activities of daily living" (p. 2274). Complications in parenteral nutrition therapy consisted of: (1) three patients experienced catheter sepsis, two of which were due to non-adherence to sterile technique, requiring hospitalization and insertion of new catheters, (2) one catheter became dislodged requiring hospitalization and replacement, and (3) all patients experienced a prolonged period of adjustment (three to six months) to nutritional support secondary to fear of complications. Elderly patients were reported as having difficulties mastering techniques, resulting in dependency on family members. One younger patient was also noted as having "serious problems" in adjusting, with significant preoccupation with the therapeutic life change. The cost of enteral nutrition was \$20 - \$40.00 per day versus \$150 - \$250.00 per day for parenteral nutrition. The authors (Chrysomilides and Kaminski, 1981) conclude that enteral nutrition achieves the same therapeutic

results as parenteral nutrition, requires a shorter adjustment period, is much less expensive, is easier to learn, and presents no risk for sepsis. Recommendations include: (1) the use of Home Enteral Nutrition in patients with functioning gastrointestinal tracts who cannot meet nutritional needs orally; and (2) retraining of Home Parenteral Nutrition patients at least one time per year to assure proper care. Limitations of the study were not presented, nor were criteria for patient selection, or methods of data collection and analysis.

Rumley, et al. (1985) report the use of bolus jejunostomy feedings and reinfusion of gastric secretions in twelve patients with profound gastric atony in a university hospital in Gainesville, Florida. Criteria for patient selection was gastric atony with complete or partial intolerance to diet and high gastrostomy output. All patients had gastric atony secondary to cancer or its treatment, except one which was related to surgery for a bleeding gastric ulcer. Results indicated that eleven patients were able to tolerate bolus feedings of 125 to 300 ml every one to two hours, and one patient was not able to consistently tolerate feedings. Gastric fluid reinfusion was

tolerated and required by eight patients in-hospital and seven patients at home. Two complications were reported: (1) one incidence of aspiration while asleep and (2) one occurrence of tachycardia and hypotension, with abdominal pain, distention and frank blood through the jejunostomy 48 hours after gastric fluid reinfusion was initiated. The authors (Rumley, Lineaweaver, Guff, and Vogel, 1985) conclude the reinfusion of gastric secretions is an effective method of preventing fluid and electrolyte losses in patients with gastric atony and high gastrostomy outputs. Home Enteral Nutrition and gastric reinfusion are proposed as methods to facilitate earlier hospital discharge, without the use of intravenous solutions. The use of bolus feeding is viewed as tolerated by the patient, less expensive, and less complicated because it does not require the use of an infusion pump. The use of cimetidine or other hydrochloric acid blockers is recommended for management of severe reflux and high gastric acidity. Limitations are not specifically stated, however, the text notes that nitrogen balance studies were not consistently performed, which precludes assessment of the therapeutic value of the feeding method. No anthropometric or laboratory indices were included in

the study, nor were methods described. Results were presented in a table format with no manipulation of the numbers or variables. This study appears to be descriptive in nature, essentially stating that 9 out of 12 patients were able to tolerate bolus enteral feeding and 8 out of 12 tolerated gastric reinfusion.

Heymsfield, et al. (1983) from Emory University School of Medicine in Atlanta, Georgia, present case reports of two patients with Chron's disease, measuring the effectiveness of cycled Home Enteral Nutrition in improving metabolic balance. Both patients were placed on low-fat elemental formulas via small nasogastric tube. Patient one lost 12.6 Kg prior to initiation of therapy. Baseline studies were performed for three days prior to enteral formula institution, establishing oral nutrient intake, stool weight, fat, nitrogen and energy, and anthropometric measurements. Caloric requirements were based on 220% of the patient's basal energy expenditure. The patient was taught to insert the feeding tube and check for placement by air insufflation while auscultating with a stethoscope. Feeding was infused over eleven night-time hours, using an infusion pump. The feeding tube was removed and discarded at the end of each feeding. Self-monitoring

postcards with weight, number of stools per day, solid food intake and symptoms were sent to the research center weekly by the patient. Follow-up included monthly visits with evaluation of electrolytes, anthropometrics, hemoglobin and vitamin and mineral studies. Results indicated that in a 12-month period: (1) the formula was changed one time, (2) daily stool output decreased, (3) serum electrolytes and hemoglobin improved or continued within normal limits, (4) no mineral or vitamin deficiencies occurred, (5) a 10 Kg weight gain and increase in free body mass and fat, (6) increased strength and work tolerance, and (7) increased ability to assume normal daily activities. Patient number two had a 20 Kg weight loss prior to therapy. Baseline studies, teaching and follow-up were identical to patient one. Patient two gained 4 Kg in the nine-month study period and increased anthropometric measurements. The authors (Heymsfield, et al., 1983) conclude that patients with weight loss secondary to inflammatory bowel disease can increase weight, body mass and fat through Home Enteral Nutrition. Raw data was presented in tables and graphs or calculated in percentages. One study limitation is that complications were not described, with reference

only to "no significant complications" (Heymsfield, et al., 1983, p. 170). A second limitation is the definition of cost-effective. The cost of Home Enteral Nutrition, after start up fees, is stated as approximately \$770 vs \$3,800 to \$5,000 per month for Home Parenteral Nutrition. Although this cost is consistent with Chrysomilides and Kaminski's (1981) study, it does not seem very cost-effective to use a nasogastric feeding tube which is removed and disposed of every day. Most enteral feeding tubes cost \$10 - \$20 each, adding \$300 - \$600 per month in patient costs. The major limitation of this study is that the outcomes are difficult to interpret because both patients also received oral diets of 1700 to 2000 K calories per day during therapy. Prior to therapy their oral intake was 2800 - 3100 K calories per day (pre-study diet). It is unclear whether a modified oral diet would have been as effective as the tube feeding and oral diet.

In a descriptive study of pediatric gastroenterology patients, Navarro, Goutet and Charritat (1981), from Hopital Trousseau in Paris, France, analyzed the application of continuous enteral feeding via nasogastric (99 children) and gastrostomy routes (12 children) in the home. One hundred and eleven

children ages two months to 15 years participated in the program from 1974 to 1979. Involvement in the program was based on need for enteral nutrition secondary to intractable protracted diarrhea and inflammatory bowel syndrome, and ability of the families to perform necessary techniques at home. Mothers were taught to prepare formula and regulate pumps prior to discharge. Nasogastric tubes were changed every three days. The average length of therapy was four months. Complications related to the therapy were: (1) two cases of esophagitis; (2) four cases of nasal hemorrhage; (3) four cases of vomiting; (5) one case of simple dysphagia; and (6) 49 cases of relapsing rhinopharyngitis and otitis. As a result of therapy, 32 children were able to attend school and infuse at night, and most children experienced improvement in behavior and developmental performance. Continuous Home Enteral Nutrition was proposed as a cost-effective method (as compared to prolonged hospitalization) which allows children to return to family and school life. Limitations include: (1) the authors do not note which feeding tubes complications were related to or possible reasons for complications; (2) there is no data to support the conclusions drawn

concerning the psychosocial impact on children; (3) the rate of complications is noted as no greater than that occurring in the hospital; however, hospital statistics are not included; and (4) there is no data to support the cost-effectiveness reported in the study. Although the psychosocial impact on children has not been supported, these impressions add information, which is generally sparse, to the field. The documented occurrences of complications is significant in that the population is large and specifically denotes problems in children.

Newmark, Simpson, Beskitt, Black and Sublett (1981) of Texas A & M University College of Medicine, Temple, Texas, studied the effects of Home Enteral Nutrition on malnutrition in 23 patients referred to their service. Diagnostic criteria for participation was protein-calorie malnutrition (serum albumen less than 3.5, recent weight loss greater than 10 pounds, and anergy to four intradermally administered antigens). Disease processes included cancer (17), myasthenia gravis (2), chronic obstructive lung disease (2), Duckenne's muscular dystrophy (1) and multiple traumatic injuries (1). Tube feeding was initiated if oral caloric intake was not greater than 500 K calories

per day for three consecutive days. Methods of tube feeding were taught to the patient and at least one other family member prior to discharge. Eighteen patients utilized infusion pumps to deliver feeding over 16-18 hours per day with feeding tubes remaining in place during "off hours." Head of the bed was elevated 30 degrees to prevent regurgitation. Gravity infusion method was used in five patients. As a result of therapy 20 patients gained an average of 8.7 pounds over 66 days with a significant increase in serum albumen (average 0.6g% increase). The authors (Newmark, et al., 1981) report an average of three to six hours to teach patients and family. Costs of feedings per day were \$6 - \$12, with pump rental fees of \$120 per month. Compared to the hospital room cost of \$87 per day, an estimated savings of \$75 - \$81 per day was calculated using Home Enteral Nutrition therapy. Reported complications were anorexia, diarrhea, and abdominal distention, which were resolved by decreasing the infusion rate. The authors (Newmark, et al., 1981) emphasize that "adequate follow-up and reinforced instruction concerning the enteral nutrition delivery system are essential for successful nutritional repletion" (p. 78). The format used for

the study is the descriptive correlation method. The raw data is presented in tables and has not been manipulated. Limitations have not been noted, however the following have been observed: (1) methods of calculating nutritional needs were not included, making it difficult to apply results to another population; (2) follow-up and reinforcement of learning is stressed but no data is available concerning adherence or factors related to adherence; (3) ages of the patients and duration of disease are not included; and (4) it is unclear whether patients had oral intake in addition to tube feedings. Although the information presented is valuable in establishing the characteristics of Home Enteral Nutrition, it is impossible to establish what variables affected the outcome and how the outcome was affected.

Nasogastric feeding at home in malnourished patients has been described in a study by Greene, et al., (1981) of Vanderbilt University in Tennessee. Two groups of malnourished patients were compared. Group A consisted of 14 patients, aged two months to 68 years (10 under age 14), who were treated for one to eight months. Primary diseases included: (1) chronic renal disease (two infants, one adult); (2) surgical short

bowel syndrome (two toddlers); (3) malignancy (3 children five and under and two adults); (4) inflammatory bowel disease (two teenagers); (5) and congenital heart disease (one infant). Several elderly patients and inflammatory bowel disease patients were excluded related to study criteria. Group B was composed of 11 patients with inborn errors of metabolism, type I glycogen storage disease (nine patients age 1-22 years) and homozygous type II hyperlipoproteinemia (two patients aged 8 and 21 years). Feedings in both groups were delivered by nasogastric routes, primarily by continuous infusion pumps. Patients and families in both groups received instructions prior to hospital discharge concerning how to prepare and administer formulas, operate infusion pumps, and how to reinsert feeding tubes if accidentally dislodged. Results of the therapeutic intervention in group A were: (1) appetite improvement; (2) substantial weight gain; (3) improvement in weight/height index (primarily children); and (4) improvement in their primary disease status. Group B: (1) significantly improved growth parameters; (2) exhibited "dramatic" improvements in biochemical parameters related to the disorder; and (3) one patient

experienced a significant decrease in serum cholesterol concentrations. One serious complication was noted in a patient who developed pneumonia, possibly from aspiration of formula. The authors (Greene, et al., 1981) state that having patients frequently assume the right lateral position decreased the problem of successive gastric residual. Conclusions related to the study include: (1) the procedure is safe and effective in meeting nutritional requirements; (2) all patients responded favorably; and (3) complications were "minimal." The authors (Greene, et al., 1981) recommend jejunostomy feedings for persons at risk for pulmonary aspiration. Several limitations exist in this study, including: (1) grouping of patients suggests comparative analysis, however, results were presented per group and no correlations were made; (2) in the study methods group A is noted as receiving therapy for 1 - 8 months, yet the following paragraph states that patients usually meet criteria for discontinuing treatment within the second or third week of therapy; (3) exclusion of elderly patients and persons with underlying bowel disease related to study criteria was noted, however, the specific criteria which caused exclusion was not stated; (4) no criteria

for caloric requirements was stated and formula selection was related to cost, availability, physician preference and underlying disorder; (5) it is unclear whether patients received only enteral feeding or oral diet and enteral feeding; (6) only one possible complication is reported, yet the text refers to problems with acid-base balance, electrolytes and diarrhea in two patients with surgical short bowel and symptomatic selenium deficiency in one patient; (7) improvement in primary disease state is reported, yet there is no data indicating that enteral nutrition was the enabling factor; and (8) significant improvement in clinical nutrition parameters is stated, but supportive data is not provided.

Nelson, Palumbo and O'Brien (1986) provide a descriptive study of Home Enteral Nutrition at Mayo Clinic, and Rochester Methodist and Saint Mary's Hospitals in Cleveland. The study population included 144 of 145 patients referred to nutrition support services who met criteria for inadequate oral intake of nutrients. Eighty-seven males and fifty-seven females, age 2-1/2 years to 96 years, participated in the program. The majority of patients were 60-80 years old. Diseases necessitating Home Enteral Nutrition

included: (1) malignancy with gastrointestinal obstruction (48%); (2) dysphagia or altered gastric motility secondary to neurological impairments (40%); (3) gastrointestinal disorders, i.e., chronic pancreatitis and inflammatory bowel disease (6%); and (4) traumatic injuries or psychological conditions (6%). Feeding routes utilized were esophagostomy (1), pharyngostomy (1), jejunostomy (22), gastrostomy (75), nasogastric (37) and nasoenteric (7). Methods of formula infusion were pump-assisted (59%), gravity intermittent (40%) and syringe bolus (less than 1%). Patients and significant others were taught feeding techniques prior to discharge. Study findings indicate that at the end of one year half the patients remained on Home Enteral Nutrition, one quarter expired as a result of primary disease, one fifth converted to oral diets and one patient required Home Parenteral Nutrition. Active patients were surveyed at the end of the study period regarding complications, therapy tolerance, effectiveness of therapy and its impact on quality of life. Seventy percent of the remaining 75 patients responded, reporting the following observations: (1) 36 incidents of tube blockage: 67% were resolved at home, 16% required a physician's visit, 14% resulted in an

emergency room visit and 3% necessitated hospitalization; (2) a sum of 164 problems with maintaining access were reported in 53 patients, 48% of which could not be resolved at home; (3) 128 problems with feeding intolerance (diarrhea, nausea, vomiting, fullness/distention, gas, constipation and regurgitation) occurred, 15% of which could not be resolved at home; (4) 77% perceived their quality of life as "less than good" prior to therapy; (5) 50% reported that the program improved daily living; (6) 39% felt their quality of life was maintained; and (7) 12% reported a deterioration in their quality of life secondary to the Home Enteral Nutrition therapy. Of the persons whose quality of life deteriorated, many reported being overwhelmed by the requirement of the therapy which offset the benefits of the therapy. The authors (Nelson, et al., 1986) conclude that: (1) feeding access maintenance and feeding intolerance problems occur frequently, which often require medical intervention; (2) the majority of patients tolerated and followed prescribed therapeutic regimens; (3) most patients gained or maintained body weight; (4) 88% perceived improved functioning ability; and (5) Home Enteral Nutrition is a "relatively" safe and effective

therapeutic intervention. Limitations of this study include: (1) the survey was sent to remaining patients at the end of one year; reported results are influenced by the patient's ability to recall specific events; only half of the original population filled out questionnaires, thus the half not sampled may have significantly changed study results; (2) the authors report weight gain or maintenance, however, there is no data to support this conclusion; and (3) the therapy is noted as being effective, yet, there is no definition of "effective" or supportive data. Despite limitations, this study represents a large patient population and confirms that problems do occur. It adds information to the field concerning characteristics of Home Enteral Nutrition and acts as a resource for patients' perceptions of therapeutic outcomes and quality of life.

As the field of Home Enteral Nutrition is relatively new, and many aspects have not been studied, professionals often base practice on methods established by enteral nutrition in the hospital setting. Included under the umbrella of enteral nutrition are: (1) the utility of specific feeding routes; (2) methods for catheter care and maintenance;

(3) formula infusion methods; and (4) complications and prevention. Major feeding routes are nasogastric, gastrostomy and jejunostomy. Studies and articles related to nasogastric feedings focus on catheter materials, insertion and maintenance techniques, patient acceptance, and related complications. Ramos and Lindini (1986) studied the effectiveness and safety of eight French polyvinyl feeding tubes in twenty-one patients, aged 19 to 95 years in a Bronx, New York hospital. Methods of tube insertion included: (1) placing the patient in an upright position for placement; (2) ascertaining the tube location by injecting 50 ml. of air into the tube while auscultating over the stomach; and (3) stabilizing tubes with tape or transparent dressing over the cheek. Tubes were irrigated with cranberry juice to prevent clogging. Results of this descriptive study indicate: (1) 19 tubes passed into the duodenum within 48 hours; (2) six tubes were dislodged by patients; (3) the average length of time tubes remained in place was 11 days; (4) four tubes became obstructed, two of which had to be removed; (5) there were no complications associated with the use of guidewires; and (6) the tubes may remain patent and properly placed for up to 71 days.

The reported total cost of the use of this method was \$14.85 as compared to \$189.00 to \$467.10 with the use of other nasogastric feeding tubes. This technique is recommended as a safe, inexpensive, and simple method of enteral feeding. Study limitations include: (1) lack of complications related to the use of guidewires is reported, but not those associated with the use of polyvinyl catheters, which historically become brittle with continued infusion; and (2) occlusion of four catheters is noted, but not the cause of occlusion.

Crocker, Krey, and Steffee (1981) implemented a performance evaluation study of a polyurethane nasogastric feeding tube with guidewire and weighted, hydromer coated tip (Nutriflex, Biosearch Medical Products). The study involved 18 patients, aged 23-84 years, at Boston University Hospital who received 38 feeding tubes over a three-month period. Results of the study included: (1) two instances of inability to reinsert the tube in one patient; (2) one instance of difficulty removing the stylette after the tube was in place; (3) no problems with formula flow; (4) tubes remained in place 1 - 27 days; (5) nine patients pulled out 19 tubes related to confusion; (6) 18% of the tubes "slipped out of position"; (7) two tubes were removed

secondary to misplacement; (8) aspiration pneumonia was suspected in one patient, presumably related to the use of a 30 inch tube in a 6' 2" adult; and (9) one tube became clogged requiring removal. The authors (Crocker, et al., 1981) conclude that the Entriflex tube was easy to insert and remained patent, reducing invested nursing time. Caution concerning the use of stylettes is noted as they may easily slide through feeding ports in the tubing and cause mucosal perforation and/or irritation. The use of a longer feeding tube in adult patients is suggested. The major limitation of this study is that the methods of tube insertion and maintenance are not noted, which may significantly affect study results.

Hansen (1979) conducted a comparison study of methods used for establishing appropriate length of feeding tube insertion. The study sample included five volunteers and 99 cadavers, with 73 males and 31 females, aged 17 to 92 years, from the Seattle, Washington area. The researcher evaluated the relationship between external body measurements and actual distance from the tip of the nose to the lower esophageal sphincter. Study findings show that the measurement method of tip of the nose to tip of the

earlobe to tip of the xiphoid (NEX) demonstrated the strongest correlation to actual body measurement. Stepwise multiple regression analysis and graphic plotting of data was performed to determine clinically effective methods of tube insertion. The recommended technique is: (1) mark the catheter at a point 50 cm from the tip; (2) measure the tip of the nose to tip of the earlobe to tip of the xiphoid (NEX); and (3) insert the tube to the midpoint between (1) and (2). The author notes, as a study limitation, that 1% of the confidence level of predicting the tube tip location was sacrificed by changing the slope of the regression line of NEX from .38696 to .50.

Meer (1987) from Sinai Hospital in Detroit, Michigan, reports the incidence of nasoenteric feeding tube dislodgement and suggests measures to prevent this complication. A retrospective study was performed in which 78 adult patients' charts were randomly selected from 761 patients with nasoenteric feeding tubes between 1982 and 1985. Tube dislodgement is defined as "either complete or partial removal of the entire tube or coiling of the feeding tube in the pharynx" (Meer, 1987, p. 187). Feeding tubes were secured with tape on the nose and cheek or forehead. Study findings

indicate: (1) 78 episodes of tube dislodgement, with 40% of the patients experiencing at least one episode; (2) 89.7% of the dislodgements were secondary to the patient removing the tube; and (3) 7 tubes were dislodged by medical personnel or by coughing (one case). Meer (1987) concludes that study findings concerning tube dislodgement are consistent with related study outcomes, which presents a significant risk for pulmonary aspiration of formula. The placement of feeding tubes in the small intestine is recommended in high risk patients. This process may be facilitated by having the patient lie in the right lateral decubitus position and semi-fowlers position or by giving metoclopramide 20 mg intravenously ten minutes prior to tube insertion. For esthetic long-term feeding, gastrostomy, esophagostomy or jejunostomy are recommended. The major limitation of this study is the method of chart review, which is dependent on accurate recording of events and may affect outcome.

Distresses experienced by the patient related to nasogastric tube feeding are reported in a descriptive study by Padilla, et al. (1979). Thirty patients from Honolulu, Los Angeles County and Seattle were interviewed with a 47-item hospital and tube feeding

experience checklist. Most patients received tube feeding secondary to cancer, trauma, or other head and neck problems. Tube feedings were administered through #12, 14 or 16 French plastic or rubber feeding tubes, by gravity method. Patients received four to six feedings per day, at room temperature, in the semi or high Fowler position. The quantity of formula varied from 300 to 1800 ml/day, with 150 - 2700 ml of additional free water. Instruments include: (1) a Study Period Constants tool used to obtain historic and demographic data; (2) a 24-hour data collection form used to record feeding, intake and output, medications, etc.; (3) the checklist designed by the author's eliciting patient perceptions of feeding and hospital experiences; and (4) the mood adjective checklist, Johnson's version (1973), assessing mood and anxiety at the time of the interview. Pertinent study findings are: (1) patients felt: dependent, helpless, not angry, not annoyed, not afraid and not "scared stiff," a "little downcast," and did not feel blue, jittery, tense, vigorous or energetic; (2) tube distresses were noted as: lack of socialization associated with eating and audible stomach rumbling; (3) psychosensory distresses were described as: being thirsty, burping,

craving certain foods, missing the taste of food, and chewing, swallowing and drinking; and (4) hospitalization distresses occurring were: pain related to disease or surgery and wearing identification bands. Other gastrointestinal distresses noted were regurgitation, abdominal cramps, constipation, nausea, vomiting, diarrhea, gas and hunger. Padilla, et al. (1979) recommend that patients be encouraged to express their feelings, moisten lips and mouth regularly, sit up during feeding to prevent reflux, chew gum or hard candy, if permitted, and to take feedings while others are eating. Limitations to this study are: (1) persons who responded may differ from persons who refused to participate; (2) the use of medical records to collect data may alter findings secondary to the accuracy of recording information; (3) the importance of the findings is not established; and (4) reliability and validity of instruments are not noted.

Rains (1981) conducted a similar descriptive study to identify psychosocial and physiological problems related to tube feeding in gastrostomy (9) and pharyngeal (1) routes. Ten patients (age 52 to 80 years) in the Los Angeles area were interviewed with the Walike tool, which covers past medical history,

demographic data, clinical and laboratory data and tube feeding history. Significant physiological findings included: (1) changes in weight varied from a gain of 19 pounds to a loss of 18 pounds; (2) changes in stool frequency and consistency in three patients; (3) 70% of the patients were taking one or more prescribed medications, with 60% using over-the-counter or prescribed pain medications; (4) gastrointestinal symptoms reported were borborygmus (7), fullness and flatus (5), burping or belching (4), cramps (3), distention or nausea (2), vomiting (1), and singultus (1). Findings related to social roles and relationships indicate that 8 out of 10 patients required little assistance from family to continue independent daily functioning, while six required family (three) or nursing (three) help for stoma care. Five prepared their feedings and nine administered feedings. Nine out of ten felt the feeding method was easy. Seventy percent of the patients experienced a decrease in social activity related to the time involved in feeding. Decreased socialization also occurred with increased gastrointestinal symptoms. Only two patients felt they had someone to talk to about their feedings. All subjects reported missing eating, and family

members felt guilty about eating in front of tube-fed patients. Rains (1981) concludes that patients had little or no problems preparing and administering formulas and that psychosocial factors should be included in teaching programs. Limitations include: (1) the small sample size, (2) possible bias on the part of the investigator who collected data, (3) reliability of interview information is dependent on recall and desire to disclose information, (4) criteria for nutritional status is inconsistent with related research, and (5) data does not support the conclusion that patients had little or no problems with formula preparation and administration.

Seltzer, et al. (1984) conducted a prospective study of 1072 patients receiving nutrition support during 1981 and 1982 to evaluate the patterns of care. Pertinent information on 52 points of interest for parenteral, and 35 points of interest for enteral nutrition was gathered through review of patient charts. The study population included 550 women and 522 men, with 12.6% under age 40, 22.7% aged 40-59 and 64.7% of the patients age 60 or older. Neonatal patients were excluded from the study. Four hundred and sixty-eight patients received only enteral

nutrition, while 64 received parenteral and enteral feedings. Methods of enteral feeding were nasogastric (472), gastrostomy (33), jejunostomy (19), cervical esophagostomy (4) and nasoenteric tube (4). Primary diagnoses in enteral feeding patients were nonmalignant gastrointestinal disease (53), cancer (121), renal failure (45), cerebrovascular accident (80), burn (47), cardiac disease (52), trauma (46), respiratory failure (61) and miscellaneous (91). In this group, a total of 147 complications occurred with 96 metabolic and gastrointestinal problems, 27 mechanical problems and 24 judgemental problems (physician related). Approximately, 29% of the patients received feedings for 10-19 days and 31% received feedings for 20 days or longer. Seltzer et al. (1984) note the need for established population and disease related requirements, especially in patients age 60 and older, who represented 65% of the treatment groups. Limitations related to this study include the use of chart review for data collection, which may be inaccurately recorded, influencing outcome, and the use of a data collection instrument which has not been tested. Complications are categorized but not specified, which affects the clinical significance of the findings.

An evaluation of percutaneous endoscopic gastrostomies was performed in a Chicago tertiary care center by Kirby, Craig, Tsang and Plotnick (1986). Fifty-five patients, aged 17-98 years, who required a gastrostomy to meet nutritional needs, were included in the eighteen-month study period. Twenty-two males and thirty-three females participated who had primary diagnoses of dementia, stroke, and post-surgical alterations in consciousness (48 patients). Findings indicate that percutaneous endoscopic gastrostomies (PEG's) were successfully placed in 93% of the patient population. No fistula or mortality resulted from the procedure. Dislodgement of the catheter (six patients), peritonitis (one case), cellulitis (five patients), aspiration pneumonia (five patients), and tube clogging (two patients) were reported complications which occurred 24 hours or more after the procedure. Two patients experienced repeated aspiration and pneumonia resulting in death. One other patient developed aspiration pneumonia, responded well to treatment, and expired 12 days after the procedure of unknown causes. The complication rate of 24% is compared to Preshaw's (1981) study of 11 patients who experienced only one complication, (a dislodged tube) and Wasiljew, et als.

(1982) 15.7% complication rate in 147 surgical gastrostomy patients. In the latter, major complications (6%) were wound dehiscence, hemorrhage, and stomal leak. Minor complications (9.5%) were described as prolonged ileus, cellulitis, unexplained fever and superficial wound infection. Kirby et al. (1986) conclude that aspiration and peritonitis present serious risks for patients with PEG's and recommend prophylactic antibiotic use and methods to decrease the incidences of catheter dislodgement and aspiration. Although demographics are presented, the method of patient selection is not stated. Patients included or excluded and selection criteria may significantly influence outcome. As a result of the study, a nursing and physician education sheet was designed and distributed, which led to a change from crushed medications to liquid forms, avoiding catheter clogging.

The types of drugs which are compatible with enteral feeding formulas and their methods of administration affect patency of the enteral feeding tubes. Two recent studies explore this problem and establish recommendations for practice. Altman and Cutie (1984) assessed the chemical compatibility of Osmolite HN, Vital, Ensure HN and Ensure Plus HN with

drugs commonly used in hospital and home settings. Specific factors addressed were flow characteristics, granulation and phase separation, viscosity, and particle growth. Methods used were rotational viscometry and visual inspection with a contrast light. Four enteral formulas and 53 pharmaceutical preparations were studied. Results (expressed in tables) indicate "excellent physical compatibility" of the four formulas with drugs and alcohol. Calcium, in concentrations of greater than 130 mEq/L affected stability of all four formulas. Most suspensions, elixirs and emulsions were very compatible with formulas, however, some oil/water based medication (MCT, mandelamine suspension) clumped and separated. The most significant problem was with syrups that were strongly acidic or had buffered pH levels of 4 and below, i.e., KCL liquid, Klorvess, Feosol. The authors (Altman and Cutie, 1984) recommend not exceeding 130 mEq/L of calcium in formulas and substituting equivalent drugs for those which are deemed incompatible with formulas. A limitation noted in the study was that chemical stability and compatibility were not assessed, nor was the effect of combining the formula and drugs on the bioavailability and effectiveness of each. A factor

not mentioned by the study is the temperature of feeding and drugs which may also affect stability. Drugs included were in the liquid form or crushed tablets, granules and capsules dissolved in 60 ml of water.

Holtz, Milton, and Sturek (1987) also present a descriptive study of drug compatibility in enteral feedings. Ensure, Osmolite, and Ensure Plus enteral feedings and liquids forms of furosemide, phenytoin, theophyllin, methyldopa and digoxin were examined to establish osmolality, drug concentrations and pH in formula/medication mixtures. Selection of drugs and formula were based on common use, liquid form, and known bioavailability. A closed feeding system was used and formula/medication mixtures were vigorously shaken for 30 seconds to ensure appropriate mixing. Methods of analysis included use of an Analog pH Meter with a double standardization, an Advanced Cryomatic Osmometer, drug concentration assays, Forrey's fluorimetric assay, HPLC (high performance liquid chromatography), and visual inspection. Results were expressed in percentages or placed in a table format. Study results demonstrated microbial growth in one specimen at 0 hours and growth in five specimens at 12

hours, indicating 98% and 89% sterility, respectively. *Staphylococcus epidermitis* and *Bacillus* sp. were identified as specimen contaminants. Holtz, et al. (1987) note that this is consistent with Iannini, et al., (1983) results of 92% and 75% sterility at 0 and 12 hours. Theophylline significantly increased formula osmolality. There were no changes in formula pH with addition of medications. An unexplained decrease in the drug concentration of phenytoin suspension was observed when added to Ensure, Osmolite and Ensure Plus. Recommendations include: (1) addition of digoxin to Ensure and addition of furosemide to all three products; (2) not adding phenytoin to any of the three products because of unexplained decreases in drug concentration; (3) not adding theophylline to any of the three feeding because of the significant increase in osmolality; and (4) not adding methyldopa to feeding because drug concentrations varied from 1-27% over 12 hours. Possible limitations to this study include instrumentation, which prevented analysis of several variables.

Niemiec, et al. (1983) note that patients receiving enteral feedings often experience imbalances such as hypophosphatemia, hypomagnesemia and hypokalemia

requiring electrolyte supplementation. The noted frequency of medications and gastrointestinal symptoms encouraged a case study of these factors. The patient presented was a 47-year old male with staphylococcal septicemia, who was receiving nafcillin intravenously, Isocal via nasoduodenal feeding tube and bolus doses of KCL elixir via the feeding tube. The patient developed abdominal cramping and guiac-positive diarrhea, which was felt to be secondary to the tube feeding. Subsequently, the feeding was discontinued, as well as potassium supplements via the feeding tube. Niemic, et al. (1983) contend that the high osmolality of potassium supplements, antibiotic suspensions, and many other oral drugs, when bolus administered repeatedly via feeding tubes, may produce gastrointestinal intolerance and interfere with drug absorption, especially in severely malnourished patients and infants. Recommendations include: (1) using the parenteral route for administration of high osmolality medications; (2) not routinely adding medications to enteral formulas, (3) clearly labeling feeding bags when medications are added; and (4) further studies related to the effect of mixing drugs and enteral feeding formula on drug concentration levels. Although osmolality of the

feeding and electrolyte supplements were established in the study, their relationship to the outcome is not established, only speculated, based on the researcher's experience. As with other case studies, it is impossible to generalize the results to other populations.

Bacterial contamination of enteral feeding formulas has been noted by several authors as a source of diarrhea (Anderson, Norris, Godfrey, Avent and Butterworth, 1984; Fagerman, 1985; DeLeeuw and VanAlsinoy, 1984; Mandal, Hamilton, Hamilton and Pemberton, 1985; Hostetler, Lipman, Geraghty, and Parker; Schroeder, 1981; Schroeder, Fisher, Voltz, and Paloucek, 1983). Schroeder, et al. (1983) conducted a seven-phase study to determine when and under what circumstances bacterial contamination occurred in a Milwaukee community hospital. The formula studied was vanilla-flavored Ensure, which showed no growth on Blood Agar Plates at 24 and 48 hours. Variables studied in relationship to the formula sterility were: (1) allowing feeding to be at room temperature for 24 hours; (2) cleansing the can top with alcohol pads, air drying, and pouring into a sterile feeding bag in laminar flow hood and hanging for 24 hours; (3) having

nurses put the feeding in the bag in a kitchen environment; (4) repeat #3 with a different feeding bag; (5) evaluating bacterial growth in feedings hanging in the patients' room over 24 hours; (6) repeat of #5 with nurses aware a contamination study was being performed; and (7) determine if organisms travel retrograde from the feeding tube to the feeding container. Study findings indicate that bacterial growth does not occur in feeding left unrefrigerated for a 24-hour period, nor is bacterial growth related to bolus or continuous feeding. Feedings prepared by nurses showed significant bacterial growth at 12 and 48 hours. Knowledge of the study did not influence bacterial colonization of feedings. Bacterial did not travel retrograde from a colonized feeding catheter to the feeding bag. Bacterial contaminants were alpha and beta streptococcus, *S. epidermidis*, staphylococcus aureus, bacillus, enterococcus, neisseria species, pseudomonas aeruginosa, klebsiella pneumoniae, citrobacter diversus and escherichia coli. Recommendations based on study findings include thorough hand-washing when preparing and administering enteral formulas, changing the feeding bag and tubing every 24 hours, and rinsing the feeding bag and tubing prior to

refilling with enteral feeding. An unexpected outcome was diarrhea in some patients with no bacterial contamination and lack of diarrhea in some patients with contaminated feedings. Although the author speculates that contamination was related to hand-washing, no cultures were taken to support the assumption. Many changes were made from one phase to another, which may influence the outcome, i.e., similar situations are not being studied.

Anderson, Norris, Godfrey, Avent and Butterworth (1984), explored the frequency and extent of bacterial contamination of enteral feeding formulas in the clinical setting and its relationship to diarrhea. The descriptive study population was composed of all patients (35) in two separate 24-hour periods, occurring one month apart, in a Birmingham teaching hospital. Ensure, Isocal, Ensure Plus, Magnacal, Complete B and a blenderized hospital diet were studied. The usual length of time that formula remained in feeding containers was 7-12 hours, with bolus feed formulas refrigerated between dose schedules. Findings indicate that 14.3% of the samples contained 100,000 or more cfu/ml, 37.1% contained 10 to 99,000 cfu/ml and 48.6% contained fewer than 10 cfu/ml.

Bacterial contaminants identified were *Enterobacter cloacae*, *E. agglomerans*, *Klebsiella pneumoniae*, *Staphylococcus* species, *Proteus mirabilis*, *E. coli*, *Citrobacter* species, *S. epidermidis*, and *Pseudomonas maltophilia*. A review of medical records during the two 24-hour periods demonstrated diarrhea in 12 patients, 12 patients had normal stools, and eleven charts contained no information concerning stool character or frequency. Fifty percent of the formulas sampled from patients with diarrhea were colonized with coliforms, 100,000 cfu/ml to 20,000,000 cfu/ml. Statistical analysis demonstrated a significant association between diarrhea and bacterial contamination with increased diarrhea from solutions containing greater than 100,000 cfu/ml and decreased diarrhea in patients whose feedings contained less than 100,000 cfu/ml. Anderson et al. (1984), speculates that feeding contamination may not be the source of diarrhea, but rather the patients' "contaminated environment" may be the source of feeding contamination. Their concern goes beyond diarrhea to the more threatening outcomes of aspiration pneumonia and bacteremia. A recommendation as a result of study findings is the use of sterile, non-manipulated formulas in a closed feeding

system. The major weakness of the study was the use of chart review which may have significantly affected results. The authors' (Anderson, et al., 1984) acknowledge that 11 out of 35 charts contained no information pertinent to the study.

Tolerance of enteral feedings has also been related to the temperature of the formula when administered. Kagawa, Busby, Heitkemper, Hanson, Hanson, and Vandenburg (1980) evaluated the effect of feeding temperature on total gastric transit time, gastric motility, diarrhea, and subjects' sensations. Experimental study subjects were six volunteers, two males and four females, with no history of disease or pathology. Nasogastric tubes were placed in all subjects with the head of the bed elevated 45 degrees. Ensure (250 ml) was infused at 50 ml/minute in each subject at cold- ($5-7^{\circ}\text{C}$), room- (24°C), and warm- ($36-38^{\circ}\text{C}$) temperature. Intragastric temperature was measured with a YSI thermistor probe and gastric motility was measured with a Statham pressure transducer. Results are presented in graphs and tables. Significant findings are described as: (1) there was no significant difference between mean motility indexes and feeding temperature; (2) no

statistical difference existed between gastric contraction frequency and feeding temperature; (3) there was no significant difference between the time of onset of digestive activity and temperature of the feeding; (4) the postfeeding time required for intragastric temperature to return to baseline was 30 minutes with cold feeding, 20 minutes with feedings at room temperature and 10 minutes with warm feeding; and (5) all subjects experienced hunger or "grumbling" in the 30 minutes prior to feeding. Gastrointestinal distress was most frequently associated with cold feedings, with two subjects experiencing mild to moderate abdominal cramping and diarrhea following infusion of cold feedings. A third participant had diarrhea after three cold feedings and after one warm feeding. One cold and one warm feeding diarrheal episode coincided with start of menstrual cycle in two patients, which was viewed by the subjects as normal. All subjects complained of throat and nose discomfort related to the feeding tube. Kagawa-Busby, et al. (1980) conclude that abdominal cramping and diarrhea may be caused by the infusion of cold formula through nasogastric tubes and recommend that feedings be warmed to room temperature prior to infusion. The major limitation of this study is the

subjects' menstrual cycles coinciding with feedings may have skewed results as two out of six participants experienced this problem. A factor not studied which may have significantly influenced the outcome is the rate of infusion. The osmolality of the infusate is also not mentioned, which may affect results.

There is currently little information available concerning metabolic complications in Home Enteral Nutrition. Vanlandingham, Simpson, Daniel, and Newmark (1981) present a descriptive study of hospitalized patients which provides a basis for understanding potential complications in Home Enteral Nutrition patients. The study population included all patients receiving enteral nutrition support via nasogastric feeding tube for five days or greater between July, 1979 and June, 1980. One hundred patients received feedings for an average of 15.3 days. Primary diagnoses were neoplasm (31), neurological disease (17) and organic brain syndrome (10). Study findings indicate that there were no gastric residuals greater than 100 ml and no aspiration pneumonia. Hyperglycemia (blood glucose greater than 250 mg) occurred in 29% of the patients, and was commonly related to systemic infection. Hypoglycemia occurred in two patients

receiving insulin. Hyponatremia (31%) and hypernatremia (10%) were observed secondary to fluid balance disturbances. Hypokalemia (8%) was related to insulin and diuretic use, while hyperkalemia (40%) occurred in patients with renal insufficiency. Hypophosphatemia (30%) occurred in hyperglycemic patients, and hyperphosphatemia (14%) was observed in patients with renal compromise. Also noted were hypomagnesemia (3%), decreased zinc levels (11%) and decreased copper levels (3%). Based on these findings, recommendations include: (1) utilizing established enteral feeding protocol as guidelines for care; (2) monitoring glucose and electrolyte levels every five days and phosphate levels two to three times per week; and (3) individualizing fluid and electrolyte composition based on the patients' underlying condition. It is unclear how the author arrived at the suggestions noted. A limitation noted is that 50% of the patients had been in the intensive care units prior to treatment, which may influence the rate of occurrence of complications. Age and sex of participants is also not included in the study data.

In summary, persons who receive Home Enteral Nutrition may be male or female, and ages range from

infant through the late 80's. A large portion of the population is over age 60 years. Most persons have chronic illness, i.e., cancer, heart disease, neuromuscular disease.

The majority of patients receive feedings via nasogastric tubes, however, jejunostomy and gastrostomy feeding methods are frequently employed.

The method of formula infusion varies with institutions, with infusion pump assisted, and gravity infusion the most frequent techniques. Although bolus feedings are occasionally reported, their use appears to be in a small proportion of patients.

The techniques most commonly taught to patient and significant other are: (1) formula preparation; (2) formula infusion; (3) care of the catheter; (4) insertion of the nasogastric tube; (5) problem-solving related to equipment, formula, and complications; and (6) record-keeping. Occasionally the patient is the only learner, but most frequently the patient and a significant other are taught Home Enteral Nutrition techniques.

The technique most frequently employed in nasogastric feeding tube insertion is to have the patient sit upright, measure the tip of the nose to the earlobe

to the xiphoid process, insert the tube, then tape to the nose and/or cheek. The patient is instructed to remain in a sitting position for thirty minutes following the feeding. Tube placement is assessed by inserting air into the feeding tube while auscultating over the stomach. Aspiration of gastric contents is also used in conjunction with auscultation.

Complications related to Home Enteral Nutrition vary from study to study, however, a review of the studies presented indicates that significant metabolic, mechanical, and gastrointestinal complications do occur. Aspiration, vomiting, electrolyte disturbances, diarrhea, constipation, fluid imbalances, tube displacement and clogging represent a portion of those reported.

Bacterial contamination of enteral feeding formulas secondary to preparation and infusion of feedings have been identified as a potential source of diarrhea in some patients.

Medications are frequently given via enteral feeding catheters, which may cause clogging of the catheter. Liquid medications or crushed and well dissolved pills help prevent this problem, as well as flushing the feeding tube well after instillation of

medication. Many drugs are not compatible with feedings. The literature suggests that a pharmacist be consulted concerning compatibility questions.

The feeding tube material varies from institution to institution, as does the frequency of tube changes and dressing changes. Peroxide and water are most frequently used for wound cleansing, with the application of a clean dressing.

The preceeding information has been used as a basis for the development of materials in the Home Enteral Nutrition patient education manual.

Home Enteral Nutrition Patient Education

Chronic illness affects the lives of millions of infants, children, adults, and elderly persons. The dramatic increase in the number of persons with chronic illnesses has been attributed to the general increase in longevity, and specifically to advanced medical technology which has allowed many infants, children, and adults to survive with diseases which previously were associated with high mortality rates. A 1967 National Health Survey announced that 23% of the children under age 17 were diagnosed with one or more chronic illnesses; by 1970, one child in five and one

youth in eight had one or more neurological, cardiovascular, musculoskeletal, or other physical abnormalities (Purdue, Mahon, Hawes, and Frik, 1981). In 1981, 7.2 to 10.8 million children under the age of 18 years were diagnosed with chronic illness; this estimate represents 10-15% of all American children under 18 years of age (Rose and Thomas, 1987). An estimated 30-40% of American children will have chronic diseases before reaching age 18 years (Rose and Thomas, 1987).

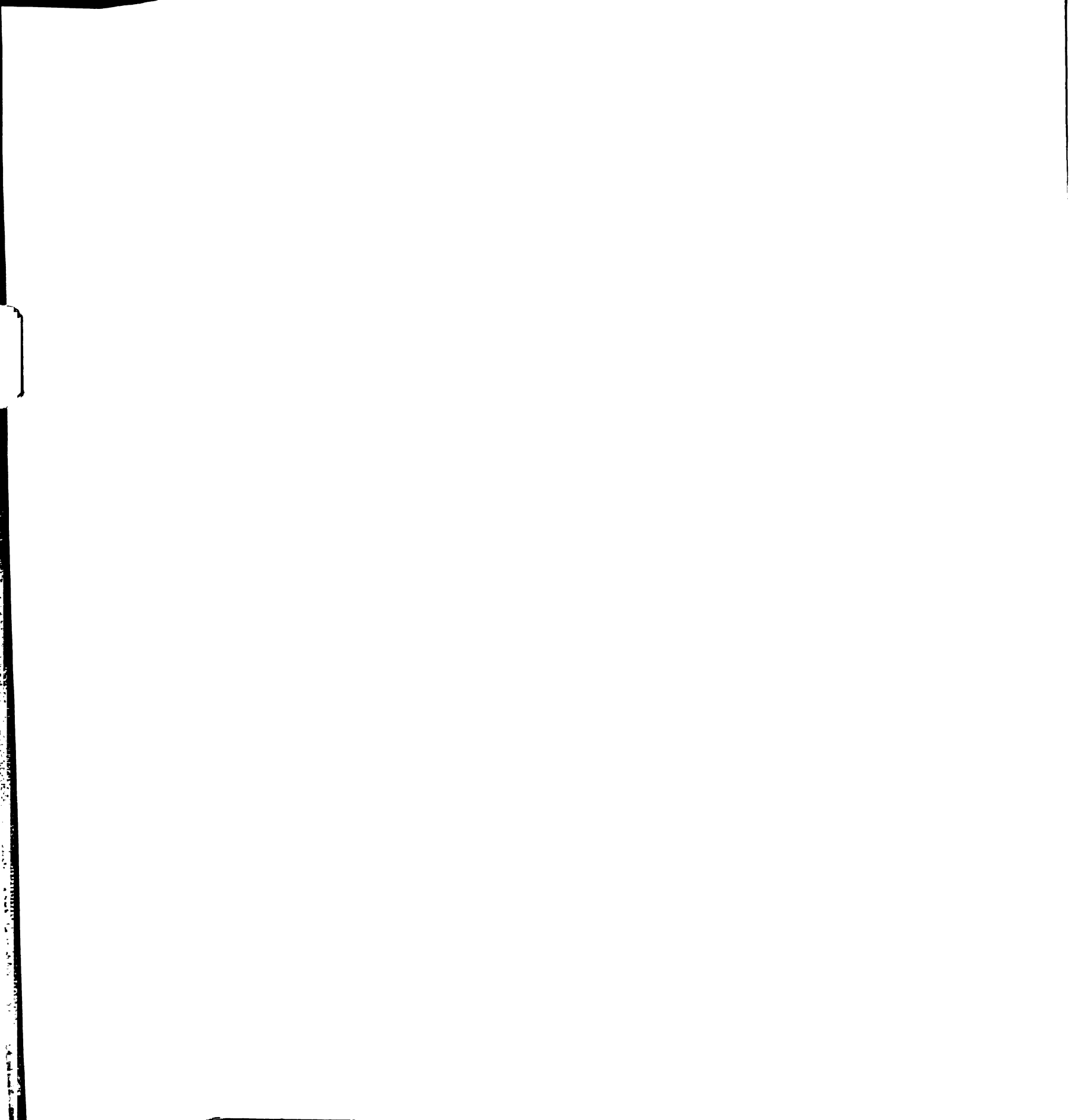
Currently, the United States is approaching a "gerontology boom," secondary to decreased birth rates, and increased medical technology, which have increased life-expectancy (Yurick, Spier, Robb, and Ebert, 1984). In 1900, approximately 3 million persons were age 65 or older. By 1980, there were more than 22.5 million older persons (an 8.3% increase). Given current mortality rates, life-expectancy rates, and decreased birth rates, the number of older adults is expected to increase to 32 million by the year 2000 (Birchenall and Streight, 1982).

The need for and effectiveness of nutritional support has been established in adults with chronic diseases (Elkort, Baker, Vitale, Vavrousek-Jukuba, and

Cordano, 1978; Faintuch, Faintuch, Friedman, Azul, and Decourt, 1981; Noller and Mobarhan, 1986; Phillips, 1987; Welch, 1981), and more recently in children with chronic diseases (Greecher, Cohen, and Ballantine, 1980; Mize, et al., 1984; Pollack, Wiley, Kanter, and Holbrook, 1982). It is reasonable to assume that the need for Home Enteral Nutrition will increase with the number of aging persons, and those with chronic illnesses. This trend presents an increased need for emphasis on patient education.

The recent advent of DRG's (diagnosis related groups) has promoted an increased emphasis on patient/family education. Patients are frequently discharged earlier from the hospital with complex medical regimens, necessitating comprehensive patient education. The trend toward increased self-care responsibilities by the individual has also generated an increased need for patient education.

Many factors influence the effectiveness of patient education, including teaching methods, interpersonal relationships, and learner motivation. Ascione and Shimp (1984) studied four different strategies for teaching elderly persons to determine their effectiveness in changing drug knowledge, patient



attitudes, and adherence behavior. Participants were all adults, 60 years and older, from a specific Family Practice Clinic in a semi-rural area in southeastern Michigan. Educational strategies utilized were analyzed with a randomized, seven-group study design. Pre- and post-tests were utilized to measure knowledge. A single-blind method was used during the intervention with physicians and nurses unaware of which strategy was being studied. The four patient education interventions were oral instruction and a medication reminder package, oral instruction plus a medication reminder calendar, oral instructions, and oral instructions plus written information. Six groups received one of the interventions and one group acted as controls. Written information was pretested and readability was assessed by the FOG index. Likkert-type scales were employed to measure knowledge and attitudes, while adherence was based on verbal account of the patient. Participants were also asked to assess the usefulness of the intervention by completing a five-point Likkert-type scale. Student or paired T tests and Chi-squared tests were used to analyze data. Study results indicate 82% of the eligible participants agreed to be interviewed. The average participant was

married, over age 70, white, female, lived with her spouse and/or child, and was educated beyond high school. The most successful methods of increasing drug knowledge were oral instruction or oral instruction with reminder calendars. Knowledge of drug side effects was the major area of increased knowledge. All four interventions had little impact on perception of benefits and barriers to following drug therapy. Self-reported adherence showed greatest improvement with oral instruction and the medication reminder package. There was a significant increase in adherence to therapeutic regimen in the experimental versus the control group. Favorable responses to the interventions occurred in 78% of the participants. Specifically, respondents were most positive concerning the amount of information supplied. Results also suggest that there may be differences between the patients' perception of the effectiveness of strategies and the actual effectiveness of strategies in increasing knowledge and adherence. Recommendations, based on finding, include the use of reminder aids in addition to oral instruction to increase adherence to therapeutic regimen. Although this study supports the idea of non-adherence related to forgetting and

documents that patients want information, the outcomes are questionable due to study methods. A control group was used, however, it represents only one-seventh of the population. No demographics are given for this group, thus participants may differ from the experimental group. The treatment received by controls is also excluded. In discussing adherence, control and experimental groups are compared by percentages which appear inaccurate in view of total population numbers. Although readability was tested, levels are not stated.

Deberry, Jefferies and Light (1975) conducted a study of 25 cardiac patients, aged 35-82 years to assess the effectiveness of a patient education program in increasing knowledge necessary for self-care. A pilot study confirmed that patients lacked knowledge concerning drug regimens. Pre-tests were performed, consisting of six items, requiring approximately five minutes to complete. Its purpose was to assess knowledge the patient possessed, assist in planning education and as an aid to measuring changes in knowledge after intervention. Learning sessions were on a one-to-one basis and lasted 15 to 30 minutes each. The drug name, purpose, dose and frequency, side effects and precautions were included. Corresponding written

drug cards were given to patients to take home. Sessions continued until the patient was able to restate information in his own words. One to four drugs were taught to patients in one to eight sessions (mean of three) and with no patient requiring more than two sessions on a specific drug. Post-tests prior to discharge indicate improvement in drug knowledge by all participants. Gains ranged from 33.3% to 71.4%. Ten of the patients returned for a second post-test, of which two remained unchanged, one gained knowledge, and seven experienced a knowledge decrease. Drug actions and names were items most difficult for patients to learn. The authors (Deberry, et al., 1975) believe that the drug name and action are least essential information to learn. Although not included in the study, patients were found to be more motivated to learn when family members attended teaching sessions. Timing of the sessions was also noted as impacting readiness to learn. Mutual scheduling of set times for teaching/learning sessions increased interest and decreased distractions. Recommendations from study results include initiating patient teaching as early as possible during hospitalization, teaching family members or friends of persons who are unable to learn

to take medications safely and that knowledge be reinforced following discharge to compensate for loss of knowledge. This study was well planned and based on patient need as established by pilot study and pre-test. Researcher bias appears to have occurred related to findings that patients couldn't remember drug names or actions, and support of those factors as non-essential by the authors (DeBerry, et al., 1975). An important finding (not included in the data) was that motivation appeared more related to learning than actual grade level completed.

King and Tarsitano (1981) replicated the study of Lindeman and Van Aernam (1971) which explored the effect of structured and unstructured pre-operative teaching. Study participants were volunteers from a 500-bed teaching hospital, who were 18 years or older, able to understand English, and who were undergoing abdominal surgery. Participants were divided into control and experimental groups with 27 and 22 subjects, respectively. Patient ages ranged from 25 to 75 years old. Vital capacity, forced expiratory volume in one second, expiratory reserve volume, and maximum midexpiratory - flow rate were tested pre- and post-operatively. Nurses on the unit were unaware of group

placement. Control group received no structured pre-operative education, while the experimental group received a slide-tape presentation, a teaching pamphlet related to the slide-tape instruction, and one-to-one supervision. A significant finding was that pulmonary functions increased in patients with structural pre-operative teaching. Length of hospital stay was not related to the type of pre-operative teaching. Increases in pulmonary function secondary to structured education supports Lindeman's (1971) findings, however, hospital length of stay does not replicate original results. Study findings suggest that patient outcomes may be benefited by consistent implementation of educational protocols. Limitations include lack of information concerning teaching received by controls, nonrandomization, and lack of post-operative teaching.

Brown, Wright, and Christensen (1987) conducted a study to demonstrate the relationship between the type of medication instruction and patients' knowledge, side-effects, and compliance. The study population consisted of 30 persons, 18 years or older, with schizophrenia or schizoaffective disorder, and who attended the community support program of the Harborview Community Mental Health Center. A

randomized controlled trial study design was utilized, with patients assigned to one of four treatment groups: (1) Group 1 was provided with verbal drug instruction, and minimal side-effect information; (2) Group 2 received verbal and written medication instruction, and minimal side-effect information; (3) Group 3 was given verbal instruction, and maximum side-effect information; and (4) Group 4 was provided with both verbal and written instruction, and maximum side-effect information. Participants' knowledge level, compliance, and side-effects reports were assessed once a month for four consecutive months by the case manager and psychiatrist during medication review sessions. Medication knowledge was recorded on a 12-point structured survey, side-effects were reported on a 60-point scale, and compliance was measured by self-report and monthly pill counts. Both minimum and maximum side-effect groups demonstrated significant increases in medication and side-effect knowledge in the third and fourth sessions as compared to baseline scores. All participants experienced a significant decrease in side-effect impact from session one to four. When analyzed by separate groups, only those who received verbal instruction and minimal side-effect information

demonstrated a significant decrease in side-effect impact. No significant differences were established between the four teaching interventions and compliance, nor was improved compliance associated with decreased side-effect reporting or knowledge gain. Conclusions related to study findings indicate that individual instruction increased the patient's general drug and side-effect knowledge, and a decline in the incidence of side-effects. Persons who received verbal instruction and minimum side-effect information experienced fewer side-effects. No relationship was established between compliance and the method of instruction. Study limitations include the sample size. When randomized into groups, only 6 persons were in each group, limiting analysis. The use of a non-treatment control group may have demonstrated that patient education had a positive influence on compliance to therapeutic regimens. Although adherence was one of the main variables, adherence rates are not reported. The use of a specific psychiatric population limits generalizations to other populations.

Swain and Steckel (1981) were concerned with the prevalence of non-adherence to therapeutic regimens in hypertensive patients, and the resultant poor control

of blood pressures. Based on a review of the literature, patient education and contingency contracting were identified as strategies to improve adherence to drug regimens. A 3x4 repeated measures analysis of variance design was used for the study. Three different intervention strategies were involved in the first factor, treatment modality: patient education, contingency contracting, and routine clinic care. The second factor involved four sequential clinic visits. Hypertensive patients, age 18 years or older, were selected from clinics at a medical center hospital or Veterans Administration Hospital. Of the eligible persons, 115 were randomly selected and placed in three different treatment groups: routine clinic care, patient education, and contingency contracting. No significant differences existed among groups related to age, race, sex, hypertensive medical history, or educational background. Information was obtained from subjects during four clinic visits. Data was collected on each participant for an 18-month period, during which patients routinely returned to see the physician every six months. Patients were pre-tested and post-tested with two separate 39-item questionnaires requiring short answers. Adherence to medical regimens

was measured by the frequency of appointment-keeping, and continuance of treatment. Persons who did not return for appointments within nine months were considered as "drop-outs." Blood pressure measurements were taken at each clinic visit by clinic nurses. Persons receiving routine care did not receive patient education booklets or write contracts with the nurses. The patient education group received five patient education booklets, which complemented classroom content. The contingency contracting group participants were also given educational booklets, and wrote contracts with the nurses concerning targeted health goals and associated rewards. Pre-treatment test scores indicated that participants were generally unknowledgeable concerning their disease. The mean correct responses varied from 5.9 for the routine clinic group, to 10.1 for the educational group, indicating correct scores of 15% and 26%, respectively. Post-test scores were significantly higher in the contingency contracting group than in the patient education group. The contingency contracting group also demonstrated a significantly higher level of adherence in the variable of continued therapy. The routine care group experienced a 7.9% loss from

treatment, while in the patient education group 35.9% of the population "dropped out" by the end of the 18-month period. For the adherence variable of missed appointments, the usual clinic group and patient education group were similar; however, the contingency contracting group kept appointments or rescheduled appointments. No consistent pattern existed in blood pressure measurements in the routine clinic group or patient education group, but the contingency contracting group participants' blood pressure was clinically under control at the second visit and remained so throughout the study period. No contract failures occurred in the contingency contracting group, who showed a 100% adherence to contracts written between nurses and themselves. Conclusions drawn from the study findings were that contingency contracting is an effective intervention strategy for increasing adherence and health status in hypertensive persons, and that patient education by itself, did not increase adherence. A strength of this study is that it clearly identifies the need to implement more than one strategy in patient education. As noted by the authors (Swain and Steckel, 1981), adherence is a significant problem in chronic illness; this population may achieve

increased adherence if nurses incorporate contracting into their educational activities. A study limitation is the population; information is designed primarily for generalization to other hypertensive groups. The reporting of information also decreases generalization, as the race, sexes, ages, and education information concerning the patients are not stated.

Milazzo (1980) explored the relationships of informal and formal teaching strategies to patient learning in chronic diseases. Twenty-five patients from a coronary care unit in an 829-bed teaching hospital in Texas, were divided into one control and two experimental groups. The control group (A) received informal instruction and pre- and post-tests. Experimental Group B received pre- and post-test and a slide presentation and lecture, while Group C received the slide presentation, lecture and post-test. The study period was May, 1978 through October, 1978. The teaching intervention included information concerning anatomy and physiology, the healing process, angina, risk factors, danger signals, activity, and drug therapy. Pre- and post-tests used 20 multiple-choice questions to assess patient knowledge. Median pre-test scores (based on a possible score of 20) were 11 in

Group A and 11 for Group B. Post-test score medians were 11 for Group A, 17 for Group B and 17.5 for Group C. Nonparametric statistics were used to establish whether significant differences existed between groups. No significant difference was identified between Group B and C post-test scores; however, Group B post-test scores were significantly higher than Group A. Group A and Group B post-test scores were significantly different from pre-test scores. Conclusions drawn from study findings were that structured teaching produced greater learning than informal teaching. Milazzo (1980) notes that patients were very interested in learning about their specific diseases and that knowledge is necessary to achieve the goal of patient education, which is to "provide people with enough assistance where needed to help them understand the factors that promote health and those that threaten it to make informed choices in their own lives" (Somers, 1978, p. 37). "A gross deficiency of teaching tools and evaluative instruments" (Milazzo, 1980, p. 1081) is noted by the author. This study supports the need for organized, formal patient education to achieve maximal patient learning. The ability to generalize findings is limited by the sample size and lack of information

concerning patient ages, sexes, and diagnoses. Criteria for selection and method of group selection are not noted, which does not rule out selection bias. The instruments were designed by the researcher, with no mention of validity, reliability or basis for their design.

Linde and Janz (1979) also studied the effect of comprehensive patient education on learning, and included the dimension of adherence in cardiac patients. Eighteen patients with coronary artery bypass and 30 patients with valve replacements, from a large medical center in the midwest, participated in the study. Mean ages were 56.1 years and 54.6 years, respectively. The comprehensive post-operative patient education program included information concerning the disease process, surgery, activity, diet, medication, risk-factors, and warning signs. Teaching materials incorporated into the program were a written patient booklet, medication cards, models, and illustrations. The program consisted of five to six sessions, lasting 20-25 minutes each, with family included. Both patient groups (valve replacement and coronary artery bypass) were pre-tested prior to the educational intervention and post-tested at discharge, and one month and four

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months after discharge to assess learning. Pre- and post-tests included multiple-choice, true-false, and open-ended questions which measured recall and knowledge. Compliance was measured through patient reports, laboratory findings, diet adherence, and attending clinic appointments. Twenty-five patients were taught by cardiovascular nurse specialists and 23 by undergraduate prepared staff nurses. Study findings indicate that statistically significant pre-test score differences existed between the study groups. Data was analyzed by a Mann-Whitney U test and a T test, which showed that demographic variables were not significant. The Hotelling T-Squart Test was employed to measure knowledge scores over time. Knowledge increased after the educational program, and there was no significant difference in discharge knowledge or knowledge at follow-up visits in either group. A T test was used to measure differences between the sample mean and population mean compliance rates. Persons who received the educational intervention experienced a significant increase in compliance. A T test measure was also used to assess differences related to whether patients were taught by nurse specialists or floor staff nurses. Patients taught by nurse specialists had significantly

higher discharge test scores than did patients taught by floor staff nurses. As a result of study findings, the authors (Linde and Janz, 1979) conclude that the educational intervention was successful in increasing patient knowledge and compliance, and knowledge gain was greatest when patient teaching was performed by nurse specialists. The lack of post-discharge knowledge decline commonly noted in the literature was related to knowledge reinforcement during clinic visits. Implications for nursing include: (1) nursing responsibilities for pre-operative patient education was not fulfilled, as evidenced by low pre-test scores; (2) comprehensive patient education has a positive effect on learning and compliance; (3) outpatient reinforcement of learning enhances knowledge retention and compliance; and (4) the use of nurse specials in patient education is appropriate. Study limitations include the presence of the Hawthorne effect in both groups; staff nurses were relieved of usual responsibilities to perform patient teaching and were often not the primary nurse of the patient taught, limiting generalization of the setting to other populations; content validity of instruments is noted as being established, but not by whom; instrument reliability is

not established; and patient group selection and assignment of nurses to groups is not explained; differences in pre-test, post-test scores between groups may be biased by previous educational intervention or lack of intervention.

White, Lemon and Albanese (1980) explored patient factors which could potentially influence educational outcomes. Of particular interest to the researchers were the effects of hospital and illness-related stress, and previous educational successes or failures. A 36-item multiple choice test of knowledge level, related to cardiac disease was designed by two cardiologists and reviewed by an educational specialist and an adult educator for psychometric soundness and appropriate language. All participants were inpatients of the University of Iowa Hospital. Participants were divided into four groups: (1) control group: non-cardiac patients over 30 years old; (2) One hundred, twenty-eight consecutive persons admitted to medical cardiology prior to coronary arteriography; (3) Fifty-eight post-surgical patients from group two; and (4) thirty-eight post-surgical patients who returned to the cardiac rehabilitation clinic for follow-up. Patient education was provided on a daily basis by physicians,

nurses, dieticians, physical therapists, pharmacists, and social workers, and consisted of verbal, pictorial, and written health information. Student T tests and two-factor analyses of variance were conducted on study data. Results of pre- and post-tests indicate that patients with cardiac disease had higher levels of knowledge than controls on pre-test, and level of knowledge was related to previous educational success in both groups. When patients were tested following surgery, knowledge levels were significantly increased over pre-test scores. Persons with previous educational success scored higher than those without previous successes on both pre- and post-test, however, their scores did not increase following the educational intervention. Test scores from the rehabilitation clinic exhibited a small, but significant, increase in knowledge. The authors (White, et al., 1980) conclude that their educational program was not effective in increasing the patient's level of knowledge, and speculate that hospital-related stress, pain and anxiety may have significantly influenced program outcomes. Implications for health professionals include awareness of the timing of patient education and factors that interfere with learning. This study is

limited by its methodology. The educational intervention is only briefly described, noting what each professional teaches the patient. What and how patients were taught may have significantly influenced outcome. The questionnaire and teaching/learning experiences were based on what professionals felt was important for patients to know, which may differ significantly from what the patients felt was important to learn. It is noted, incidentally, in the text that subjects knew more about heart disease, psychological factors and the categories of hypertension and less about tests, medication and significance of chest pain. Knowles (1973) states that adult learners are motivated by factors which immediately affect their roles and responsibilities. It is feasible that the factors patients knew most about were those perceived as having the greatest impact on their role performance.

Legge, Massey, Vena and Reilly (1980) noted that many patients at Stephens County Hospital, experienced readmissions secondary to knowledge deficits related to post-surgical conditions and chronic diseases. This initial assumption was confirmed through conversations with hospital and community physicians. Diabetes mellitus was identified by nurses and physicians as an

area of acute educational needs. A multi-disciplinary group designed an educational program to decrease unnecessary hospital readmissions by increasing the self-care abilities of patients with chronic illness. One-to-one verbal instruction and written booklets and material were provided concerning the disease process, activity, self-management, medications, diet, and signs and symptoms. A quasi-experimental design was employed for the study with single treatment and control groups. All patients admitted to the hospital between July, 1976 and June, 1978 with diabetes out of control were asked to participate in the study. Controls received no systematic instruction (patient teaching as usual). Control and experimental groups were followed for six months after hospital discharge to assess readmissions. A four factor analysis of variance was utilized to explore the effects of factors and co-variates. Study findings indicate that the program was effective in reducing hospital readmissions. Results suggest that the treatment was most successful in patients admitted to the hospital with diabetic ketoacidosis, and that special attention needs to be directed toward educational needs of this population. This study is valuable in that learning needs of the patients were

the basis for program development. The study outcome suggests that those immediate needs related to health and well-being were met. Limitations of this study include: (1) the use of a quasi-experimental design may not rule out threats to internal validity or change related to other than the study variable; (2) the history of the participants may present a threat to the study design, as staffing and procedures changed over the study period; and (3) evaluation began after the program was already in progress, limiting influence on the independent variable.

Nurses are held responsible for patient education by national nursing, hospital and government organizations, who also recognize education as the right of the individual (Pigg, 1982). Professional preparation for patient education may significantly influence the quality and outcomes of patient teaching. In an effort to establish nursing preparation for patient teaching, Pigg (1982) designed a 17-item survey instrument which was sent to 249 schools who offered specialized instruction in health education and school and public health. The responding institutions (91.6%) indicated that in 82.9% of their programs, minors, majors or specific courses in patient education were not included

at the undergraduate or graduate level. Seventeen percent offered degree options or specific courses in patient education. Of the 39 institutions offering patient education courses, 10 used textbooks, while most used journals or audiovisuals for classroom learning. The author (Pigg, 1982) concludes that "professional preparation in patient education represents an undeveloped resource among academic institutions as evidenced by the fact that less than 18 per cent of those institutions surveyed offer even one course on the subject" (p. 181). High quality education in patient teaching is emphasized as a requisite for the acceptance and maximal use of patient education. The survey is important in that it establishes a potential barrier to patient education. A limitation of this study is the selection of the population. The rationale for selection is unclear and criteria is not noted. Although the purpose of the study was presented as gaining information concerning professional preparation, the discussion focuses primarily on needs and outcomes for the learning institutions.

Murdaugh (1980) was interested in the relationship between patient knowledge and nurse's knowledge of

teaching-learning principles. The nurse was perceived as in an ideal position to assess the patient's learning needs on a daily basis. A descriptive study was performed to explore the relationship of nursing knowledge of learning principles to patient knowledge. Forty patients from a coronary care unit (CCU) in a west coast community hospital participated. All patients diagnosed with congestive heart failure (CHF) or myocardial infarction (MI) were asked to participate. Male and female patients, up to age 75, were included in the sample. Eighteen of the twenty-six CCU nurses agreed to participate. Control and experiment groups took pre- and post-tests with a static group comparison design. A 12-hour course in teaching-learning principles was designed and presented to the nurses in five sessions and included: (1) the nurse's role, (2) elements of the learning process, adult learning principles and learning principles, (3) characteristics of the learner, assessing readiness to learn, and barriers to learning, (4) writing objectives for patient teaching, and (5) teaching strategies and evaluation to assess learning. The effect of the course was measured with written tests demonstrating the degree of learning. Two tests were designed to

reflect understanding of medications, disease process, fluid restriction, diet, activity and risk factors. The course was conducted after 20 patients had completed pre- and post-test questionnaires. Nurses were pre- and post-tested to assess knowledge levels. Following the course, 20 patients each were admitted to the control and experimental group. Results indicate that nurses possessed the necessary knowledge for teaching patients, with a mean post-test score of 86%. Prior to the course, nurses' mean score on learning/teaching principles was 56%, indicating inability to assess patient readiness to learn and lack of understanding concerning learning objectives and evaluation of learning. Post-test scores indicated effective knowledge gain in the cited areas. No significant difference in age or duration of disease existed between control and experimental group when analyzed for variance. Patient baseline knowledge levels, as tested on the pre-test, demonstrated knowledge deficits in the following areas: (1) MI: disease process, symptoms of a heart attack, the healing process, and risk factors; and (2) CHF: disease process, diet, and medications. Based on pre-test scores, neither control or group subjects had sufficient knowledge of the

disease process and treatment. A Z-score transformation was applied to the raw data to establish differences in patient knowledge related to whether teaching was provided by course-graduate nurses or routine floor staff. A significant difference existed, with a positive relationship between nurses' knowledge and application of teaching/learning principles and an increase in the patient's disease knowledge. Documentation of patient teaching was also evaluated in the study. Both control and experimental groups documented patient teaching. As a result of study findings, the author (Murdaugh, 1980) states that teaching nurses "how to" teach specific information needed by the patient is more effective in meeting patient learning needs than teaching nurses "what to" teach. Barriers to teaching were noted as lack of time, patients not emotionally ready for learning, physician interference and lack of nursing skill. Contrary to several reports, findings indicate learning can occur in short periods of time in critical care settings. Nurses viewed themselves as educators and received satisfaction from patient teaching, but were basically not satisfied with their teaching skills. The major limitation to this study is the method of description

of variables. Control and experimental group characteristics and treatments are inferred but not stated. As patients, nurses, and physicians were aware of the treatment, this may have affected the outcomes, as noted in the lack of difference in charting patient teaching. An important implication for nursing is that applying principles of adult learning in assessing patient needs and readiness to learn, as a component of the learning process, produces more effective learning.

Nutrition-related educational backgrounds of health professionals have been recognized as a problem which may negatively affect patient care. Long (1982) states that "comprehensive nutrition education is an essential basis for the sound practice of modern clinical medicine" (p. 280). Hain, Howell, Crosby, and Mullen (1982) conducted a survey of American Society for Parenteral and Enteral Nutrition members to establish what nutrition knowledge was essential for health professionals. A modified Delphi survey technique was performed. Two hundred and three surveys were completed and returned, (51%). The following content areas were noted as essential by 75% or more of the respondents: (1) nutrient requirements in stress and disease (93%); (2) nutrition in stress and disease

(91.2%); (3) digestion, absorption, and metabolism of micronutrients (86.8%); (4) diseases of malnutrition: protein/calorie malnutrition (84.8%); (5) nutrition assessment (82%); (6) disease of malnutrition: iatrogenic malnutrition (80%); (7) nutrient requirements in growth and development (78.5%); (8) diseases of malnutrition: undernutrition (77.3%); (9) nutrient requirements in health maintenance (75.6%); and (10) nutrition in growth and development (74.5%). Of interest is that 67.6% felt information concerning nutrition intervention (feeding modalities) was essential, 62.9% felt drug-nutrient interaction knowledge was essential, 30% perceived nutrition education resources as essential and 24.3% felt knowledge concerning socio-economic influences on nutrient intake and eating patterns was essential. The authors (Hain, et al., 1982) conclude that this multidisciplinary group believe knowledge in the science of nutrition is more important than content referring to the sociology of nutrition. The major limitation of this study is the population. Only 51% responded. There may be significant differences between those who responded and those who did not.

Stotts, Englert, Crocker, Bennum and Hoppe (1987)

conducted a descriptive study to assess whether nurses receive adequate education to enable them to provide care for nutrition patients. Four hundred and forty-six National League of Nursing accredited baccalaureate nursing programs were surveyed to determine the conceptual framework utilized, content and number of hours required, and faculty preparation. Response rate for the survey was 58.7%. Study findings indicate that nutrition content was required in all of the programs (264), with 54% requiring at least one nutrition course. The number of classroom hours required varied from 0-100, with a mean of 32 hours. Nutrition content was integrated into other courses in 64% of the sample. Nutrition-related clinical/ laboratory hours required were 0 to 64, with a mean of 3.3 hours. Of the schools requiring integrated nutrition content, 70% had no required clinical/laboratory hours. Conceptual models included, systems theory (38.9%), Roy's adaptation model (25.1%), Orem's self-help model (21.6%), Roger's life process model (9%) and the medical model (5.4%). Nutritional assessment was taught in 96% of the schools requiring nutrition courses. Enteral nutrition was taught in 85% of the programs, and biochemistry was included in 71% of the schools

surveyed. In Graduate level programs, pattern of care in specialties influenced nutrition content, i.e., age, chronic care, etc. Pediatric nurse practitioner, adult health nursing, occupational health nursing, gerontology nursing, and maternal-infant nursing were specialties which required significant nutrition content in programs. Nutrition courses were absent in over half of the gradual level programs. Nutritional assessment (95.9%), diet counselling (84%), and enteral and parenteral therapy (60.3% and 58.8%) were the nutrition-related content areas most frequently taught at the graduate level. The authors (Stotts, et al., 1987) conclude that increased clinical time and elective courses need to be provided to "deepen and broaden the scope of nutrition knowledge of the novice nurse" (p. 410). This study is informative, however, the authors (Stotts, et al., 1987) draw conclusions concerning lack of nursing knowledge at the baccalaureate and graduate level which are not supported by data. There is also a possibility that those schools who responded differ from schools not responding.

Seltzer (1982), then president of the American Society for Parenteral and Enteral Nutrition states: "the provision of proper nutrition support to sick

patients represents the standard of nutritional care in contemporary clinical medicine. Such support is the obligation of the clinical physician, pharmacist, nurse and dietician. The omission of such care is synonymous with the rendering of substandard treatment" (p. 185).

In January, 1985, the American Society for Parenteral and Enteral Nutrition established minimal standards for home nutritional support, which state that care should be guided by written procedures and policies, services should be documented and that therapy should be "reviewed and evaluated regularly to determine overall effectiveness and safety" (p. 5). Patient and family educational materials for teaching and use at home are included in the standard of written policies and procedures. In respect to patient education the standard states:

1. The patient and/or responsible other shall receive education and demonstrate competence in feeding formulation preparation and administration.
2. The patient and/or responsible other shall receive education and demonstrate competence in access route care.
3. The patient and/or responsible other shall receive education and demonstrate competence in the

recognition and appropriate response to complications and equipment maintenance and malfunctions.

4. Educational materials should be provided to the patient or responsible others.

5. Patient education shall include periodic reassessment and retraining as needed (The American Society for Parenteral and Enteral Nutrition, 1985, p. 6-7).

In summary, there is an increased need for Home Enteral Nutrition patient education secondary to the increasing age of the population, increased number of persons with chronic illnesses, and the advent of DRG's which encourage early hospital discharge, often with complex medical regimens.

Patient education is a multi-faceted concept, which is influenced by learner motivation, beliefs and perceptions, methods and strategies of teaching, age, interpersonal relationships, and the environment. Providing medication reminders to elderly patients complemented oral instruction and improved adherence to therapeutic regimen, supporting the concept that forgetting (failure of recall) affects adherence (Ascione and Shimp, 1984). One-to-one teaching sessions with written information increases learning

initially, however, that knowledge decreases over time (Deberry, Jeffries and Light, 1975), necessitating follow-up reinforcement of patient education. Linde and Janz (1979) demonstrated that continued patient education and reinforcement of learning after hospital discharge prevents knowledge decreases commonly associated with time factors.

King and Tarsitano (1981) explored the impact of structured versus unstructured patient education on patient outcomes. Structured teaching proved effective in increasing pulmonary function parameters.

Milazzo (1980) also demonstrated that the method of teaching influenced learning or acquisition of knowledge. Organized formal teaching was found to be superior over informal teaching in increasing the patients level of knowledge.

Comprehensive structured patient education has been demonstrated as positively influencing acquisition of knowledge and adherence to therapeutic regimens (Linde and Janz, 1979).

Swain and Steckel (1981) explored patient education and contingency contracting as a method of improving patient adherence to therapeutic regimens in chronic illness. Post-test scores and adherence were

significantly higher in the group receiving patient education and contingency contracting.

Brown, Wright, and Christensen (1987) demonstrated that persons who received minimal verbal side-effect information experienced fewer side-effects than persons who received maximum side-effect information.

Motivation to learn may be more significantly related to acquisition of knowledge than stated school grade level completion (Deberry, et al., 1975). This finding may be viewed in relationship to adult learning principles (Knowles, 1973) which describe man as self-directed in performing behaviors which affect his immediate roles and status.

Patients are interested in learning, which may influence the degree of learning (Milazzo, 1980).

Stress and pain related to hospitalization have a negative effect on learning, as demonstrated by White, Lemon and Albanese (1980). Timing of educational intervention is noted as crucial in achieving desired outcomes.

Legge, Massey, Vena and Reilly (1980) recognized that chronic disease knowledge deficits were causing unnecessary hospital readmissions, and developed an educational program which provided one-to-one verbal

instruction and written booklets and materials. The outcome was a decrease in hospital readmissions secondary to disease symptoms.

A patient outcome related to comprehensive structured teaching is improved health status. Length of hospital stay may not be influenced by patient education, but rather dependent on other factors (King and Tarsitano, 1981).

Although nurses are held accountable for patient education, they are frequently not prepared for this role at the undergraduate or graduate level. This lack of formal preparation may present a barrier to comprehensive patient education (Pigg, 1982). Murdaugh (1980) demonstrated that nursing education in adult learning principles and learning principles had a positive effect on increasing patient knowledge. Linde and Janz (1979) also showed that patients taught by clinical specialists experienced greater learning than those taught by staff nurses.

Also impacting patient education is Milazzo's (1980) findings which indicate a severe deficiency of teaching aids and evaluation tools.

The readability of written health materials is noted (Ascione and Shimp, 1984), and implied as

important in designing health care education materials, and in planning and implementing patient teaching programs, however its effect on this process and outcomes has not been addressed.

Patient and family education is a vital component of Home Enteral Nutrition. Although mentioned in all studies, research has not been performed to explore the dimensions of patient education in this therapy, i.e., the relationship of teaching methods to recall and comprehension. The American Society for Parenteral and Enteral Nutrition (1985) has established minimal standards for patient/family education. Key components are provision of written materials concerning formula preparation and administration, access care, recognition and response to complications, and equipment maintenance.

A factor which interferes with patient education is lack of nutrition-related knowledge and skills by the health care provider. Long (1982) notes that comprehensive nutrition education is necessary to provide optimal patient care, however, it is evident that many nurses have not been provided with comprehensive nutrition education in their baccalaureate and graduate nursing programs (Stotts, et al., 1987).

Thus, enhancing nurses' knowledge related to aspects of Home Enteral Nutrition may be a key factor in providing effective patient education.

Recall/Comprehension/Readability

Recall and comprehension refer to the lowest cognitive levels of learning (Redman, 1984). Recall is the remembering of information presented, which represents knowledge. Comprehension refers to understanding, and is representative of the lowest level of understanding. It involves translation, interpretation, and extrapolation of information. Readability refers to the ease with which materials can be read and understood. Due to the overlap of these concepts in the literature, they will be reviewed together.

Streiff (1986) designed a study to determine whether patients were able to read at a level which permitted comprehension of available patient education materials. The patient population was composed of a convenient sample of 106 adult patients from a primary care center. Each participant completed a short demographic questionnaire and the Wide Range Achievement Test (WRAT), level 2. Patient education materials were tested with the SMOG, Fog, and Fry formulas, and an average of the three was calculated. The study

population was 68.9% female, aged 13.9 to 88.6 years, unemployed (63.2%), and with black and white races equally represented. Actual reading levels, as measured by WRAT scores, were 1.7 to 13.5 grades (mean 6.8 grades). Reported reading levels were much higher than actual comprehension levels. The average readability level of available patient education materials, as determined by readability formulas, was 11.2 grades, with a range of 6.6 to 15.4 grades. The mean difference between grade level of comprehension and grade level of patient education materials was 3.1 grades. As a result of study findings, Streiff (1986) recommends that patients be tested for reading comprehension rather than selecting patient education materials based on stated educational level, and that patient reading comprehension of specific patient education materials be tested. This study is valuable in that it establishes that many patient education materials are written above the level of the learner's comprehension. Limitations to this study may be the population. It's high rate of unemployment and low average educational level may not reflect characteristics of the general population.

Based on a literature review which established

that large percentages of diabetic patients were unable to demonstrate self-care skills following participation in patient education courses and research identifying a significant mismatch between patient reading levels and the reading level of written patient education materials, McNeal, Salisbury, Baumgardner, and Wheeler (1984), developed a study to assess diabetic patients' reading and comprehension levels. Study participants were persons attending the Diabetes Education Program in the Appalachia III Public Health District of the South Carolina Department of Health and Environmental Control. Study periods were April 22, 1980 to May 13, 1980 and January 13, 1981 to February 3, 1981. Eighty-three percent (39 persons) of those eligible to participate agreed to be involved in the study. Descriptive data was collected by interview, while reading level and comprehension were tested by the Wide Range Achievement Test (WRAT) and Cloze technique. Reading tests were performed at the 5th or 10th grade level, based on WRAT scores. The SMOG readability formula was employed to assess the reading levels of written patient education materials. Study findings show patients were 30 to 77 years old, had stated educational levels of third grade to college graduate,

and 33 women and 6 men participated. Word recognition skills above the fifth grade level were present in 87% of the population, with word recognition levels much lower than stated years of education. Only 28% of the persons reporting ninth grade education (64%) had word recognition skills at that level. Cloze and reading test scores demonstrated that persons tested at the 5th grade level had more difficulty (30%) than those tested at the 10th grade level (0%). Forty-one percent of those tested at the 5th grade level could not comprehend material, 23% required help, and 13% were completely capable of comprehending information. The reading levels of material provided in the diabetes program, as tested with the SMOG formula, were 5th to 13th grade level. The mean reading level was 10th grade, with 87% of the materials written at the 9th grade level or above. Thirty-eight percent of the materials contained illustrations, however, the effect of this factor was not analyzed. The authors (McNeal, et al., 1984) conclude that a significant mismatch exists between the learner's level of reading and comprehension and the reading level of existing written patient education materials, and emphasize that: "If written and oral instruction cannot be understood, then

learning and resultant behavior changes cannot be expected to occur" (p. 234). The nurse is charged with assessing the readability levels of written health education materials in designing and implementing patient education to insure that materials are consistent with learner needs and skills. Stated reading levels are viewed as an inaccurate method of assessing reading and comprehension levels. Factors which may have influenced outcome are the environment in which tests were performed, including stress related to the program, interpersonal relationships with those persons performing the tests, fatigue or disinterest. The text does not note the validity and reliability of instruments used. The educational program is discussed, emphasizing that physical, knowledge and learning needs of each patient are assessed, however, there is no relationship between the program and the study.

Glazer-Waldman, Hall, and Weiner (1985) conducted a similar study using half clinic and half hospital patients, to assess patients' reading comprehension. The Comprehension Subtest of the Gates MacGinite Reading Test, Level E, Form 1, which tests reading levels 7th through 10th but can be extended from 3rd

through 12th grades, was used to test reading comprehension. Subject selection was based on availability. One hundred patients agreed to participate. The environments were controlled for noise and distractions. Study findings demonstrated that the mean reading level for 81 participants was 6.0 grade equivalents (GE's), with a range of 3.0 to 12.9 grade equivalents. No significant difference existed between males and females or between clinic and hospital patients; however, a one-way analyses of variance demonstrated a significant difference in reading comprehension in the three age groupings, i.e., ages 18-30 = GE 6.9, ages 31-50 = GE 5.1, and ages 51+ = 3.5. There was also a significant variance between ethnic groups related to reading comprehension. Means for the ethnic groups were 7.7 GE for caucasians, 4.6 GE's for black americans and 4.3 GE's for hispanics. The authors (Glazer-Waldman, et al., 1984) conclude that 40% of the study group could comprehend materials written at the 6th grade level; they recommend that the readability of patient teaching materials be tested, and that written information be complemented by audiovisuals, models and practice under supervision. This study is important in that it demonstrates that there were no differences

between the comprehension levels of patients related to clinic vs. hospital setting or between men and women. The findings of decreased comprehension with age and in non-white cultures is an important factor in planning patient education for these groups. A study limitation is the sample selection; bias may have occurred which could inflate or deflate mean scores. The method of reporting data makes it difficult to compare results to similar studies. Reading level is reported in extended scale scores and grade equivalents, which have not been fully defined in the methods. Nearly all data is reported in means; the use of ranges and percentages could have added understanding and scope to the data provided.

Based on literature noting inappropriately high reading levels of health care information and the reported low scores on patient comprehension tests, Eaton and Holloway (1980) designed a study to assess the relationship between altered reading levels of patient drug information and patient comprehension and attitudes. Criteria for selection of subjects included being able to read English, see normal-sized print, and to not be currently taking warfarin sodium. The later was included to eliminate prior drug knowledge.

Participants who were selected from the outpatient setting of the Minneapolis Veterans Administration Medical Center, were randomly given one of two test packets. Written information on warfarin was designed at the 5th grade level for one packet and the 10th grade level for the other packet. Information provided, and number of words and paragraphs were the same for each packet. The Raygar Readability Estimate was used to establish drug information grade levels. Each packet also included the reading portion of the Adult Basic Learning Examination (ABLE), Level II. Comprehension was measured with a 23-item true false test of recall following reading of the monograph. Test reliability was measured by the Kuder-Richardson formula 20, which demonstrated that items were generally too easy. Five items were also designed to elicit participants' attitudes about their ability to clearly read and understand the information, and whether they felt it was written at their reading level. A 2 x 2 factorial design was employed to accommodate for the effects of variables. All study phases were completed by 108 patients. Persons receiving the 10th grade level packet had a mean grade level completed of 12.06 years and a mean age of 47.71

years. Those receiving the 5th grade level packet had a mean grade level of 11.9 years and a mean age of 48.29 years. A two-tailed T test was used to measure group differences; no significant differences existed between groups based on age and grade level completed. Analysis of variance suggested that comprehension of information provided is most dependent on reading ability. Reading ability and reading level, independently, were strong enough factors to account for large portions of variance. Patients receiving 5th grade level materials felt they were at (78.9%) or below (20%) their level of reading, while those who received 10th grade level packets perceived materials as at (56.9%) or above (27.5%) their level. Fifth grade level materials were viewed by the patients as clearly written, and that they could understand all (54.4%) or most of the material (35.1%). Strong correlations existed between reading ability and patients' perceptions of their ability to understand materials and the clarity of materials. The authors (Eaton and Holloway, 1980), conclude that: (1) comprehension of written information is dependent on reading ability; (2) altering reading levels of written information to the reading level of the population enhances comprehension;

and (3) persons receiving 5th grade level materials perceived the information as clearly written. Recommendations based on study findings are that health care information be written in the simplest form possible so it may be understood and perceived as understandable by the learner. A major implication for nursing is that patients cannot understand materials that are written above their reading levels, and that for effective learning to take place, reading levels of written materials must be adjusted to the patient's reading level. Although this study appears very well designed, and many factors were controlled, disease states are not noted (nor disease duration), which may have affected results. The environment in which tests were administered was also not mentioned, which may have negatively influenced scores.

Mohammed (1964) was also concerned with adults' ability to comprehend written health information, and conducted a study designed to provide a rapid method of assessing patient comprehension of materials written at the 4th, 6th, and 8th grade levels. Five, one hundred-word paragraphs referring to diet (4th grade), colds (6th grade), eye hygiene (8th grade), reading a thermometer (4th grade) and test instructions (4th grade)

were constructed at predetermined grade levels. Four multiple choice questions followed each paragraph. Three hundred clinic patients (approximately 50% of the clinic population) at University Hospitals of Cleveland, participated in the study. One hundred and ninety-two patients were black females, 56 white females, 38 black males, and 14 were white males. Average ages for the groups were 56.0, 64.7, 58, and 48.9 years, respectively. A random sample of patient visits was taken. The study period was four months, with 26 consecutive morning clinic sessions in which an average of 10-12 patients each were tested. Each participant received a written test with verbal explanation and sample questions. Study results indicate that the average school grade levels completed was 6.8 grades. Eight grades or less had been completed by 67% of the patients, with 33% of the patients having four or less grades of schooling. Two hundred and twenty patients attempted the test. Of a possible 20 correct test responses, 41.9% correctly answered 15 or more questions, while 35.5% answered ten or fewer questions correctly. Reasons for not completing the test included inability to read (7.3%), non-english speaking or reading (3.3%), visual impairment (14.7%), and inability to choose

correct answers (1%). There were no significant differences in test scores between sexes; however, those from the urban north had significantly higher scores than those from the urban or rural south. Age was significantly related to scores, i.e., the lower the age, the higher the test score. A positive correlation was noted between number of school grades completed and test scores. An analysis of variance in correct answers for each five test segments was performed. Diet questions were least difficult, followed by cold viruses, test instructions, reading a thermometer, and eye hygiene (most difficult), which represent an increase from 4th to 8th grade reading comprehension levels. Analyses of the discriminating ability of each question was tested and items were noted as discriminating well between poor and good readers. Results indicate that 4th and 6th grade level health-related information was easier for patients to comprehend. Available literature in the clinic setting was written at an 8th grade level, which would be comprehensible to 22% of the population. Simplifying materials written at the 8th grade level or above is recommended. Mohammed (1964) concludes that the method designed for assessing patient comprehension is

effective, quick, and easy to use. The importance of this study is its use of actual health-related comprehension tests in patients, and the correlation of grade levels to comprehension. Although the population was large, it may differ from other diabetic populations and thus influence generalization. The questionnaire utilized in the study was tested for readability, but not validity and reliability.

The relationship between methods of communicating health information and the patient's ability to recall information provided was studied by Kishi (1983). The author (Kishi, 1983) hypothesized that increased patient recall would be related to an increased ratio of indirect to direct health care provider influence, an increased frequency of question-asking by the health care provider, a higher frequency of patient question-asking, and a higher ratio of client talk to provider talk. The study sample size was based on a prior estimation of a medium effect size, with a one-tailed alpha of .05 and power of .80. Subjects were selected from six clinic settings, from which one Indian, 29 black, and 38 white mothers participated. Ages of study subjects ranged from 15 to 43 years, with a mean age of 26 years. Sessions were audiotaped in 28 cases

and directly observed in 68 cases. Interrater reliability of the two observers was established throughout the four-month study period. Recall was determined by asking open-ended questions at the close of the health teaching session. The environment was controlled during the five-minute interview eliciting recall of information. Results, based on study data, include: (1) there was not a significant correlation between the ratio of indirect to direct educator influence and client recall; (2) increased question-asking by the health care provider was not significantly correlated with information recall; (3) higher occurrence of client questions was not significantly correlated with increased client recall; (4) an increased ratio of client to provider talk was significantly related to increased recall; (5) client recall was negatively related to direction and orders given by the health care provider; (6) recall was highest when practitioners gave four or five orders in a brief period of time, gave less lectures, and less "supportive communication"; and (7) white mothers and mothers who received repetition of information recalled more information. Kiski (1983) concludes that indirect versus direct provider influence, increased frequency

of client questions, and increased frequency of provider questions, do not lead to high learning of health information. Written achievement tests are suggested, as opposed to verbal tests, because they allow the participants to return to unanswered questions. The study outcomes are well supported by data and the population is relatively large which aids in generalization; however, the population is of a lower socioeconomic background which limits generalization to this population. Terms are generally well defined, however, "supportive communication," which is noted as less influential in recall of information, is not defined. The noted factors which influence recall, and client characteristics which are associated with decreased recall, are important to nurses in planning and implementing health care education.

Parkin, Henney, Quirk, and Crooks (1976) observed the increase in the number of persons with chronic diseases being discharged from the hospital on prescribed treatment, and the frequency with which errors occurred in medication taking. A descriptive study was undertaken to explore possible causes for this problem. One hundred and sixty-nine patients were selected for the sample, who met the criteria of having

been discharged from the hospital on prescribed medications, which they had been taking for at least 14 days. Patients were interviewed at home, and information was collected concerning medications, frequency, doseage, and the person prescribing the medication. Data was compared to the original prescription; differences were defined as non-comprehension. Actual adherence to the medical regimen was assessed through the pill count method. All patients were followed for a six-month period of time. Of the potential 169 patients, 134 participated (80 women and 54 men). Their mean age was 66.2 years, and all were diagnosed with chronic diseases. One hundred and fourteen of the subjects were on regular medications when entered into the study. Of the entire study population, 64.6% were administering medications as prescribed, 35.4% made errors in medication due to non-comprehension, and non-compliance was present in 25.9% of the subjects. Non-comprehension was not significantly related to sex, age, education, social isolation, or social class. Adherence to therapeutic regimen was also not significantly related to the mentioned factors, nor was it correlated with understanding of the illness. Non-compliance and non-comprehension were both

significantly related to the number of drugs prescribed. Parkin, et al. (1976) conclude that both non-comprehension and non-adherence were factors related to deviation from prescribed drug regimens, and that complexity of the drug regimen was significantly related to both non-compliance and non-comprehension. This study provides important information for nurses and other health care professionals regarding the potential for complications related to non-comprehension of drug information, and non-compliance related to complexity of the drug therapy. Although the interview was conducted in the patient's home, which should produce less stress, the group is composed of elderly persons who may have difficulty recalling information immediately. The use of a written test format might have allowed time for recalling information, which would influence non-comprehension scores.

Byrne and Edeani (1984) conducted a study to identify the relationship between professionals' perceptions of patients' knowledge of medical terminology and patients' actual understanding of that variable. Medical terms used were based on a review of the literature and a previous study by Smeltzer (1980), which explored patients' understanding of 15 medical

terms frequently used by doctors and nurses. The study sample (74 women and 51 men) was composed of 125 patients from the outpatient clinic or medical unit of a 325-bed county general hospital. All patients were diagnosed with chronic diseases and were interviewed for the study within the first three days after admission. Ages ranged from 15-82 years with a mean of 42 years. Fifty terms of a possible 90 deemed as appropriate by a panel of experts, were randomly selected for the patient interview instrument. Of a possible 50 correct answers, a range of 4 to 48 correct responses occurred in the study population. No single question was answered correctly by the participants. The populations mean test score was 36, as compared to the panel of five health care providers who perceived all 50 terms as common in practice and understood by patients. A T test was employed, which measured a significant difference in professionals' beliefs concerning patients understanding of medical terminology and the patients actual understanding. A Pearson correlational analysis was used to measure relationships between independent variables and knowledge. Significant relationships existed between knowledge and the variables age, educational level, and perceived

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level of knowledge. As age increased, the level of knowledge decreased, especially in the 71 years or older group. Scores increased with the number of years of schooling; those with eight years or less had a mean test score of 23, high school graduates had a mean of 38.8, and those with 13 to 16 years of education obtained a mean test score of 42. Of the total population, 66% perceived themselves as fairly knowledgeable concerning medical terminology, 24% felt they were very knowledgeable, and 10% did not feel knowledgeable. Byrne and Edeani (1984) conclude that patients' understanding of medical terminology has increased from levels noted in previous studies; patients perceived understanding of terminology is a reliable measure of patient understanding; there are significant differences between the health care professionals' perception of patients' understanding of medical terminology and the individual's actual understanding; knowledge decreases with age; and knowledge increases with the number of years of schooling. A limitation of this study is the instrument and its application. Validity and reliability are not discussed, nor is the method of determining correct responses. Both factors could affect test scores.

The effectiveness of a self-teaching program for hypertension was evaluated by Roberts, Hosokawa, Walts and Mueller (1981). A teaching booklet was designed which answered 20 true-false questions concerning hypertension. The instrument was pretested to determine reliability, and content validity was established by a panel of experts. Readability was tested by the FOG Index and showed a seventh to eighth grade reading level. Participants were from a Veterans Administration hospital or a metropolitan hypertension screening clinic, over 50 years old, 90% white and two-thirds men. A randomized pre-test, post-test control group design was implemented. Controls had a mean educational level of 11.9 years and the educational group had 10.9 years of schooling. Ninety-two educational and 102 controls completed pre- and post-tests, and the telephone follow-up test was completed by 76 educational and 81 controls. The control group received no special educational intervention, while the experimental group was given the designed booklet to read. There was no significant difference in pre-test scores for both groups, and both groups experienced lower post-test than pre-test scores. Men scored better on both pre- and post-tests, however, on the

follow-up test there was no difference related to sex follow-up scores of patients in the educational group who had read the teaching booklet (39 patients) did not differ from those who had not read the booklet (39 patients). In addition to hypertension-related questions, participants were asked where and how they received information about hypertension. Eighty-two percent received information from a physician in the hospital (26%) or office (22%) and from pamphlets (36%) or television (35%). Conclusions based on study findings were that the teaching booklet was not effective in providing educational information, and that its use with other teaching strategies (small group or one-to-one) would probably be more effective. Although not effective, this study provides guidance for professionals in elements which must be considered when planning patient education. The large percentage of white males may make this population different than other hypertensive patients, influencing ability to generalize to other populations. Veterans Administration hospital patients may also differ from other hospitalized patients. Two hundred persons were asked to participate; as criteria for inclusion is not noted, selection bias may have occurred.

In summary, the learner's ability to recall patient education information is significantly related to the patient's reading level, number of years of education completed, race, age, the readability level of written educational materials, and the patient's tested reading level.

Reading tests commonly utilized to test the learner's comprehension are the Wide Range Achievement Test (Streiff, 1986), the Comprehension Subtest of the Gates MacGinite Reading Test, Level E, Form 1 (Glazer-Waldman, Hall, and Weiner, 1985), and the Adult Basic Learning Examination, Level II (Eaton and Holloway, 1980). The readability levels of written health information have been established through use of the SMOG, Fog, and Fry Readability formulas (Streiff, 1986), and the Raygar Readability Estimate (Eaton and Holloway, 1980).

The reading level of a majority of health education materials is written above the level of the reader's comprehension. The reading levels of written information reviewed range from 6.6 to 15.4 grades (Streiff, 1986), while learners comprehension levels were 1.7 to 13.5 grades (Streiff, 1986). Reading material grade levels were found to be 3.1 grades

higher than the learner's comprehension level. The stated grade level was poorly correlated with actual reading levels (Streiff, 1986); however, the patient's perception of his knowledge level and the clarity of written information was positively associated with actual reading ability (Byrne and Edeani, 1984).

This problem is also expressed in McNeal, Salisbury, Baumgardner, and Wheeler's (1984) study of patient comprehension and reading levels. The learner's needs were not assessed or accounted for in the design or selection of patient education materials, resulting in most material being above the level of the learner.

Age is documented as being negatively associated with reading ability (comprehension) and recall (Byrne and Edeani, 1984; Mohammed, 1964), as is race (Kishi, 1983). An increase in directions and orders by the provider was related to decreased recall, while repetition of information was related to increased recall (Kishi, 1983).

Mohammed (1964) established that altering the readability level of health care information to that of the learner increases comprehension and patient perception of understandability and clarity of written

information. Materials written at the 5th grade level were viewed as most clear and understandable. Average reading was established as 6th grade by Glazer-Waldman, et al. (1984).

Non-adherence to therapeutic regimens has been associated with non-comprehension of medical information, and complex therapeutic regimens (Parkin, Henney, Quirk, and Crooks, 1976).

Roberts, Hosokawa, Walts, and Mueller, (1981) emphasize the importance of the readability of written health materials when designing health care education materials, and in the planning and implementation of patient education programs.

The consensus of the authors reviewed is that appropriate reading levels of health care information are imperative in enabling patients to recall and comprehend information provided--an individual is unable to learn what he cannot read.

Summary

The field of Home Enteral Nutrition is relatively new; the literature is characterized by its sparse provision of information concerning the effectiveness of patient education, and its relationship to patient

recall, comprehension, and the readability of educational materials.

The increased life-span and survival of persons with chronic diseases presents a potentially large group of persons who are at risk for malnutrition and its sequelae. The advent of disease related groups (DRG's) has encouraged the use of Home Enteral Nutrition to expedite earlier hospital discharge of patients, who are typically more ill and have more complex therapeutic regimens than was noted in the past.

The current trend of increased self-care in patients, and earlier hospital discharge with complex medical regimens, has focused the attention of health care providers on patient education and its effectiveness. Research has demonstrated that the use of adult education principles and learning theories, mutual planning by the patient and nurse, increased fit between the learner's reading level and the level of educational materials, and continued follow-up and reinforcement, facilitates the teaching/learning process. Barriers to patient teaching/learning have been identified as: general lack of teaching aids; a lack of educational materials designed at the learner's

level; inadequate educational preparation of nurses in patient education, adult learning principles, self-care, and nutrition related content; characteristics of the learner, such as motivation, age, health, educational level, reading and comprehension level, sensory-motor perception; and environmental factors, such as noise and interruptions.

The patient's ability to perform self-care is dependent on acquisition of knowledge and skills through the teaching/learning process and individual patient characteristics, such as cognitive, psychomotor, and physical abilities. The goal of intervention is to promote the highest level of wellness and self-care possible.

Patient adherence to therapeutic regimens may significantly influence the incident of complications related to therapy. An increase in complications is consistent with a decrease in patient wellness and self-care ability. Both non-comprehension of educational information, and complexity of therapeutic regimens have been associated with lack of adherence to prescribed therapy.

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THE DEVELOPMENT OF A HOME ENTERAL NUTRITION SELF-CARE
EDUCATION INSTRUMENT WITH MODIFIED READABILITY LEVEL,
AND DESIGN OF A PILOT STUDY TO EXPLORE ITS RELATIONSHIP
TO PATIENT/SIGNIFICANT OTHER RECALL AND COMPREHENSION

Volume II

By

Debra L. Schipper

A SCHOLARLY PROJECT

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MASTER OF SCIENCE IN NURSING

COLLEGE OF NURSING

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CHAPTER IV

METHODOLOGY AND PROCEDURES

Overview

This chapter will present two Home Enteral Nutrition Self-Care education tools, and discuss their implementation in a comparative pilot study. The instrument has been designed with increased readability, which will be studied in relationship to learner recall and comprehension. Both the development of the instruments and the methods of implementation will be discussed.

Research Question

The instruments developed for this project were designed to answer the following research question:

1. Does altering the readability level of written Home Enteral Nutrition patient education materials to the fifth grade level or below increase learner recall and comprehension?

Instrument Development

There are currently no instruments available in the literature to measure patient/significant other recall and comprehension, or the readability of written health care information in relationship to Home Enteral Nutrition patient/significant other education.

Development of project instruments was based on a review of the literature and the author's experience in Home Enteral Nutrition patient education.

A review of available teaching instruments indicates that problems exist related to: (1) the inclusion of unnecessary information, which made texts excessively long and confusing for the learner; (2) pertinent information was often excluded; (3) instructions were very complex; (4) a high degree of medical terminology was utilized; (5) the reading ease levels of materials varied within and between texts, ranging from the seventh grade to college level; (6) no instruments included tests of patient recall and comprehension specific to information provided; and (7) factors which influence readability, recall and comprehension of information did not appear to be considered in instrument design. Based on these findings, the decision was made to develop a new instrument for Home Enteral

Nutrition patient education (see Appendix D) and written tests of recall and comprehension (Appendix C).

In designing instruments, a fifth grade or lower reading ease level was chosen because of numerous studies which indicate that this is the most appropriate reading level for written health education materials. As many persons have chronic illnesses, and may be 60 years or older, print size will be increased for visual ease. Pictures are included to enhance understanding of procedural steps. Medical terminology has been reduced to that which is necessary, and definitions are provided.

Recall and comprehension instruments have also been developed with a fifth grade or lower reading ease level to facilitate understanding. Care has been taken to employ terminology included in the patient education text.

Factors which may influence the patient/significant other recall and comprehension will be addressed in the Sociodemographic Survey (Appendix C), including age, sex, marital status, family income, occupation, formal education, and the household composition of the Patient and significant other.

As duration of illness and diagnosis has been

related to ability to learn, this information will be collected on the Medical Record Review instrument (Appendix C), as well as the type of feeding and feeding tube, and pertinent data concerning the patient's significant other.

In summary, no instruments have been developed which specifically address the study variables related to Home Enteral Nutrition patient education. However, studies in other fields have provided valuable information for the development of specific Home Enteral Nutrition patient education tools.

Research Approach

A short-term, experimental study approach will be designed to answer project questions related to the effectiveness of the author-developed Home Enteral Nutrition patient education booklet (Appendix D). This booklet, which has an adjusted readability of the fifth grade or below, will be compared to a similar booklet developed by Abbott Laboratories (1983), which is assessed at the tenth to twelfth grade level by the Flesch Readability Formula.

Study Variables

Independent variables are viewed as the cause of dependent variables (Brink and Wood, 1983). They are able to stand alone, and occurred first in time (Treece and Treece, 1977). For purposes of this project, the levels of readability of educational tools are viewed as the independent variables.

Dependent variables are those which occur as a result of the independent variables, and which are affected by extraneous variables. Patient and significant other recall and comprehension of written patient education materials are the dependent variables in this project which are related to the readability of written materials.

Extraneous variables are factors which may affect study variables (Brink and Wood, 1983). Educational factors, occupation, presence of children in the home, duration of illness, economic status, age of the learner, and with whom the patient resides are extraneous variables for which data will be collected.

Study Hypotheses

Based on the review of the literature and personal experience, the following hypotheses are proposed.

1. Altering the readability level of written Home

Enteral Nutrition patient education materials from the 10th-12th grade level to the 5th grade or below level, will significantly increase learner recall or information provided.

2. Altering the readability level of written Home Enteral Nutrition patient education materials from the 10th-12th grade level to the 5th grade or below level, will significantly increase learner comprehension of information provided.

Operational Definitions

Patient/significant other recall of information refers to the ability to remember information provided. All patients and significant others who participate in the study will be tested for recall of information through the use of a 10-item, true-false post-test, which will be administered 48 hours after participants have been given the educational tool to study (see Appendix C, Post-test A).

Patient/significant other comprehension is the degree to which information provided is understood. Greater cognitive skills are required than in recall of information. The learner must be able to translate and extrapolate health care information. The patient/

significant other's ability to comprehend information will be tested 48 hours after each subject has been given the educational tool to study, through the use of a post-test B (Appendix C), which contains four vignettes related to Home Enteral Nutrition education. Each vignette has three possible answers and an "I don't know" response choice.

The readability level of written information refers to the ease with which it may be read and understood (Liquori, 1978). Ease of reading is affected by the length of sentences, the number of polysyllabic words, the size of print, print contrast, unfamiliar terminology, and the presence or absence of graphics (Doak, Doak, and Root, 1985). The readability levels of the two study patient education instruments have been tested by the Flesch Readability formula (Liquori, 1978). The character of print and graphics in each will be discussed.

Home Enteral Nutrition patient education will be provided to all study participants. It includes giving all study subjects a written Home Enteral Nutrition teaching manual (Appendix D), which includes basic nutrition information, data concerning specific feeding tubes and their care, information related to prepara-

tion and infusion of enteral feeding, and guidance regarding problem-solving and record-keeping. The content provided will be consistent for all subjects, however the readability level will differ, with groups receiving materials at the 5th grade level or below, or at the 10th to 12th grade level.

Sample

The study sample will consist of 30 individuals who will be discharged from Strong Memorial Hospital, a 651 bed northeastern university hospital, on Home Enteral Nutrition, and who meet study criteria. Each person who meets study criteria will be asked to participate, until a total of 30 subjects have agreed to take part in the study. The number of patients discharged from the institution on Home Enteral Nutrition per month is unknown at this time. Based on patient numbers from similar institutions, it is estimated that two to four patients per month may qualify, which would make the study period approximately seven to fifteen months.

Criteria for participation in the study are: (1) Participants must be able to speak and read the English language; (2) all persons must be designated by the

physician as requiring enteral nutrition at home; and (3) subjects must have a nasogastric (including, nasoduodenal and nasojejunal), jejunostomy, or gastrostomy feeding tube.

Instruments

Five instruments were designed for this study, to collect data concerning stated variables, and to provide patient education. An existing patient education manual, designed by Abbott Laboratories (1983), with a tenth to twelfth grade readability level, will also be employed to provide patient education to the control group.

The Medical Record Review survey (Appendix C), contains nine open-ended questions, which assess information concerning the primary diagnosis (questions 1 and 2), the method of feeding (questions 3 through 6), and the significant other (questions 7 through 9). As with all other author-designed instruments, development was based on review of pertinent literature, and the author's experience. Data will be collected by the Nutrition Support Coordinator, a nurse employed by Strong Memorial Hospital.

The Sociodemographic Survey (Appendix C) will be completed by the patient and also by the significant

other. Seven open-ended questions are included which assess the person's age (number 1), sex (2), marital status (3), income and occupation (3 and 4), number of years of education completed (6) and living conditions (7) .

Post-Test A (Appendix C) is a ten-item true/false test of recall of information. It will be completed by the patients and significant other, from both control and experimental groups, 48 hours after each has been given the patient education instrument to study. Questions 1 and 2 deal with nutrition, while the remainder are concerned with enteral nutrition feeding techniques.

Post-Test B (Appendix C) contains four vignettes concerning potential enteral nutrition-related problems. The patient and significant other from both groups will individually respond to each question by selecting one of three possible answers, or the fourth, which indicates that they do not know the answer. As with other instruments designed for completion by the learners, the readability level has been adjusted to the fifth grade or below reading level.

The final author-designed instrument is the Home Enteral Nutrition Self-Care Education booklet

(Appendix D). The tool is designed with readability modified to the fifth grade level or below. The readability level has been tested by the Flesch Readability Formula (Liquori, 1978), which evaluates written material based on average word and sentence length in 100 word samples. In longer texts, three samples are measured and averaged. The reading ease score is calculated by the following formula:

$$RE = 206.835 - (1.015 SL + 0.846 WL)$$

RE is the reading ease score, while SL represents the average sentence length in words, and WL is the average word length in syllables. Sentence length is determined by dividing the number of words in the sample by the number of sentences. Word length is calculated by dividing the number of syllables in the sample by the number of words, and multiplying this number by 100. The reading ease score is compared to the following scale, which represents the reading grade level:

1. 100-90, very easy, 5th grade and below
2. 89-80, easy, 6th grade level
3. 79-70, fairly easy, 7th grade level
4. 69-60, standard, 8th-9th grade level
5. 59-50, fairly difficult, 10th-12th grade level
6. 49-30, difficult, 13th-16th grade level

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7. 29-0, very difficult, college graduate level

As the text of the author-designed educational instrument is long, and contains sections with medical terminology, seven separate samples were tested, which resulted in an average reading ease score of 95.093, representing the 5th grade and below reading level.

The booklet contains a patient/significant other introduction to the text, an index, information on basic nutrition, methods of receiving feedings, and the actual feeding prescription. Teaching and learning goals and objectives related to Home Enteral Nutrition are provided, with space for specific goals and objectives noted by the nurse and patient. Information is recorded concerning the date specific information was taught, and by whom, when return demonstrations occurred and were approved, and the signatures of the learner and nurse. A space is also provided for a one month review of behaviors taught in the educational sessions.

Teaching sheets are included for insertion of the nasogastric feeding tube, taping of the nasogastric feeding tube, jejunostomy and gastrostomy dressing changes, preparation of canned or powdered formula, gravity or pump-assisted infusion of feeding, checking

tube placement, flushing the feeding tube, and giving medications through the enteral feeding tube.

Information is provided concerning potential complications, and appropriate patient/significant other actions in response to problems. Intake and output is explained, and an example of intake, output, and fluid balance is provided. The Daily Diary, which has previously been described, is incorporated in the teaching booklet. Important points to remember concerning the therapy and questions to ask the physician regarding the enteral nutrition are also presented for the patient/significant other.

As instrument readability is related to factors other than the number of words per sentence, and the number of syllables per word, the booklet will be altered to enhance other readability factors. Graphics are provided which show related anatomy, and tube-placement positions. All major steps of the procedures included in the booklet will be accompanied by black and white photographs depicting the technique. The letter size will be increased, and dark lettering on white paper will be employed to enhance reading ability. As the texts of many booklets contain information not pertinent to the patient's specific

feeding regimen, this booklet is designed to select only procedures relevant to each persons feeding techniques and tube. For purposes of this study, however, all subjects in the experimental group will receive the entire booklet, and will be tested on material from the entire booklet.

An existing Home Enteral Nutrition Patient Training Manual (Abbott Laboratories, 1983) will also be utilized for patient education. Its reading level is assessed at the 10th-12th grade level by the Flesch Formula, with a reading ease score of 51.347. It was selected for use in this study because of its similarity to the author-designed booklet, rather than comparing the author-designed manual to the existing method of patient teaching in the institution, which is unknown at this time. This existing manual has been utilized for Home Enteral Nutrition patient education since published in 1983. It is provided in a hard-cover ring-binder, with each section designated by index-tabbed dividers. It includes the same content as the author-designed manual, with the exception of the teaching/learning goals and objectives, important points, questions to ask the physician, and the Daily Diary. No questions from these areas are included in

the recall and comprehension tests. Graphics have been included, and print size has been adjusted. All control group subjects will receive this instrument, while all experimental subjects will receive the author-designed patient education instrument.

Proposed Methodology

Several pre-testing methods are available to establish the clarity and stability of instruments designed to study Home Enteral Nutrition patient education and the related variables of readability, recall, and comprehension. The primary purpose of this project is to design a pilot study which could be conducted to identify problems related to the understandability of the instruments, and their internal consistency. A pilot study format was also chosen to address the issue of whether or not this project would be a valuable research study. As research studies involve considerable professional time and money, information concerning the validity and reliability of instruments, and the clinical value of the author-designed tool could provide cost-savings.

Pilot study. The study instruments would be implemented in a group of 30 patients and significant others, who meet study criteria, who have been selected

by the primary physician for Home Enteral Nutrition. Subjects will be limited to those who are currently inpatients (and significant others of inpatients) in the study hospital, which is a 561 bed northeastern university hospital. All unit charge nurses will be informed of the criteria for patient selection, study purpose, and methodology. When a decision is made to begin Home Enteral Nutrition patient education, the charge nurse will notify the Nutrition Nurse Coordinator. Floor staff will be instructed not to provide any related information to the patient and significant other until after each has completed the study.

Informed Consent (see Appendix B) will be obtained from all study participants prior to any application of study procedures. All potential study patients/significant others will receive both a written and verbal explanation of the purpose of the study, their proposed involvement, confidentiality factors, and the benefits of taking part in the study. Possible participants will be interviewed by the Nutrition Nurse Coordinator. The contact letter (Appendix A) will be signed by the director of the Medical Nutritional Support Services.

Prior to any patient contact, the study will be

presented to the Human Rights Committee of the University of Rochester and Strong Memorial Hospital. Approval by this committee will be included in the subject contact letter and consent form.

Those willing to participate will be asked to sign a consent form, which reiterates their rights of confidentiality, humane treatment, and the ability to leave the study at any time without alterations in the level of professional care received.

Subjects will be asked to study educational materials provided to them, and to complete a two-part test of recall and comprehension 48 hours later. Subjects will be asked to study separately, and will be examined individually.

After subjects have agreed to participate in the study, the Nutrition Nurse Coordinator will ask for their permission to obtain data from the medical records.

Randomization of study subjects into two treatment groups will be performed after consent to participate is obtained. This process will be utilized to place participants in patient/significant other educational intervention Group 1, or Group 2. Group 1 will receive their education with the Home Enteral

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Nutrition Self-Care Education booklet with the reading level adjusted to the fifth-grade or below level. Group 2 will receive the Abbott Laboratories (1983), Home Enteral Nutrition Patient Training Manual, with a tenth to twelfth-grade readability level. The only difference between group intervention will be the level of readability of the written health-education materials. A flip of the coin method will be used to randomize subjects into groups, with head of the coin being placed in Group 1 and tail of the coin being placed in Group 2.

Following randomization, each participant will be given the appropriate Home Enteral Nutrition patient education manual by the Nutrition Nurse Coordinator, and asked to study the manual contents. The same nurse will conduct the written tests 48 hours later. This nurse will be instructed to provide only information related to test directions. The time required by each participant to complete the exams will be recorded.

Reliability refers to the ability of the study instruments to accurately measure variables, and to obtain consistent results (Treece and Treece, 1977). Inaccuracy may be related to differences between persons who are administering and recording data, and

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the instrument itself. To eliminate differences between test administrators and data gatherers, only one nurse will be involved in these activities, who will be instructed in study procedures.

Homogeneity or internal consistency refers to the degree to which parts of an instrument measure the same study characteristics (Polit and Hungler, 1983). For purposes of this project, the Cronbach's alpha method could be employed to establish internal consistency of study instruments. This formula could be applied to the ten-question Post-test A, which reflects recall of information and separately to Post-test B, a four-question test of comprehension of information provided. Application of this method is dependent on the homogeneity of the instrument subparts, that is, the degree to which they measure the same behavior (Polit and Hungler, 1983). As Post-test A and Post-test B were each designed to measure a single, but different behavior, they are suited to this method of analysis. In determining internal consistency, it is generally accepted that the number of subjects required is ten times the number of questions per behavior; however, five study subjects per question may be a sufficient number to establish internal consistency (Nunnally,

1978). For this project, 50 subjects would be required to establish internal consistency of items in Post-test A while 20 individuals are necessary for Post-test B item analysis. As these instruments are designed for a new area of study, a reliability coefficient of .70 or greater would be acceptable for this project (Gay, 1981).

Validity refers to the degree with which study instruments actually measure the factors they are designed to measure (Polit and Hungler, 1983). Content and construct validity must be assessed when instruments are designed. Content validity is the representativeness of questions asked to all questions which could be asked concerning the specific topic. Content validity is typically based on the judgement of experts in the study field. The content of the study instruments was based on a review of pertinent literature, and the author's experience, in an effort to provide validity. All instruments will also be subjected to the perusal of a panel of experts in nutritional support. This panel of judges will consist of the following nutritional support personnel: (1) the surgical nutrition support physician director; (2) the medical/pediatric nutrition support physician

director; (3) two surgical nutrition support nurse specialists; (4) one pediatric nutrition support nurse specialist; and (5) one adult nutrition support nurse specialist.

Construct validity is concerned with the validation of the constructs on which the study was based (Brink and Wood, 1983). Constructs are concepts related to the research. They are abstract in nature, and cannot be directly observed. The validity of the instrument is based on the degree to which it accurately measures the construct. In designing an instrument, construct validity can be supported by comparing the proposed content with other tools designed to measure the same construct. Highly correlated factors in previous scales should be included in the proposed instrument, as applicable. Construct validity may be tested by several methods, one of which is employing an independent panel of judges to observe participants' behaviors, and record behaviors which exemplify the construct. Results obtained from the instrument may also be correlated with an established tool which measures the same construct (Treece and Treece, 1977). The multitrait-multimethod matrix method measures the convergence and discriminability of study constructs.

Its premise is based on the assumption that given certain facts, outcomes may be predicted (Polit and Hungler, 1983). This method is designed to measure differences between constructs, and to demonstrate similarities between different methods of assessing the same construct.

In this study, the construct which may influence learner recall and comprehension of Home Enteral Nutrition patient education information is the readability of written information provided.

Scoring

The results from Post-Test A and B (Appendix C) are designed to demonstrate recall and comprehension of information provided. The number of correct responses on each test will be recorded on a frequency distribution tool. This data represents an interval scale, from which the mean number of correct responses and the percentage of correct responses may be calculated. Each participant will receive a separate score for each test, and cumulative results for each group will be presented.

Data retrieved from the Medical Record Review (Appendix C) will describe the primary disease and its duration, the enteral feeding route and its character-

istics, and information concerning the age and relationship of the significant other to the patient. The primary diagnosis, type of feeding tube, type of enteral nutrition, and relationship of the significant other to the patient represent nominal scale categories. The responses from each group will be recorded, and the total number for each response. The date diagnosed, and date the tube was placed will be converted to days, months, and years. The dates and the age of the significant other will be presented as interval scales, from which means may be calculated for each group.

The Sociodemographic Survey (Appendix C) will describe participants' age, marital status, sex, educational background, economic status, and living situation. Sex, occupation, marital status and household composition represent nominal scale categories. The frequency in each category will be tallied and presented, as well as the percentage for each group. Age, income, and education are interval scale data, from which means will be expressed and percentages for each group.

Data Collection Procedures

Two sources will be utilized for data collection

in this study: (1) individual patient record review;
and (2) the use of self-administered, structured
Patient/significant other questionnaires.

The auditor is the Nutrition Nurse Coordinator,
who is employed by Strong Memorial Hospital. This
nurse is masters' prepared and holds a current New York
State Registered Nurse license. In the course of her
work, she deals with adult and pediatric Home Enteral
Nutrition patients. Prior to initiation of the study,
the nurse will receive an explanation of the proposed
study, and instruction regarding the use of educational
booklets, and post-tests, as well as medical record
data retrieval.

When the need for Home Enteral Nutrition has been
established by the physician, the nurse investigator
will visit and interview the patient/significant other
to determine if study criteria are met, and to explain
the study. The written contact letter (Appendix A) and
Consent form (Appendix B) will be given to the
Potential participants by the nurse, during this inter-
view. The study purpose, benefits, confidentiality,
and right to refuse will be discussed, and participa-
tion will be requested. Those agreeing to take part in
the study will be asked to sign the study consent form.

A consent form will be signed by each patient and each significant other. Following consent to participate, the patient/significant other, independently will complete the Sociodemographic Survey (Appendix C). Permission will be requested to review the medical record. At this interview, a time will be set between the nurse and patient/significant other for providing the patient education manual.

The patient/significant other will be randomized into educational intervention Group 1 or Group 2.

At the second patient/significant other meeting, the nurse will provide the participants with the appropriate educational booklet, and instruct them to study the contents individually. A time will be set between the nurse and participant for the post-test 48 hours later.

In the third meeting with the patient/significant other, the nurse will collect the teaching manual and provide the participant with Post-Test A and B. The nurse will be instructed to answer only questions related to test directions. The time required for each participant to complete each test will be recorded.

Medical patient charts from the hospital will be reviewed by the Nutrition Nurse Coordinator following

completion of the participant post-tests. All data and questionnaires will be returned to the primary investigator for analysis. Patients' and spouses' completed instruments will be coded with the date and personal identification number. Patients will be assigned odd numbers, with significant others receiving the next consecutive even number.

Statistical Analysis

Study data will be analyzed using both descriptive and inferential statistics. Information from the Sociodemographic Survey (Appendix C) and Medical Record Review (Appendix C) related to age, marital status, income, educational preparation, diagnosis, and duration of illness will be used to describe differences between Group 1 and Group 2. The t-test is suited to analysis of differences between two independent groups, when dependent variable information is presented on an interval scale. This method utilizes probability values to describe whether significant differences exist. For purposes of this study, a probability level (p) of less than 0.05 would indicate that differences exist between groups related to the variables of age, marital status, income, educational preparation, diagnosis, and duration of illness.

To answer the study question, concerning the effect of altering the readability of written educational materials on participant recall and comprehension, statistical analysis could be performed by the t-Test method. The means of Post-Test A and B will be compared for each group, to establish if those educated at the fifth-grade or lower level had higher post-test scores than subjects taught at the tenth to twelfth-grade level.

Although randomization of patients assists in reducing differences between groups, statistical controls may also be used to compensate for differences between groups with respect to background variables. As age, income, education, years of illness, and the period of time with a feeding tube inserted are presented as interval scales, the results for each group could be calculated by the t-Test method.

Analysis of study data is important in preventing Type I and Type II errors related to study hypotheses. Type I errors refer to rejecting the null hypothesis when it is actually true, while Type II errors occur when the researcher fails to reject the null hypothesis. Rejecting the null hypothesis infers that a difference exists (Treece and Treece, 1977). The

level of significance affects the chance of making Type I errors. Acceptable significance levels range from for Type I errors (Polit and Hungler, 1983). There is an inverse relationship between Type I and Type II errors, in which Type II errors increase as Type I errors decrease. The tests described to show differences between study groups are measures of the Probability of hypotheses being true and the direction of the noted differences.

Summary

This chapter has presented the proposed research methodology and rationale. Information has been presented concerning the research problem, hypotheses, instrument development, instruments, the study sample and randomization, data collection, and statistical analysis of data. Chapter V will contain a discussion of the possible study results, and implications for nursing research and nursing practice.

CHAPTER V

SUMMARY AND CONCLUSIONS

Overview

Chapter V will present a summary of the project presented, and possible outcomes. The implications of the possible findings will be related to nursing practice, education and research. Recommendations, based on potential outcomes, will be cited concerning nursing practice, education, and future studies.

Project Summary

The current trend of increased self-care, and the advent of reimbursement systems which encourage early hospital discharge present greater needs for patient education. Nurses have both professional and legal responsibilities to provide this education, and protect the individual's right to receive appropriate knowledge and skills required for self-care. Home Enteral Nutrition is a complex therapy, which requires both technical knowledge and skills. The family clinical

nurse specialist (FCNS) is in the prime position to assess learning needs, design appropriate teaching interventions, and evaluate the outcomes of patient/significant other education.

Home Enteral Nutrition has been described as a safe and effective form of providing nutrients by artificial means (Chrysomilides and Kaminski, 1981). Its cost-effectiveness, as compared to other methods of artificial nutrition, has also been established (Newmark, Simpson, Beskitt, Black, and Sublett, 1981).

In a review of enteral nutrition literature, Worthen (1979) noted considerable difficulty in accessing related material, secondary to terminology utilized by authors. A large portion of the published articles were concerned with chemically defined diets utilized in specific disease states. Of importance to nursing, is the finding that no nursing journals were noted as major sources of information concerning enteral nutrition. Worthen (1979) suggests that accessibility to information is necessary for professionals to remain current with changes and new information in fields of interest. In a later publication, Worthen and Lorimer (1984), concluded that access to enteral nutrition literature continued to be a major

problem, and provided a key to available information. This literature is characterized by in-hospital orientation, with the primary focus on specific disease treatment and complications. A review of nutrition-related nursing research (Moore, Guenter, and Bender, 1986) indicates similar results. Only 55 articles were identified related to nutrition in the nursing literature, greater than half of which were found in The Journal of Parenteral and Enteral Nutrition, and in Nursing Research. Most publications were presented by nurses and other health-care professionals, rather than primarily nursing. The focus of this research was tolerance and delivery of enteral and parenteral feedings. Seven percent of the nursing studies dealt with nutritional assessment. It is evident from these reviews that the primary focus in enteral nutrition continues to be the appropriateness of therapies in specific disease states, related complications, and the clinical effectiveness of therapy. Most of this information exists in literature which is not received by most acute care and primary care nurses.

The importance of professional education in nutrition is stated by the former president of The American Society of Parenteral and Enteral Nutrition, Dr. Long

(1982), who emphasizes that "comprehensive nutrition education is an essential basis for the sound practice of modern clinical medicine" (p. 280). This knowledge is imperative in preventing iatrogenic malnutrition (Butterworth, 1974), and in providing the level of nutritional support which reflects the standard of nutritional care (Seltzer, 1982). Recent nursing studies concerning professional preparation in nutrition-related content areas indicate that few nurses receive this information at the undergraduate level (Englert, Crocker, and Stotts, 1986; Stotts, Englert, Crocker, Bennum, and Hoppe, 1987). Nutrition-related content has gradually been phased-out of educational programs as dieticians have gained prominence in hospital settings. Graduate level programs contain a greater amount of this information, but few clinical experiences are provided, and most information focuses on the technical components of in-hospital enteral nutrition support. In contrast to formal educational preparation, a survey of content areas viewed as essential by professionals in the field of nutrition support (Hain, Howell, Crosby, and Mullen, 1982) indicates that biochemistry related to nutrient requirements and nutrition in stress and disease,

nutritional assessment, diseases of malnutrition, and growth and development nutritional factors represent the most critical knowledge areas. This problem is compounded by the findings of Pigg (1982), who reports that only a very small percentage of nursing education institutions require or provide courses in patient education. The outcome is that, although nurses have Professional responsibilities for patient education, they are not professionally prepared for patient education, nor for the care of and/or education of the Home Enteral Nutrition patient/significant other. This Presents a significant barrier to increasing patient/significant other Home Enteral Nutrition self-care abilities.

Home enteral nutrition studies indicate that one additional family member is usually included in patient education sessions (Newmark, Simpson, Beskitt, Black, and Sublett, 1981), and that this educational process generally requires three to six hours of nursing time. In the cases of children (aged two months to 15 years), mothers were taught to perform necessary procedures (Navarro, Goutet, and Charritat, 1981). Little information exists concerning who performs techniques related to adult patients receiving educational

interventions. Rains (1981) reports that half the patients studied were able to prepare their own feedings, four out of ten cared for their own stomas, while three required family help and three needed nursing assistance.

The characteristics of patients receiving Home Enteral Nutrition indicate that patients' ages range from infant to old age, most have chronic diseases, and that the majority receive feedings via nasogastric (including nasoduodenal and nasojejunal routes), jejunostomy, and gastrostomy methods (Chrysomilides and Kaminski, 1981; Greene, et al., 1981; Heymsfield, Smith-Andrews, and Hersh, 1983; Navarro, Goutet, and Charritat, 1981; Newmark, Simpson, Beskitt, Black, and Sublett, 1981; and Rains, 1981). Formula is most frequently delivered by infusion pump and gravity methods.

Benefits to the patient secondary to Home Enteral nutrition have been noted as: (1) an improvement in nutritional status (Chrysomilides and Kaminski, 1981; Greene, et al., 1981; and Newmark, Simpson, Beskitt, Black, and Sublett, 1981); (2) improvement in primary disease status (Greene, et al., 1981); (3) increased ability to participate in school (Navarro, Goutet, and

Charritat, 1981); (4) patient perception of improvement in daily living (Nelson, Palumbo, and O'Brien, 1986); and (5) a cost savings (Newmark, Simpson, Beskitt, Black, and Sublett, 1981).

Considerable variance exists in the literature concerning complications related to Home Enteral Nutrition therapy. Greene, et al., (1981) report only one "possible serious" complication (aspiration pneumonia) in a five-year study of 11 patients with inborn errors of metabolism, who received enteral nutrition. Rains (1981) reported gastrointestinal symptoms in 7 out of 10 study patients, while others (Newmark, Simpson, Beskitt, Black and Sublett, 1981) report no metabolic abnormalities, and gastrointestinal symptoms in a minority of their 23 adult patients. In a study of 18 patients, Chrysomilides and Kaminski (1981) reported one feeding tube accidentally lost, diarrhea and constipation in three patients, but no other serious problems or complications. Heymsfield, Smith-Andrews, and Hersh, (1983), reported no significant complications in case reports of two patients followed for 9 to 12 months on Home Enteral Nutrition. Nelson, Palumbo, and O'Brien conducted a multi-institution study of Home Enteral Nutrition patients, which included 144

patients, who were followed for a one-year period of time. Of the 75 patients remaining on the therapy at the end of the study period, 53 responded to a questionnaire concerning the frequency of complications. There were 36 incidents of the tube blackage, of which 16% required a physician office visit, 14% required emergency room treatment, and 3% resulted in patient hospitalization. These 53 patients reported a total of 164 problems maintaining access, with 48% of the problems requiring medical attention. A total of 128 problems with feeding intolerance were reported, of which 15% were not able to be resolved at home. Navarro, Goutet, and Charritat (1981) report similar complication rates in a study of 111 children aged two months to 15 years. Nasal hemorrhage (4 cases), recurrent abdominal pain (4 cases), esophagitis (2 cases), vomiting (3 cases), dysphagia (1 case), and relapsing rhinopharyngitis and otitis (49 cases) were reported during a five-year period. A significant problem appears to exist in the definition of what constitutes a complication, and when the complication is significant.

Patient/significant other adherence to therapeutic regimen in Home Enteral Nutrition is rarely addressed.

Nelson, Palumbo, and O'Brien (1986) report that 82% of the patients remaining in the program at the end of one year consistently followed and tolerated their prescribed enteral feeding. As no study methods are presented, it is difficult to interpret the importance of this finding.

As indicated, very little information exists concerning the actual side effects related to Home Enteral Nutrition, the actual role of the significant other in patient education and self-care, or the effect of age and/or chronic illness on patient education and self-care abilities. The outcomes of patient education, including recall, comprehension, patient/significant other satisfaction, learning related complications, and knowledge related patient/significant other adherence to therapeutic regimen have not been addressed, nor has the readability of written Home Enteral Nutrition patient/significant other teaching materials, or its degree of efficacy in meeting learning needs.

There is currently no proposed theoretical base or framework for Home Enteral Nutrition suggested in the literature. This project has aspired to utilize the self-care theory of Orem (1980), adult educational

theory (Knowles, 1973), and learning theories to develop a self-care educational framework for Home Enteral Nutrition patient education. The primary focus of self-care theory (Orem, 1980) is that individuals perform self-volitional behaviors which are required to promote their own well-being or the well-being of persons dependent on them. Knowledge and skills are required for execution of these behaviors, which are usually learned through the individuals' environment. When knowledge deficits exist secondary to health deviation self-care requirements, the educative supportive nursing system is employed to assist the patient/significant other in acquiring the necessary knowledge and skills to attain the highest level of self-care possible, given physical, and psychosocial limitations. A key component of this theory is that of mutuality or collaboration between the health care provider and patient/significant other in assessing needs, demands, and deficits, and in designing, planning, and implementing self-care education. Each participant in the educational process is viewed as having responsibilities. The nurse's role is that of compensating for the patient/significant other self-care deficits, through a variety of helping nursing systems.

Adult education theory (Knowles, 1973) has much the same focus as self-care theory (Orem, 1980). Man is perceived as self-directed, and motivated to learn information which can immediately be applied to preserve role functions. The adult learner has many past experiences, which may positively or negatively influence the teaching/learning process. Readiness to learn, in the adult, is most significantly related to the developmental requirements of perceived social roles. As the learner is self-directed, mutual planning is an important factor in motivation to participate in learning experiences. The adult learner views information from a problem-oriented perspective, in which useful material and information is most valued.

Cognitive learning theories assist the educator in planning patient education activities by providing insight concerning the ordering of symbols or information. Cognitive, psychomotor and behavioral skills are ordered from the most simplistic to the most complex. The outcomes of the educational process are recall and comprehension of information, which represent the ability to remember and understand, respectively. Information is remembered best when

presented in the most simplistic form, through watching a role model (FCNS) and practicing skills, and when written, pictorial directions are used to supplement verbal instruction. Understanding is based on knowledge and experience.

The blend of these theories provides a basis for Home Enteral Nutrition Self-Care Education, in which the focus of education is that of promoting the individual's ability to be self-directed and to meet self-care needs through the acquisition of knowledge and skills which are deemed necessary to fulfill social roles, and enhance self-care agency. The FCNS's role is that of a facilitator in assisting the patient/significant other in assessing needs, planning and implementing intervention, and in evaluating the effectiveness of the teaching/learning strategies. The FCNS acts as a knowledge resource for the patient/significant other. Her knowledge of the cognitive and psychomotor skills necessary for specific educational program components assists the learner(s) in selecting methods which will achieve the desired learning outcomes.

Based on Home Enteral Nutrition research, other related literature, and personal experience, several

instruments have been designed for this project. The major instrument is a Home Enteral Nutrition Self-Care Education tool with readability adjusted to the fifth-grade or below level, which will be compared to a similar teaching booklet designed with a 10th-12th grade readability level. Instruments have been developed to measure patient/significant other recall and comprehension of information provided. Instruments designed to collect data from medical records, and sociodemographic information from participants will provide data which may affect patient education and/or self-care abilities.

The anticipated outcome of data collection and analysis, based on review of pertinent literature and personal experience, is that recall and comprehension of educational materials will be greater in patients utilizing the Home Enteral Nutrition Self-Care Education tool with adjusted readability levels.

Results of this data could be utilized to assist FCNS's in assessing learning needs, in planning learner-individualized educational strategies, and in implementation, evaluation, and documentation of patient/significant other instruction.

Although patient/significant other education is

stressed in the literature, no framework has been designed to explain the dimensions of this service. The data from this study could give credence to the content and methods of education suggested in the literature, by establishing that patients/significant others are able to demonstrate the acquisition of knowledge by written tests.

As no information currently exists in the field concerning the readability of patient educational materials, study findings may increase professionals awareness of the importance of this aspect of teaching and learning, and encourage them to consider this factor when designing and selecting educational instruments.

Although standards of care for home nutritional support patients have been established, there is little empirical evidence to support recommendations. Study data could add information to substantiate proposed tenets.

Study Limitations

Expected and potential study limitations include the following:

1. patient education materials were designed for

1. Patient education materials were designed for a 651 bed northeastern university hospital. Although instruments reflect current concepts in Home Enteral Nutrition, they may not be consistent with the perceived instructional needs of patients/significant others in different settings.
2. This research project will not be implemented at this time.
3. The instruments have not been tested, and therefore, lack reliability and validity. Their components, however, reflect an overview of the literature and this author's twelve-year experience in Home Enteral Nutrition patient education.
4. Variables not identified by the researcher may affect study outcomes, including perceived self-efficacy, adaptation, locus of control, health beliefs, stress, and health status.
5. There are currently no standards regarding the readability of Home Enteral Nutrition patient education materials. Factors affecting reading ease, which are not measured in the study may negatively impact outcomes, i.e., unfamiliar terminology.
6. Patients/significant others who participate in

the study may differ from those who decline, which may influence assumptions concerning recall and comprehension of written educational materials.

7. Readability formulas may not measure all factors impacting the ease with which materials are read, however, their use is accepted in the literature.

8. The study does not control for reinforcement of educational intervention, which may occur from other sources, i.e., the physician.

9. Differences in the outcomes between current and proposed structured patient education may be more valuable or pertinent to nursing practice than project results.

Implications for Nursing Practice

Utilizing self-care (Orem, 1980), adult education (Knowles, 1973) and learning theories provides the FCNS with a nursing model rather than a medical model (Steiger and Lipson, 1985), on which to base the care of patients receiving Home Enteral Nutrition. As most acute-care clinical nurse specialists focus on illness, self-care theory (Orem, 1980) encourages them to refocus their attention on wellness, and the individual's abilities to care for him/herself. Its

view of man, the individual's interaction with the environment, and moulding of the environment, encourage the FCNS to consider social, emotional, and environmental factors which may impact ability to perform self-care behaviors. Self-care nursing processes are enacted to assist the patient in attaining the highest possible level of self-care and wellness. Assessment of the patient's self-care needs, demands, and deficits is a mutual process between the nurse, patient, and significant other. During this assessment, the FCNS applies knowledge concerning the adult learner, his/her self-directedness, problem-oriented focus toward learning, and need to continue social roles. The age of the learner, and presence of chronic illness are included, as the FCNS recognizes that cognitive skills decrease with age, as does sensory motor perception. In mutual design and planning of educational strategies, environmental factors are considered which may influence the ability to learn. The FCNS recognizes that older learners have a decreased ability to eliminate extraneous stimulus, and controls noise and confusion to facilitate learning. Increased length and complexity of educational information decrease ability to recall, for which the FCNS compensates by

providing learning sessions of thirty minutes to one hour, with a gradual progression from less complicated and threatening material to more complicated and more threatening information. Actual equipment, and demonstrations are employed in addition to verbal discussions and written material to enhance learning, by involving multiple senses. The individual's motivation to learn is increased through participation in all phases of the educational process. A collaborative effort is employed to establish goals and objectives of the teaching program, which are utilized to measure learning outcomes. Recognizing that learning does not occur immediately, but rather over a period of time, the FCNS plans for continued nursing follow-up at home to reinforce learning. The main objective of nursing is to increase the patient/significant other self-care (or dependent care) abilities. The educative-supportive nursing care system is continued until no actual or potential Home Enteral Nutrition self-care knowledge deficits exist. The goal of the patient/significant other is to perform self-care activities required for safe and effective Home Enteral Nutrition.

Polit and Hungler (1983) note the importance of selecting nursing research topics which relate to

meaningful problems in nursing practice, and which will benefit the greatest number of individuals. The increase in aged and chronically ill persons, who require complex therapeutic medical regimens in the home, present immediate problems for nursing. The literature notes a general lack of available patient education tools, and standards for patient education. Home Enteral Nutrition is a relatively new therapy, for which many nurses are not prepared. Data from this study could provide meaningful information, which would facilitate understanding of the patient/significant other learning needs, and assist the FCNS in planning patient education. The designed teaching booklet provides a structured method of providing patient education and evaluating outcomes. There is currently no literature available which documents the effect of Home Enteral Nutrition patient education on recall and comprehension. Post-tests could be employed by the FCNS to identify knowledge levels during the assessment phase, and to assess the need for further education during the immediate post intervention and one-month follow-up visit.

The medical record review and sociodemographic survey provide information valuable to the FCNS in

assessing self-care deficits and learning needs. The age, diagnosis, duration of illness, occupational status, and presence of a significant other may significantly affect the educational process. Characteristics of the significant other indicate age and time constraints related to employment, the presence of children in the home, and residential status. To accurately teach the patient/significant other, the FCNS must know the type of feeding tube, its location, and the enteral nutrition method. This data is restated in the patient education booklet.

The use of patient teaching/learning objectives holds the FCNS and learner accountable for educational content. It may be viewed as an informal contract between both parties. Frequently, nurses other than the FCNS provide patient education. This tool establishes what content and procedures have been taught, eliminating repetition and confusion. Polit and Hungler (1983) contend that professionalism is enhanced through increased accountability. Documenting patient education is a method of establishing the quality of nursing care. The literature expounds on the problem of lack of documentation of patient education and outcomes. The recording of successful methods of promoting

learning adds to existing information concerning patient education, and is necessary for the development of patient education standards for Home Enteral Nutrition and other therapeutic regimens. As documentation and accountability for patient education increase, a higher priority is assigned to this patient service (Woody, Ferguson, Robertson, Mixon, Blocker, and McDonald, 1984), which is equated with an increase in time allocated to patient education. "Nurses are in a key position to help clients prevent hospitalization and facilitate early discharge from acute care settings by providing clients with knowledge and skills needed to care for themselves" (Steiger and Lipson, 1985, p. 307). Documentation of education and its benefits also establishes how nursing is different from other professions, and denotes services which are specific to the profession.

The readability of patient education materials has recently been addressed in nursing literature. Assessment of available educational materials demonstrates that the majority of information is written above the level of learner comprehension. A confounding factor is the finding by several authors, that stated reading level is not a valid indicator of actual reading

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comprehension. Studies investigating patients' understanding of medical terminology demonstrate that a large percentage of persons do not understand terms which professionals perceive are well understood by the recipients of health care education. This level of understanding has been positively associated with the number of years of schooling completed. In assessing the patient/significant other learning needs, it is incumbent on the FCNS to identify factors which influence the readability of written information, including educational background, the level of reading ease of written materials, print size, the use of graphics, print contrast, the use of medical terminology, cognitive capacities, and visual abilities of the learner.

As noted, performance of self-care activities may be based on many factors. While the FCNS is concerned with all of these factors, assurance that the patient/significant other possess necessary knowledge and skills to perform self-care tasks is a paramount responsibility. Excessive use of home care nursing, physician office visits, emergency room visits, and hospitalization may occur secondary to inadequacies in patient/significant other education. Reports exist in

the literature confirming failure to perform self-care behaviors secondary to non-comprehension of health care information.

As noted previously, baccalaureate nursing programs frequently do not provide course content concerning patient education or enteral nutrition support. This educational background is provided at the graduate level, as well as information concerning comprehensive patient/significant other assessment, counselling, collaboration, and coordination of care. The FCNS is the professional most appropriately prepared for comprehensive nursing care of the Home Enteral Nutrition patient and significant other. In reality, however, many institutions do not have available clinical nurse specialists, which necessitate performance of noted activities by the primary nurse, who is typically diploma or baccalaureate prepared. This phenomenon has significant implications for nursing education.

Implications for Nursing Education

The major implication of study findings for nursing education, is that nurses prepared at the baccalaureate and graduate level must possess knowledge

concerning patient education and self-care to provide even the minimal standard of care for patients/significant others requiring home care therapies. The ability to appropriately assess educational needs, mutually design, plan, implement, and evaluate teaching/learning strategies assists the nurse in increasing patient/significant other recall and comprehension of information provided. Knowledge of the use of behavioral goals in planning educational strategies lends structure to the teaching process, and allows for meaningful assessment of the outcome of patient/significant other education.

Primary nursing care is very illness and acute care oriented; nurses frequently have no experience or little interest in home care nursing. Emphasis on this dimension of patient care is necessary during educational preparation for nursing, and on a continued basis during practice, through hospital inservice and continuing education programs. Nurses cannot teach what they do not know. As technology and trends in care change, so must the educational base of nurses. The trend toward a larger population of aged persons, with chronic illness, who require complex therapeutic regimens in the home presents a challenge to nurse

educators to update nursing knowledge concerning these aspects of patient care. It is essential that the nurse understand the biological processes involved, so that she may provide accurate information to the patient and significant other, and to assist in planning educational strategies and home care.

For patient/significant other education to take place, nurses must have good communication skills. Although taught at the graduate level, less emphasis is placed on this factor in undergraduate programs, as related to patient education. Continuing education programs designed for primary nursing and home care nurses which focus on this element of patient education may significantly impact the quality of patient care. A component of the communication process is the ability to negotiate with the patient and significant other concerning the educational process, desired outcomes, and follow-up. Effective negotiating abilities reduce the potential for patient/provider conflicts, attrition from the program, and non-adherence. An educational background concerning self-care adult education and learning theories, would provide the primary nurse and PCNS, with an understanding of the adult's need to be responsible and make decisions concerning his/her life.

The FCNS would also recognize that failure to treat the individual with respect or to include him/her in self-care decisions decreases self-worth and adherence.

Comprehensive assessment skills are possessed by the majority of graduate nurses, secondary to educational preparation, however, many undergraduate programs do not focus on this nursing skill. The nurse must be prepared to evaluate the educational, physical, and psychosocial needs of the patient and significant other. Knowledge concerning cognitive learning theories and biological theories prepare the nurse for assessment of learning ability and the potential impact of illnesses on the patient's acquisition of knowledge and skills required for self-care.

Study findings may affect nursing education institutions to the degree with which courses and content are selected based on research findings. Important study findings regarding factors which affect patient education and outcomes, as well as statistical information concerning Home Enteral Nutrition and its expansion, may significantly influence the inclusion of this content material in undergraduate and graduate nursing programs. Many negative concepts exist concerning in-hospital and home tube feedings related to

early methods, techniques, and patient outcomes. Research results which identify current practices, and their perceived benefit by the patient and professionals, aide in changing attitudes concerning the value of the therapy. As nurses gain more knowledge related to Home Enteral Nutrition, they may become more involved in the identification of patients who could benefit from the therapy. Improved attitudes toward long-term enteral nutrition support may stimulate a greater desire to participate in related patient education, and produce more beneficial patient care outcomes. Study findings and instruments may encourage changes in the design of current patient education methods. A decline in self-care knowledge and skills over time, as indicated by study results, may encourage an expansion of the educational process to incorporate a fifth phase of reinforcement, and re-evaluation. Essentially, research provides knowledge on which to base practice and education. This "knowledge is essential for making informed decisions about nursing care" (Polit and Hungler, 1983, p. 13).

To successfully incorporate Home Enteral Nutrition patient/significant other self-care education into standard nursing care, the nurse must possess an

understanding of the nursing process, educational process, and self-care processes, and the relationship of each other to the other. Although many acute care nurses successfully utilize the nursing process in providing direct care services, this format is not followed when patient/significant other education is the required service. Assessment of learning needs, mutual goal setting, evaluation of patient learning outcomes, and continued reinforcement are frequently not incorporated into the process. Informal and spontaneous teaching strategies are often employed, with no measurement of other variables. It is plausible that a lack of information concerning educational processes is the causative factor in this omission. Self-care nursing processes also mandate the inclusion of patient assessment, mutual design and planning, as well as evaluation of the process and outcomes, and continued follow-up. Emphasis on all three processes during formal nursing education would arm the nurse with the knowledge necessary to adequately plan, implement, and evaluate each process.

As noted previously, undergraduate and graduate nursing programs provide little clinical experience concerning patient education and Home Enteral Nutrition

support. Actual experience with both concepts would significantly influence the acute care nurse's and FCNS's ability to provide the most effective patient care and increase perceptions of capability to successfully teach patients concerning Home Enteral Nutrition self-care requirements. It is also possible that clinical specialty experiences could be included in employee orientation and periodically through staff education and inter-hospital efforts.

Recommendations for nursing education, based on expected study findings, would be emphasis on course content and clinical experience related to patient education, self-care, and Home Enteral Nutrition at the undergraduate and graduate level. It is also recommended that hospital and community nursing education coordinators provide this information, and related experiences to update nursing knowledge required for the provision of the highest level of patient care possible.

Implications for Future Nursing Research

There currently exists a paucity of nursing research concerning patient education in Home Enteral Nutrition. The need for patient/significant other education is emphasized, as are specific techniques

which must be mastered by the learner, however, no theory base is suggested, nor is a plan for assessment, design and planning, intervention, evaluation, or follow-up suggested. The impact of readability of written educational materials on the learner's recall and comprehension of information provided has not been addressed.

Few instruments exist which have suitable reading levels for patient education in Home Enteral Nutrition. There are also no available tools with which to measure patient/significant other recall and comprehension of educational information.

Based on these factors, it is recommended that this study and its instruments be used to answer the following research question related to Home Enteral Nutrition.

1. Does altering the readability level of written Home Enteral Nutrition teaching materials to the 5th grade or below level increase recall and comprehension?

Utilization of study instruments and methods would add to existing knowledge and increase awareness and information concerning unaddressed variables.

As there are currently so few studies concerning

patient/significant other education and outcomes related to self-care, several studies are possible which would lend to understanding of this process. It is possible that stress related to hospitalization, diagnosis, and the impact of a feeding tube on self-image, alter ability to participate in educational strategies and to recall and comprehend material. This may also affect the significant other's learning abilities. Although not addressed in Home Enteral Nutrition literature, research related to other forms of chronic therapy (i.e., Home Parenteral Nutrition) indicate that substantial differences exist between the patient and significant other's perceptions of needs and concerns related to the illness and therapy. These potential differences may impact willingness and ability to learn, therapeutic outcomes, and adherence to therapeutic regimen. Patient/significant other counseling could be employed as a strategy for improving learning abilities and therapeutic outcomes. The identification of psychological factors which impede learning could assist the FCNS in planning educational intervention, and for follow-up reinforcement after hospital discharge.

Depression and related affective experiences have

been noted in the first six months of other long-term therapies, i.e., home parenteral nutrition and peritoneal dialysis. The patient/significant other's psychological reaction to long-term therapy in Home Enteral Nutrition has not been identified. A study which focused on patient/significant other adaptation, and its relationship to educational interventions, adherence to therapeutic regimen, and the rate of complications, would aid the FCNS in understanding the impact of the therapy on the psychological status of the recipients, and provide knowledge which could avert failure to learn, and adhere, and possibly decrease potential complications.

It is possible that learning and performance of Home Enteral Nutrition self-care activities is related to perceived ability, or self-efficacy. Locus of control has been studied in many disease states to predict behavioral outcomes, as has the individual's perception of the risk of complications and cost-benefit ratio. Little is currently known concerning what factors motivate patients and significant others to adhere to therapeutic regimens in Home Enteral Nutrition. The varying rate of reported complications may be a reflection of not only researcher bias or

population variation; it may rather represent a difference in participant commitment to therapy related to perceived ability to perform complex procedures, or failure to view oneself as susceptible to adverse outcomes. In chronic illness, complications often occur in very adherent individuals secondary to the disease process itself. The changes in life-style required to continue the therapy as prescribed may not be viewed as necessary if the outcome remains less than expected. Knowledge concerning these variables could assist the FCNS in planning educational interventions and follow-up which could influence patient/significant other perceptions and therapeutic outcomes.

Lack of time for patient education has been noted in the literature as a barrier to this nursing service. A study which focuses on comparing the current unstructured method of patient/significant other education to the structured method presented in this project, could potentially increase the priority given to educational intervention by establishing that learning outcomes are greater and patient/significant other satisfaction is enhanced through the use of the proposed educational method. It is possible that this type of study may be perceived as more pertinent to the acute care or FCNS's

practice, and outcomes may be more influential in changing educational behaviors than the methods presented.

Previous studies indicate that the baccalaureate prepared nurse is not presented with nutritional information during formal education. A study which could add to the current literature, would be one in which nurses in acute care are actually tested to identify their level of knowledge related to basic nutrition, nutrition in disease states, nutritional assessment, artificial nutritional alternatives, and Home Enteral Nutrition. Study outcomes could be utilized to amend course content in educational institutions, and as a basis for planning continuing education programs and nursing in-service programs. A follow-up study, which could be valuable in motivating nurses to increase personal knowledge in the areas of nutritional support, could be one in which the knowledge level of the nurse was related to patient/significant other learning outcomes, including self-care abilities.

Previous research has not focused on patient/significant other satisfaction with educational intervention. A future study, which asks patients and

significant others what specifically makes them feel more satisfied with professional intervention, and what factors affect perceptions of quality of life, may be beneficial in increasing nursing knowledge concerning these variables, which could be reflected in the provision of services that enhance satisfaction and quality of life.

Previous studies in other fields have related patient satisfaction, and recall and comprehension, with interpersonal patient/provider relationships. A study which utilized observation and tape recordings of educational sessions, structured with varying communication strategies, could be compared to educational outcomes. The results of this type of study would increase the professional's awareness of methods which enhance or interfere with desired patient outcomes, and influence the use of more appropriate interactional styles.

A decline in knowledge over time has been documented in several studies of patient education outcomes. A study in Home Enteral Nutrition which identified the amount and intensity of educational intervention required to sustain desired knowledge-related outcomes, would increase the FCNS's knowledge

of this variable and assist in planning appropriate long-term intervention. The use of a control group with two or three intervention strategies, could be employed over a one year period of time. A study design which utilized a multi-institutional approach would be valuable in increasing patient numbers, and in establishing that outcomes were consistent in varied populations and settings. Data from this study would be of great importance to discharge planners, and nurses would provide home care, in establishing the need for, and degree of educational intervention required for maximum self-care agency. It could also identify the role of the FCNS in discharge planning and education in the home.

With the current focus on reimbursement related to patient diagnosis, allocation of resources may be based on the perceived benefit and necessity of FCNS services. A cost-benefit study in Home Enteral Nutrition could be conducted which collected data concerning the actual expenses of patient education and follow-up, including the cost of nursing time in teaching, planning, charting, and evaluating, the cost of materials for education, and the fees for in-home visits to sustain educational effects. This data could

be compared to the cost-savings related to decreased hospital days, decreased use of emergent services for problems, decreased complications, and decreased use of nursing services for tasks the patient or significant other are capable of performing. Social benefits could also be calculated by ability to enact family and community roles, and to maintain employment. Another related factor is the placement of persons receiving Home Enteral Nutrition. It is possible that high levels of patient education and follow-up are associated with a decreased rate of institutionalization in long-term care facilities, which would result in decreased therapeutic costs. Study data could be influential in establishing reimbursement for FCNS services and focusing administrative attention of the priority of patient education.

Although minimal standards have been established for the care of patients receiving Home Enteral Nutrition, little empirical data exists to support proposed standards. Specific to enteral nutrition techniques, studies which focused on the effectiveness of tube placement, dressing change, problem-solving, and feeding methods would provide substantiation of current practice. While current standards are based on the

learned opinions of experts, practical empirical findings would be much more influential in motivating other health care professionals to change their current practice methods.

The outcomes of this project have implications for nursing and other professions who interact with the patient and significant other participating in Home Enteral Nutrition, including physicians, social workers, counselors, physical and occupational therapists, dietitians, pharmacists, home care provider companies, and third party payment reimbursers. Continued research is necessary to establish factors which facilitate patient education and self-care abilities, while decreasing related complications. In view of the current status of Home Enteral Nutrition as reflected in the literature, and in this author's experience, the following research is suggested in the future:

1. Identify barriers to patient education in patients/significant others participating in Home Enteral Nutrition.
2. Determine the actual role of the significant other in patient education and self-care related to enteral nutrition in the home.

3. Identify factors which influence the significant other's willingness or desire to participate in Home Enteral Nutrition.
4. Determine the effect of increased readability of written Home Enteral Nutrition information on patient/significant other recall, comprehension, adherence, and complications.
5. Determine the degree to which learning needs are met through written educational materials.
6. Establish the degree of patient/significant other satisfaction with educational material and methods involved in Home Enteral Nutrition.
7. Determine the effects of age and chronic illness on recall and comprehension of Home Enteral Nutrition educational information, and performance of related self-care activities.
8. Establish the cost-effectiveness of patient/significant other educational intervention in Home Enteral Nutrition.
9. Determine the actual rate of complications related to Home Enteral Nutrition therapies, and causative factors.

10. Determine the frequency and intensity of intervention following discharge, which is necessary to sustain therapeutic outcomes.
11. Utilize a multi-institutional approach to studying patient education and outcomes to increase patient numbers, and establish consistency over populations and environments.
12. Determine the nutritional knowledge base of acute care and FCNS's providing services to Home Enteral Nutrition patients/significant others, and its impact on the learners' recall, comprehension, and educational outcomes.
13. Determine whether patient/significant other perceptions of the severity of illness, susceptibility to complications, locus of control, and self-efficacy are related to willingness to learn, acquisition of knowledge, and performance of self-care activities.
14. Determine the effect of structured versus unstructured patient/significant other education on learning outcomes in Home Enteral Nutrition.

15. Demonstrate the effectiveness of present Home Enteral Nutrition feeding techniques and method of caring for feeding tubes.
16. Identify the attitudes of nurses, physicians, and other health-care professionals toward Home Enteral Nutrition, which may impact the individual's access and maintenance of therapy.
17. Identify factors which promote satisfaction and quality of life in patients/significant others participating in Home Enteral Nutrition.
18. Identify psychosocial factors which may affect the patient/significant others' ability to learn, perform self-care activities, and adapt to the nutritional intervention.
19. Establish instruments which measure variables related to Home Enteral Nutrition patient/significant other education, including tools to assess recall, comprehension, satisfaction, adherence to therapeutic regimen, learning needs, and related complications.
20. Determination of persons who are at high risk

for malnutrition related to age and chronic illness, to assist in the early identification of persons who may benefit from Home Enteral Nutrition, and to avert malnutrition-related complications.

21. Identify patient versus significant other needs and concerns related to Home Enteral Nutrition self-care, to assist the FCNS in planning appropriate counseling and intervention for meeting the needs of each separately, and as a unit.
22. Identify specific self-care nursing systems which, when utilized by the FCNS, promote the highest possible level of Home Enteral Nutrition self-care behaviors by the patient/significant other.

Conceptual models are presented in Chapter II which delineate the relationships of self-care theory (Orem, 1980), and self-care education to the process of patient/significant other education in Home Enteral Nutrition, including recall and comprehension resulting from educational interventions.

The readability of educational materials has been presented as a major variable which affects both

processes and outcomes. There is no existing conceptual framework with a theory base in the literature. Studies of various components of Home Enteral Nutrition, based on self-care (Orem, 1980) adult education (Knowles, 1973) and learning theories would provide links between theory and practice, and enhance the FCNS's understanding of the logic behind the care of patients receiving Home Enteral Nutrition. As theories are applied to different patient groups and situations, it strengthens the theory by demonstrating its ability to be applied to a variety of circumstances and to successfully describe its relationship to nursing practice. Treece and Treece (1977) state that nursing research provides an informational basis for decision-making at all professional levels. The incorporation of theory into practice broadens the FCNS's understanding, and facilitates appropriate decision-making concerning patient care. Theory basis of practice encourages the FCNS to utilize appropriate nursing processes for assessment of the individual, environmental factors, significant other support, and learning abilities, and disabilities. Mutual design, planning, evaluation, and continued follow-up are supported by theory, and direct the FCNS toward

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assisting the patient/significant other to attain the highest level of wellness and self-care, and in the prevention of complications.

Summary

In conclusion, safe and effective care of the patient receiving Home Enteral Nutrition requires extensive nursing knowledge concerning self-care (Orem, 1980), adult education (Knowles, 1973), and learning theories, and biological and nutritional sciences. The comprehensive theory base and emphasis on clinical experience which are hallmarks of graduate level preparation, provide the FCNS with the knowledge and skills required to meet the complex acute and home care needs of patients/significant others receiving Home Enteral Nutrition. Completion of this study would provide valuable information concerning factors which enhance or interfere with patient/significant other education, which could be utilized by the FCNS and other health-care professionals to maximize the effectiveness of this therapeutic intervention. A summary of this project, its implications for nursing practice, education, and recommendations for future research have been presented in this chapter.

A P P E N D I X A

CONTACT LETTER

This study has been designed to find out what teaching booklets are most helpful to the patient and family. It is important that your needs for information are met. Learning information helps you take better care of yourself at home. It can also help you prevent problems. Being able to solve problems, if they do happen, can help you feel less worried. To provide the best teaching, it is necessary to know how well you remember and understand information. This study looks at what you have learned. It also points out your needs which were not met.

All information that you give in this study is confidential. Your name will not be used. No one else will be given any information about you.

If you decide that you do not want to continue in the study, you can stop at any time. This will not change the care you are getting from your doctor or nurses.

Your participation is very important. It can help you and other people who need tube feedings. The information from this study can help nurses plan better patient teaching.

Thank you very much for time and attention. If you would like to participate, please sign the attached consent form.

Sincerely,

Director, Medical Nutritional
Support Services

A P P E N D I X B

CONSENT FORM

CONSENT FORM

The study in which you are being asked to participate is designed to show what patient teaching methods best meet your learning needs. You will receive information about home tube feedings. You will be asked to study this material. After studying this information, you will be asked to take a test to see how much you remember and understand. You will also be asked to complete a questionnaire that asks questions about you, for example, age, education, etc. If you would like to take part in the study, please sign below. Before signing, please be sure you understand the following statements.

1. You are participating in this study of your own free will.
2. The study will take place at Strong Memorial Hospital.
3. The Human Rights Committee of the University of Rochester has approved this study.
4. There will be no costs to you, beyond your usual health care costs.
5. The study has been explained to you, and you understand what is involved.
6. Information you provide is confidential. Your name will not be used.
7. If you decide not to participate, at any point, your care will not be affected.

I, _____, have read and understand what is expected of me in this study, and I agree to participate in this study.

Date _____

Signed _____
(Patient or guardian)

A P P E N D I X C

INSTRUMENTS

SOCIODEMOGRAPHIC SURVEY

MEDICAL RECORD REVIEW

POST-TEST A AND B

I.D. # _____

SOCIODEMOGRAPHIC SURVEY

The following questions concern you and your way of life.
Please answer all questions as well as you can.

1. What is your age in years? (Write in) _____

2. Sex is: Male _____ Female _____ (Check one).

3. What is your marital state?

- _____ a. Married
- _____ b. Divorced
- _____ c. Separated
- _____ d. Widowed
- _____ e. Single, never married

4. Check the letter that shows your yearly family income.

- _____ a. Less than \$10,000 each year
- _____ b. \$10,000 to \$19,999 each year
- _____ c. \$20,000 to \$29,999 each year
- _____ d. \$30,000 to \$39,999 each year
- _____ e. \$40,000 to \$49,999 each year
- _____ f. \$50,000 to \$59,999 each year
- _____ g. over \$60,000 each year

5. What is your job? (Write in)

6. What was the last year of school you completed? (Check one)

- _____ a. 5th grade or less
- _____ b. 8th grade or less
- _____ c. 10th grade or less
- _____ d. Less than 12th grade
- _____ e. High School graduate
- _____ f. 1-2 years of college
- _____ g. 2-4 years of college
- _____ h. College graduate
- _____ i. Postgraduate study

7. Who lives in your home: (Check all that apply)

- _____ a. Spouse
- _____ b. Children
- _____ c. Parents
- _____ d. Other family members
- _____ e. Friends

-STOP HERE-

PATIENT NAME _____

I.D. # _____

SIGNIFICANT OTHER _____

NAME _____

I.D. # _____

AGE _____

MEDICAL RECORD REVIEW

1. Primary diagnosis (write in) _____.
2. Date diagnosed (write in) _____.
3. Type of feeding tube (write in) _____.
4. Reason for tube placement (write in) _____
_____.
5. Date tube placed (write in) _____.
6. Total enteral nutrition _____ Supplemental _____
(check one).
7. Significant other identified to assist in patient education
and self-care procedures (write in name) _____
_____.
8. Relationship to patient (write in) _____.
9. Age in years of significant other (write in) _____.

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POST-TEST A

Purpose: To see how well you remember tube feeding information.
To find areas where you may need more teaching.

Directions: The questions below are true or false. Please
put a check on the line to show whether you think
the statement is true or false.

1. Protein is an important nutrient in tube feedings. True _____ False _____
2. Tube feedings provide the same amount of nutrition as you would get from an oral diet. True _____ False _____
3. Flushing the tube with water helps prevent clogging. True _____ False _____
4. Germs are not a problem with tube feedings. True _____ False _____
5. Pills have to be dissolved in water before putting them through the tube. True _____ False _____
6. Good hand washing is important when you mix and give feedings. True _____ False _____
7. Feedings should only be given when the person is sitting up. True _____ False _____
8. Recording intake and output can help prevent problems. True _____ False _____
9. Feedings should only hang for 8 hours. True _____ False _____
10. If I have muscle twitches, I should tell the doctor the next time I go see him. True _____ False _____

POST-TEST B

Purpose: To see how well you understand tube feeding information.

Directions: Circle the number of the best answer for each question.

a. Mr. Jones has had a feeding tube for 2 months. He has not had any problems. Last night, he started having diarrhea. He has had 1800 cc's of liquid stool in 12 hours. His urine looks dark. What should he do?

1. Wait 12 more hours to see if it stops.
2. Call the doctor.
3. Give an extra 500 cc's of feeding.
4. I don't know.

b. Mrs. Smith forgot to get her feeding out early. It is cold. She should start her feeding now. What should she do?

1. Start the feeding cold.
2. Warm the feeding in the microwave.
3. Warm the feeding for 15 minutes in hot water.
4. I don't know.

c. Mrs. Smith takes medication. It goes in the feeding tube. Some are liquid. She crushes pills well. Medicines can clog the tube. Which step helps prevent this?

1. Flush the tube well with water after putting in medicines.
2. Mix medicine with 5 cc's of water.
3. Put medicine through the tube. Then, start the feeding.
4. I don't know.

d. Mrs. Smith felt well until yesterday. Her weight was 120 pounds for a month. Today, she weighs 125 pounds. It is hard for her to breathe. Her feet are puffy. She has gained 5 pounds in 3 days. She has less urine. What could her problem be?

1. She hasn't been getting enough exercise.
2. She may be getting too much feeding.
3. Her body is holding too much fluid.
4. I don't know.

-STOP HERE-

A P P E N D I X D

**HOME ENTERAL NUTRITION
PATIENT EDUCATION BOOKLET**

HOME ENTERAL NUTRITION



SELF-CARE TEACHING BOOKLET



WHERE TO FIND INFORMATION

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The Body and Nutrition	5
Ways to Take in Feeding.	6
Your Feeding Prescription.	7
Teaching and Learning Goals and Objectives	8
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YOUR TEACHING BOOKLET

This booklet was made to help you. It has information about your feeding tube and feedings. The nurse will help you learn the things you need to know. You will be able to use this booklet at home. Sometimes, it's hard to remember everything you have been told. You can use the book to refresh your memory. It can also help you solve problems.

The goal of this teaching booklet is to help you care for yourself at home.

YOUR BODY AND NUTRITION

Food is needed by the body. It helps you grow and stay well. Nutrition means the way your body uses food.

You need carbohydrates and protein. Fat is needed too. Carbohydrate gives you energy. It is your main source of calories. Cereal, breads, fruit, and vegetables have it.

Protein comes from meat and eggs. It is also in dairy foods. It is used to build muscles. Body organs need it to work right.

Fat gives you energy. It is in red meat. Dairy foods and cheese have it.

You may need more of each when you are sick.

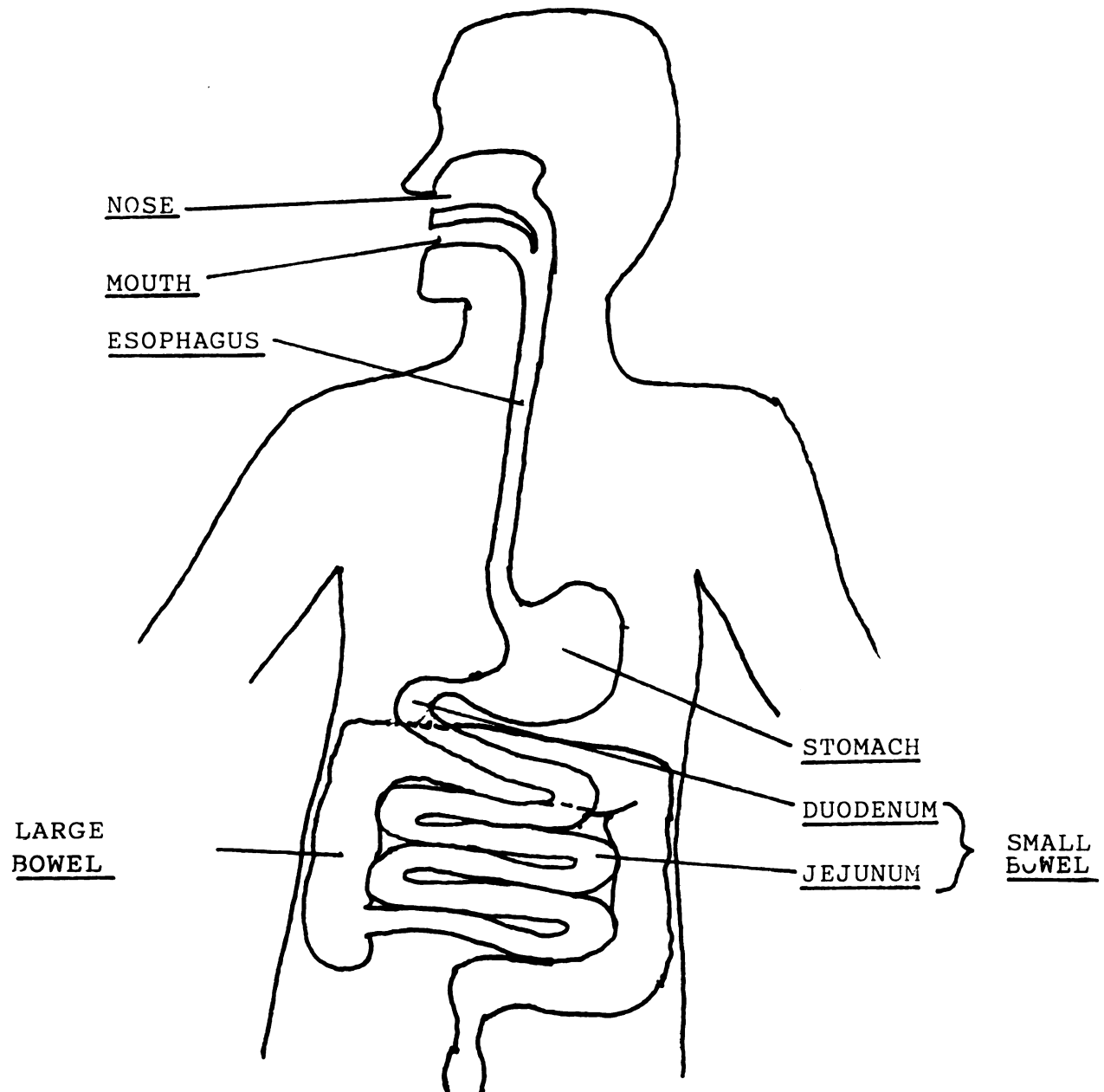
You get the food you need by eating. Illness may prevent this. Food can be taken in by other ways. Special tubes can be used. They can go through the nose. They stop in the stomach. Some stop in the small bowel. Others go through the outside of the body. They are the gastrostomy and the jejunostomy. Each way has good points. You and your doctor will choose which is best for you. Please look at the pictures on page 5 and 6. They show where your tube is.

On page 6, ways of taking feeding are shown. The nasogastric tube (number 2) goes through the nose. It ends in the stomach. The nasoduodenal tube (number 3) goes into the duodenum. That is the first part of the small bowel. It starts at the lower end of the stomach. The gastrostomy tube (number 4)

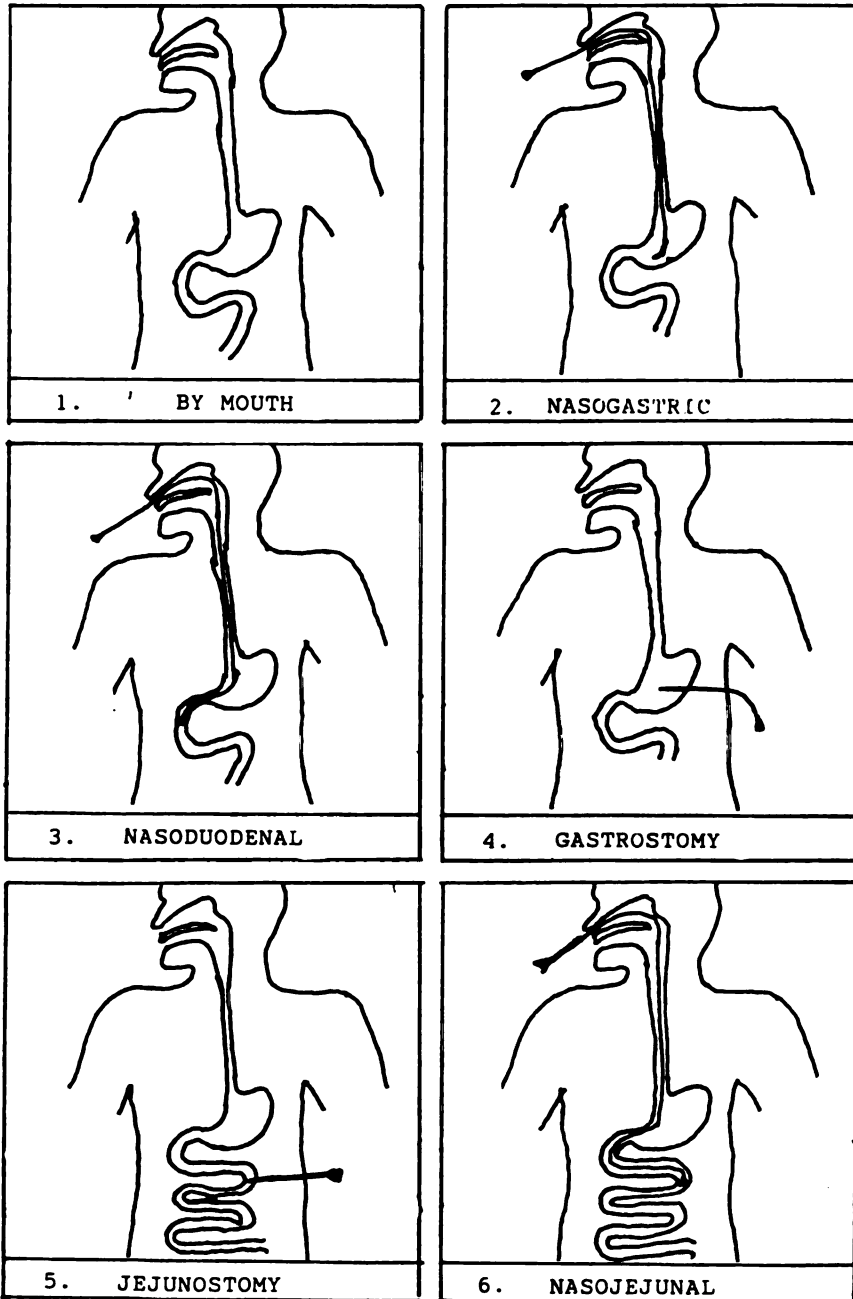
goes through the outside of the body. The end is in the stomach. The jejunostomy tube (number 5) goes through the outside of the body. It ends in the jejunum. This is the second part of the small bowel. It comes after the duodenum. Nasojejunal tubes (number 6) go through the nose. The end is in the jejunum.

You should know what kind of tube you have. Ask the doctor or nurse. You should know where the end of the tube is.

THE BODY AND NUTRITION



WAYS TO TAKE IN FEEDING



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YOUR TUBE FEEDING PRESCRIPTION

You have a _____ tube. The end of the tube
is in the _____. It's brand name is
_____. The tube size is _____.

The name of the feeding is _____.

You take a total of _____ cc's each day. The feeding
schedule is: _____

_____.

Feedings should be given at this rate: _____

_____.

For each feeding, use _____

feeding (and water). Flush the tube _____

with _____ cc's of water. You are getting a total of _____

cc's of water per day. This is in addition to your feeding. The

total amount of feeding and water each day is _____ cc's. A

total of _____ calories each day is provided by the feeding.

These are the only medications you should give through the tube:

_____.

Your doctor's name is _____.

His phone number is _____.

The company that sends your supplies is _____

_____.

Their phone number is _____. The person you should
ask for is _____.

TEACHING/LEARNING GOALS AND OBJECTIVES

Goals/Objectives	Date Taught	By Whom	Return Demonstration	Date Okayed	By Whom	Learner	one month check
1. Goal: To learn to prepare enteral feedings. a. Objectives: (1) Demonstrate proper hand washing. (2) Demonstrate proper mixing of feeding. (3) Demonstrate proper filling of the feeding bag. 2. Goal: To learn to infuse enteral feedings. a. Objectives: (1) Demonstrate proper technique for connecting feeding tubing to the feeding tube. (2) Demonstrate ability to regulate the rate of enteral feedings. (3) Demonstrate ability to disconnect feedings.							
3. Goal: To learn to care for the feeding tube. a. Objectives: (1) Demonstrate ability to flush tubing. (2) Demonstrate ability to check tube placement. (3) Demonstrate ability to change feeding tube dressings.							

4. Goal: To learn to give medications through the feeding tube. a. Objectives: (1) Demonstrate ability to crush medication. (2) Demonstrate proper dissolving of medication. (3) Demonstrate ability to give medication through the feeding tube. (5) Demonstrate proper flushing of the feeding tube after giving medication. 5. Goal: To learn to insert the nasogastric feeding tube. a. Objectives: (1) Demonstrate ability to measure proper tube insertion length. (2) Demonstrate proper patient position for tube insertion. (3) Demonstrate proper tube placement. (4) Demonstrate proper taping of the tube. (5) Demonstrate ability to check tube placement. 6. Goal: To learn to record enteral nutrition information. a. Objectives: (1) Show understanding of intake and output.					
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(2) Show understanding of signs, symptoms, and problems. (3) Demonstrate ability to record information. 7. Goal: To learn to recognize signs, symptoms, and problems, and to take appropriate action. a. Objectives: (1) Identify potential problems, signs, and symptoms. (2) State appropriate actions related to signs, symptoms, and problems. 8. Goal: To learn necessary information to provide safe and effective enteral nutrition a. Objectives: (1) Demonstrate knowledge related to enteral nutrition. (2) Demonstrate understanding of the purpose to skills taught. (3) Demonstrate knowledge concerning problem solving in enteral nutrition. (4) Demonstrate ability to formulate questions and get answers							
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GETTING THE FEEDING READY--CANNED

Purpose: To prevent growth of germs in the feeding and feeding tube.

To properly clean and store supplies.

1. Get the needed items:
Canned or bottled formula
feeding bag
measuring cup



2. Wash hands well.



3. Shake can or bottle well.

4. Wash top of can and measuring cup well. Use warm, soapy water. Rinse well with warm water. Dry with a clean towel.



5. Open can or bottle.

6. Pour _____ cc's into the measuring cup. Be sure to read the markings at eye level.



7. Roll tubing clamp all the way down. This shuts the feeding off.



8. Open the feeding bag top. Do not touch the inside of the bag.

9. Pour the feeding into the bag.



10. Close the top of the feeding bag.

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11. Hang the bag on the feeding pole.



12. Roll the roll clamp up a little. Just enough to let the feeding fill the tubing.



13. Squeeze the drip chamber on the tubing and let go. Repeat until it's half full of feeding.



14. Roll the clamp back down.

15. Hang the filled tubing over the pole. Be careful not to bump the end on anything.



Important:

- a. Cover unused portions. Label with the date and time. Put in the refrigerator.
- b. Opened feeding is only good for 24 hours. Throw it away after this.
- c. Feedings should only hang for 8 hours. Only put 8 hours worth of feeding in the bag at a time. Rinse the bag and tubing with warm tap water before adding more feeding.

Page 20

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GETTING THE FEEDING READY--POWDER

Purpose: To prevent growth of germs in the feeding and feeding tube.

To properly clean and store supplies.

1. Get the needed items:
powdered feeding packet or can
blender, mixer, or wire whip
feeding bag
measuring cup



2. Wash hands well.



3. Clean measuring cup and mixer
with warm water and soap.
Rinse well with warm water.
Dry with a clean towel.



4. Put _____ cc's of lukewarm
water into the measuring cup.
Read markings at eye level.

5. Pour the tap water into the
blender or mixing bowl.



6. Open _____ feeding packets.
Or, measure _____ scoops
of canned powder.



7. Slowly stir powder into the
water. Keep stirring until all
the powder is dissolved. (Don't
blend too fast. The feeding will
get frothy.)



8. Roll tubing clamp all the way down.
This shuts the feeding off.



9. Open the feeding bag top. Do not
touch the inside of the bag.



10. Pour the feeding into the bag.

11. Close the top of the feeding
bag.

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12. Hang the bag on the feeding pole.



13. Roll the roll clamp up a little. Just enough to let the feeding fill the tubing.



14. Squeeze the drip chamber on the tubing. Let go. Repeat until it's half full.



15. Roll the clamp down.

16. Hang the tubing over the pole.
Do not bump the end on anything.



Important:

- a. Put unused feeding in a clean pitcher. Cover the top. Label with the date and time. Put in the frig.
- b. Feeding is good for 24 hours after mixed. Throw it out after this.
- c. Feeding should only hang for 8 hours. Put 8 hours worth in the bag. Rinse the bag and tubing before adding more. Use warm tap water.
- d. Let cold feeding warm to room temperature. Get it out 30 minutes to 1 hour before feeding. Cold feeding can be warmed in hot water for 15 minutes.

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INSERTING THE NASOGASTRIC FEEDING TUBE

Purpose: To safely insert (put in) the feeding tube.

To check the feeding tube position.

To provide a way to feed.

1. Collect things you will need:
feeding tube
60 cc syringe
glass of water and straw
stethoscope
tape
water or K-y jelly



2. Wash hands well with soap and water.



3. Have person sit up in chair or bed.



4. Measure the amount of tube to insert. Hold tube by end to be inserted. Start from the tip of the nose. Measure to the tip of the earlobe. Now measure from the tip of the earlobe to the tip of the sternum. Mark with tape.



5. Wet the tube with water or K-y jelly. This makes the tube go down easier.



6. Put the tube in the nose. Gently push in.
7. Have the person swallow sips of water. (Ask the doctor if this is okay.) This helps the tube go into the stomach.



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8. Gently insert the tube to the mark.

Important: DO NOT FORCE THE TUBE
IF IT DOESN'T GO IN EASILY. IF
CHOKING STARTS, GENTLY REMOVE
TUBE.



9. Tape the tube in place on the nose or cheek.



10. Pull the syringe plunger to draw in air. Stop at 30 cc's.



11. Put the syringe tip into the feeding tube.



12. Place stethoscope in your ears.
Put the end over the stomach.
Hold in place.



13. Push the syringe plunger in.
Listen for a "gurgling" sound.
This usually means the tube is
in the stomach.

14. Keep the syringe connected to
the feeding tube. Remove
stethoscope from ears.



15. Gently pull back on the syringe
plunger. This draws stomach
fluid into the syringe. Return
fluids to the stomach by pushing
the plunger.



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CHECKING THE TUBE PLACEMENT

Purpose: To prevent getting feeding in the lungs.

To be sure the tube is in the best place for feeding.

1. Get supplies ready:
stethoscope
60 cc syringe



2. Have the person sit up.



3. Wash hands well.



4. Remove the cap from the tip of the syringe.



5. Hold the syringe with one hand. Hold the end of the plunger with the other hand. Pull the plunger out slowly. Stop when the black rubber is at the 30 cc mark.



6. Take the plug out of the end of the feeding tube.



7. Put the syringe tip into the end of the feeding tube.



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8. Place the stethoscope in your ears. Put the end of it over the stomach. Hold in place.
9. Push the syringe plunger in. Listen for a "gurgling" sound. This usually means the tube is in the stomach. (This only works for tubes in the stomach.)
10. Keep the syringe connected to the feeding tube. Take the stethoscope out of your ears.
11. Gently pull back on the syringe plunger. This draws stomach fluid into the syringe. Return fluids to the stomach by pushing the plunger.



12. Take the syringe tip out of the feeding tube.



13. Begin feeding or give medicine.



Important:

- a. Vomiting or hard coughing can make tubes slip out of place.
- b. Stomach fluids do not always come into the syringe. They won't if the stomach is empty. They also may not in duodenal and jejunal tubes.

GIVING THE FEEDING BY GRAVITY

Purpose: To make sure feeding is given at the right rate.
To make sure the tube doesn't clog.
To avoid problems related to the feeding rate.

1. Get the items needed:
prepared feeding and bag
stethoscope
60 cc syringe
feeding pole
water



2. Wash hands well.



3. Check tube placement.
Use the steps on page 24



4. Hang the filled feeding bag and tubing on the pole.



5. Be sure the person is sitting up.



6. Remove the cap from the end of the feeding tubing.



7.

8.

9.

7. Take the plug out of the end of the tube.



8. Put the end of the feeding tubing into the end of the feeding tube. Push and turn to make it stay in place.



9. Roll the roll clamp on the tubing up. This lets the feeding go in.



10. Count the drops as they go from the bag into the drip chamber. Move the roll clamp up or down a little. Stop when you count _____ drops each minute.



11. Keep the feeding at this rate for _____.



12. When the feeding is done, roll the roll clamp all the way down. This shuts off the feeding.



13. Pinch the feeding tube with your fingers. Take the tubing end out of the feeding tube.



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14. Flush with _____ cc's of water. Use steps on page 40.



15. Put the plug in the end of the feeding tube.



16. Wash the feeding bag and tubing. Use warm soapy water. Rinse well with warm water. Hang it up to air dry.



Important:

- a. Have the person sit up for at least 1/2 hour after the feeding. This helps prevent feeding from coming up. Laying down may make it go up into the esophagus.

GIVING THE FEEDING BY PUMP

Purpose: To give the right amount of feeding.
To give the feeding at the right rate.
To prevent problems related to the feeding rate.
To prevent feeding tube clogging.



1. Get the needed items:
 - pump
 - pole
 - filled bag and feeding tubing
 - stethoscope
 - 60 cc syringe
 - water



2. Wash hands well.



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3. Hang the filled bag and tubing on the pole.



4. Have the person sit up.



5. Slip the tubing drip chamber into place on the pump.



6. Wrap the tubing around the pump rollers. Pull a little. The tubing is stretchy.



7. Slip the little disc into the hole next to the drip chamber.



8. Now loop the tubing over the tubing guide.



9. Roll the roll clamp all the way up. This lets the feeding go in.



10. Check the tube placement.
Use the steps on page 24.



11. Take the cap off the end of the feeding tubing. Put the end into the feeding tube. Push and turn a little. This helps the tubings stay together.



12. Set the pump rate at cc's per hour. Push the buttons above the rate numbers to make them go up. Push the buttons below the numbers to make them go down.



12.

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13. Push the start button.



14. Stay at this rate for _____ . Give
a total of _____ cc's
of feeding.



15. Shut off the pump. Take
the feeding tubing end
out of the tube.



16. Flush the tube with _____ cc's
of water. Use the steps on
page 40.



17. Put the plug in the feeding tube.



18. Take the tubing off the pump. Wash the bag and tubing. Use warm soapy water. Rinse well with warm water. Hang up to air dry.



19. Wipe feeding spills off the pump. Use a damp cloth. Only use water to clean the pump.

20. Pump alarms:

- a. Occlusion means something has stopped the feeding. Check to see if the tubing is kinked. Then, push the start button again.
- b. Low battery happens if the pump is unplugged for too long. Leave it plugged in most of the time.
- c. Do not use the pump near water if it is plugged in.

FLUSHING THE FEEDING TUBE

Purpose: To prevent tube clogging.
To give extra water that may be needed.

1. Get things you will need:
tap water
60 cc syringe



2. Wash hands well.



3. Remove the cap from the syringe tip.



4. Hold syringe with one hand.
Hold the end of the plunger
with the other hand.

5. Put the syringe tip in the water. Pull the plunger out slowly. Stop when the black rubber is on the _____ cc mark.



6. Remove the feeding tube plug.



7. Put the syringe tip into the end of the feeding tube.



8. Gently push the syringe plunger in.

9. When all of the water is in, stop.



10. Pinch off the feeding tube with your fingers. (This helps keep feeding from coming back into the tube.)



11. Take the syringe tip out of the tube end.



12. Put the feeding tube plug back in. Stop pinching the feeding tube.



13. You should flush your tube _____ times a day. Use _____ cc's of water each time.



GIVING MEDICATIONS THROUGH THE FEEDING TUBE

Purpose: To prevent tube clogging.
To provide a way to give medicines.

1. Get the things needed:
 - medicine
 - 2 spoons
 - water
 - measuring cup
 - 60 cc syringe
 - medicine cup (for liquid)



2. Wash hands well.



3. Put 30 cc's (or _____ cc's) of warm tap water in the measuring cup. Read the markings at eye level.



4. Crush pills between 2 spoons. Be careful not to spill powder. If capsules, twist to open.



5. Dump powder into water.
Stir until dissolved.



6. Remove cap from the end of the syringe.



7. Put syringe tip in the dissolved pills and water. Pull back on the plunger slowly. Stop when all the mixture is in the syringe.



8. Turn the syringe so the tip is straight up. Slowly push the plunger in. Stop when the air is out of the syringe.



9. Put 30 cc's (or _____ cc's) more of warm water in the measuring cup.

10. Take the plug out of the end of the feeding tube.



11. Put the tip of the syringe into the end of the feeding tube.

12. Gently push on the plunger. Stop when the syringe is empty.



13. Take the syringe tip out of the tube.

14. Draw up the second 30 cc's (or _____ cc's) of water. Follow step 7.



15. Connect the syringe to the feeding tube. Flush with water. (As in step 11 and 12.)



16. Pinch the feeding tube with your fingers. Take the syringe tip out of the tube. (Medicine can come back into the lower end of the tube. This step prevents that.)



17. Put the feeding tube plug back in.

18. Take the plunger out of the syringe. Wash both parts with warm soapy water. Rinse well with warm water. Air dry.



19. Some medicine is liquid. If it is, pour cc's into the medicine cup. Read markings at eye level. Then follow steps 7 through 18.



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Important:

- a. Ask the doctor about non-prescription medicines. Some should not be crushed. Others should not be given through feeding tubes.
- b. Hard coated pills should not be given through the feeding tube. They do not crush well.
- c. Under the tongue pills should not be given through the feeding tube.
- d. Always check tube placement before giving medicine.



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TAPING THE NASOGASTRIC TUBE

Purpose: To prevent the tube from slipping out of place.

To prevent irritation to the nose from the tube.

1. Get the items you will need:
cotton Q-tips
1/2 inch tape
scissors
K-y jelly
warm water
alcohol pads



2. Wash your hands well.



3. Dip the Q-tip in water or K-y jelly. Gently clean the inside edges of the nose. Use a new Q-tip for each side. Be careful not to pull on the tube.



4. Cut a 3 inch piece of tape. Also cut a 2 inch and a 1 inch piece.

5. Cut the 3 inch tape in half, the long way. Stop at the middle.

6. Hold the tube near the nose with one hand. Gently unwind the tape from the tube.



7. Keep holding the tube. Take the tape off the nose.



8. Wipe the nose off with the alcohol pad. Let it dry.



9. Put the uncut end of the 3 inch tape on the nose.



10. Wrap one side of the cut end clockwise around the tube. Wrap the other end counter-clockwise. Be careful not to kink the tube.

11. Put the two inch piece of tape over the bridge of the nose.



12. Now put the 1 inch piece of tape over the tube on the cheek. This helps it stay in place. Be careful not to pull the tube tight. This could hurt the side of the nose.



13. Clean the nose every day.
This helps prevent irritation.
14. Change the tape every 2 days.
It may need to be done more
often.

Important:

- a. It is important to take good
care of your mouth. Brush
your teeth 2 times each day.
a mouthwash will help freshen
your mouth.

CHANGING THE GASTROSTOMY DRESSING

Purpose: To prevent irritation around the tube.

To prevent infection around the tube.

1. Get needed items:
 - two small clean bowls
 - water
 - hydrogen peroxide
 - 4 inch square gauze pads
 - clean scissors
 - 1 inch tape
 - 1/2 inch tape



2. Wash hands well.



3. Take the old dressing off. Carefully loosen tape. Slip dressing off. Be careful not to pull on the tube.



4. Wash hands again.



5.

6.

7.

5. Pour a little hydrogen peroxide in a bowl. Put the same amount of water in the bowl.



6. Put warm tap water in the other bowl.



7. Dip a gauze pad in the peroxide and water bowl. Squeeze it out a little.



8. Hold the tube with one hand. Gently wash around the tube with the other. Start washing next to the tube. Then go outward.
9. Repeat steps 7 and 8 with a new gauze pad.



10. Dip a gauze pad in the water bowl. Squeeze it out a little.



11. Repeat step 8.
12. Blot dry with a clean gauze pad.
13. Look at the skin around the tube. Note any redness, or drainage.

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14. Cut a new gauze pad in the center of one side. Stop when you get to the middle of the pad.



15. Slip the gauze pad around the tube.



16. Cut 4 pieces of 1 inch tape. Each should be about 6 inches long.



17. Tape all four edges of the gauze. Be sure enough tape is on the skin to hold it on.

18. Change the dressing every day or _____.



CHANGING THE JEJUNOSTOMY DRESSING

Purpose: To prevent irritation around the tube.

To prevent infection around the tube.

1. Get needed items:
two small clean bowls
water
hydrogen peroxide
4 inch square gauze pads
clean scissors
1 inch tape
1/2 inch tape



2. Wash hands well.



3. Take the old dressing off. Carefully loosen tape. Slip dressing off. Be careful not to pull on the tube.



4. Wash hands again.



POSSIBLE PROBLEMS AND WHAT DO DO

1. Diarrhea is liquid stools. There may be a little or a lot. You go more often. Many things can cause it. Running feeding too fast can. Feedings may need to be changed. Problems can occur with a type of feeding. Germs in the feeding can cause it. Always wash hands well. Medicines can cause it. Just take what the doctor prescribes. Not mixing the feedings right can cause it. Read orders and mix carefully. Liquid stools can change blood tests. If you have it, call the doctor.

2. Vomiting can be very serious. Feeding can get sucked into the lung. This can cause pneumonia. Running the feeding too fast can cause nausea. This can cause vomiting. Always check the tube placement. The tube can slip into the esophagus. This is the tube between the mouth and stomach. Feeding may come back up. Draw back stomach fluids. Look at the amount. It shouldn't be more than 50-100 cc's. Call the doctor if there is more. If you vomit, call him. Also if you choke on feeding. Too much fluid in the stomach can cause vomiting. Vomiting can change blood tests.

3. Constipation is hard stools. You don't go as often. You may feel full. Your stomach may be upset. Not getting enough water can cause this. So can some feedings. Medicines can too. Lack of exercise can. Give the right amount of feeding and flushes. Exercise as you are able. If this occurs, call the doctor.

4. Dehydration means not enough fluid. You may feel thirsty. Your mouth may be dry. You may feel weak. Weight loss is a sign. So is less urine. Urine may look dark. It may smell strong. Vomiting can cause this. Liquid stools can too. Not taking enough feeding or water can too. Some medicine can cause it. Water pills can. If this happens, call the doctor. Measure feedings and water. Give what is ordered. Write down your intake and output. This helps you see a problem.

5. Overhydration means too much body fluid. This does not happen very often. It can be caused by illness. Signs are weight gain. Also puffy feet or hands. Shortness of breath can occur. It can happen because people forget to take medicines. Heart pills and water pills are examples. It is important to take medicines as ordered. Careful measuring of fluids is important. If you have too much fluid, call the doctor.

6. Tube clogging means that nothing will go in or out of the tube. Feeding can clog the tube. So can medicine. Always dissolve pills well. Flushing the tube helps clean it. It also helps prevent clogging. Use liquid medicine if you can. Never force fluid in. Don't put anything in the tube to unclog it. Call your doctor.

7. Tube slipping out of place or falling out. This can happen if the tube is not taped in place. Tubes can catch on things and pull out. Vomiting can make the tube slip out. So can coughing

hard. Always check the tube placement. Change dressings and tape as ordered. Put a black mark on the tube. Check th mark. Call the doctor if it slips. Also if it falls out.

8. Laboratory tests. Blood test results may change. Sodium, potassium, and others may be checked. Liquid stool is often the cause of changes. So is vomiting. Not enough fluid can cause this. So can medications. If you feel muscle cramps or twitches, call the doctor. Call if you feel very weak. Call if it feels like your heart is pounding.

INTAKE AND OUTPUT

Purpose: To record fluids taken in.
To record fluids going out of the body.
To keep a good balance between intake and output.
To identify problems with fluids.

The hospital measures liquids as cc's or ml's. Many feedings are also measured by ml's. A cc is a cubic centimeter. A ml is a milliliter. ml's and cc's are the same. You can figure the ml's or cc's. This chart will help. Use it when you mix feedings. And, use it to figure intake and output.

Regular measure	/	cc's or ml's
1 teaspoon	=	4 cc's
1 tablespoon	=	15 cc's
1 ounce	=	30 cc's
1/2 cup = 4 ounces	=	120 cc's
1 cup = 8 ounces	=	240 cc's
1 pint = 2 cups = 16 ounces	=	480 cc's
1 quart = 4 cups = 32 ounces	=	960 cc's
1 liter	=	1000 cc's

Intake is all the liquid you take in. This may be feeding and water through the tube. And, it can be liquid things you take by mouth.

Output is urine. Liquid stool is also output. If you throw up, measure the amount. Any liquid that comes out of the body is output.

It is important to have a good balance between intake and output. Writing down the amounts helps you identify problems.

Here is an example:

oral fluid = 8 ounces water (times 30cc per ounce) =	240cc's
feeding = 5 cans with 240cc's each =	1200cc's
flushes = 4 times with 100 cc's each =	<u>400cc's</u>

Total intake = 1840cc's

urine output = 1460 cc's =

Total output = 1460cc's

Some fluid is used by the body. It is lost through breathing and sweating. The example used would be a good fluid balance.

Large amounts of liquid stool can make output too high. So can vomiting. It is important to measure both.

Urine output should be about 900 to 1200 cc's each day. Too much other output can make it less. Urine may look darker than usual. Not taking in enough fluid can also make urine output low. This can be serious. Call the doctor if your urine output is low. He needs to know if you have diarrhea. Also report vomiting.

Take your records with you to the doctor. This helps him see your progress. Any problems may also be caught early.

DAILY DIARY

Purpose: To record your progress over time.
To record problems.
To provide information to the doctor.

Date							
Weight							
Oral Intake							
Feeding Intake							
Tube Flush							
Urine							
Liquid Stool							
Other							
Urine Test							

Signs:							
-nausea							
-vomiting							
-diarrhea							
-constipation							
-fullness							
-aspiration							
-muscle cramps							
-muscle twitches							
-short of breath							
-dark urine							
-tiredness							
-weakness							
-other							

Problems:							
-tube . clogged							
-tube came out							
-pump won't work							
-more than 50 cc's from stomach							
-other							
Call/visit to the doctor							
Visit to the E.R. for pro- blem							
Hospitalized for problem							

IMPORTANT POINTS

Purpose: To point out things which are very important.
To help prevent problems.
To make the feedings as safe as possible.
To help you get the most benefit from the feedings.

1. No question is silly. Ask about things you don't understand. If something worries you, ask about it.
2. Always wash hands well. This is one of the best ways to prevent problems. It keeps germs from getting into the feeding and the tube.
3. Always sit up during the feeding. Stay sitting for at least half hour after the feeding. This helps prevent feeding from coming up, and choking.
4. Always check the tube placement before feeding. It is also important to check it before giving medicines. Coughing or vomiting can make the tube slip out of place. It can also slip out of place if the tape isn't on tight enough.
5. Never force a tube in. If it doesn't go in well, take it back out. Then try again.
6. Sometimes choking starts when the nasal tube is being put in. This means the tube is not in the right place. Take it out. Then try again.
7. Always report drainage around the tube. Let the doctor know if the skin is reddened or sore.
8. Keeping records is important. It helps you see how well you're doing. It also helps the doctor see how you're doing. Problems can often be caught early.
9. Do not warm feeding in the microwave. It may affect the nutrients. If you forget to get it out, let it sit in warm water for 15-30 minutes. Then start the feeding.

QUESTIONS TO ASK THE DOCTOR

Purpose: To help you think of things to ask the doctor.

To help you get your questions answered.

These are examples of questions you may have. Many other people have had the same questions. Having questions answered is important. It helps you take care of yourself. Try to think of questions before you go to the doctor. Writing them down often helps. Many people can't remember all of their questions. Writing them down avoids this problem. Here are some questions you may have:

1. How much should I weigh?
2. How much should I gain each week?
3. How much exercise should I get?
4. Can I have sips of water? How much?
5. Can I chew gum or hard candy?
6. When can I go out of town?
7. Are my blood tests good (better)?
8. If my pump stops working at night, what should I do?
9. If my tube comes out, what should I do?
10. If my tube gets clogged, what should I do?
11. How much urine should I have each day?
12. Dr. _____ changed my medicines. Can the new ones be put through the tube?
13. Do my pills come in a liquid form?
14. When should I have my feeding tube changed?
15. How much liquid stool is "too much"?
16. How much vomiting is "too much"?

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