THE DEVELOPMENT OF AN INSTRUCTIONAL PROGRAM FOR TEACHING DIABETIC FOOTCARE

by

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TABLE OF CONTENTS

CHAPTER		Page
I.	INTRODUCTION	1
	Statement of the Problem	1
	Review of Literature	4
	Patient Education and Disease Management	4
	Problems in Patient Education	4
	The Use of Planned Education Programs to Promote Disease Management	13
	Instructional Content--Diabetic Footcare	17
	Physiological Component	18
	Treatment Component	24
	Purpose of the Study	32
II.	METHODOLOGY	33
	Unit Development Theory	33
	Unit Development Procedure	39
	Purpose	39
	Identifying the Learner	39
	Identifying Objectives	40
	Developing the Content	41
	Selecting Teaching/Learning Activities and Resources	41
	Developmental Testing and Evaluation	42
III.	THE PROGRAM: FOOTCARE IN DIABETES	44
	The Script and Workbook	44
	The Script	44
	The Workbook	59
IV.	TESTING THE PROGRAM	62
V.	SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	72
	Summary	72
	Conclusions	73
	Recommendations	74
	REFERENCES	76
	APPENDICES	83
	A. Pretest and Posttest	84
	B. Research Study Participation Agreement	92
	C. General Information Questionnaire	94

LIST OF TABLES

TABLE		Page
1.	Cognitive and Affective Behaviors Changed Through Patient Education.	14
2.	Summary of Pretest and Posttest Scores, Gain Scores in Percent, and Client Information.	64
3.	Percent of Responses on Pretest and Posttest Considered Correct, Incorrect, and Omitted.	66
4.	Responses to Two Posttest Items, Percent Responding and Percent Making All Appropriate Selections for Each Item.	66
5.	A Correlation Matrix Among Six Variables	69

CHAPTER I

INTRODUCTION

Statement of the Problem

Education of the diabetic patient is a continuing goal of the health care team in assisting the individual toward independence and responsibility for the management of his own care. The degree to which independence and responsibility are achieved, is measured by the patient's ability to accurately follow the prescribed instructions of his physician and make adjustments in diet and medications as may be needed in daily living. Also important is the patient's ability to recognize early signs and symptoms of disease complications as well as the specific action to be taken. Crucial to the achievement of this independence however, is the continuity, consistency, and quality of instruction received.

The nurse, as a member of the health care team, has an important role in the instructional process. Because of her close contact with patients and their families, it becomes the function of the nurse practitioner to assist the patient to understand the importance of the principles and practices of care (Pohl, 1973). It likewise becomes the responsibility of the nurse, to assist the

patient in the process of applying these principles to daily disease management. It is the practitioner of nursing who is expected to assess educational needs, design and implement programs of instruction to meet these needs, and evaluate the instructional process and product for its efficiency and effectiveness in meeting learning needs. In general, however, the literature has shown the nurse practitioner, as well as other health professionals, has not fulfilled this specialized role (Etzwiler, 1967). In general, studies have shown that the patient has not received adequate instruction, and this lack is reflected in poor disease management (Martin & Smith, 1969; Watkins, 1966). If the instructional needs of diabetics are not being met in the health delivery system, then provisions for different approaches to organized and structured diabetic educational programs may be necessary.

The increasing need for more effective diabetic instruction is revealed in the growing prevelance, longevity, and complications of clinical diabetes. The number of diagnosed diabetics nearly doubled between 1950 and 1965, and current statistics of the United States Public Health Service estimate that there are 4.4 million diabetics today (Lily Research Laboratories, 1973). Not only are more diabetics being diagnosed today, but statistics report an increased longevity on the part of the diabetic patient. The life span of the juvenile diabetic has increased from a maximum of two

years beyond diagnosis in the preinsulin era, to the current life expectancy of 28.7 years after onset of diabetes (Marble, 1973). The increased life span of the diabetic has brought into focus complications of diabetic retinopathy, neuropathy, nephropathy, and vascular disease.

The need for organization in diabetic education is evidenced further by the varying aspects of the disease itself and the necessity of focusing on smaller units of instruction. One such aspect of the disease is the incidence of diabetic foot problems, since it is in the foot of the diabetic where the two complications, neuropathy and vascular disease, culminate and are so clearly seen. A review of diabetics admitted to New England Deaconess Hospital by Joslin Clinic, revealed that of the 1981 cases admitted during a 12 month period, 442 were for lesions of the foot (Pratt, 1965). Similarly, in a review of the records of 541 diabetics seen within a nine month period, Whitehouse (1964) found that 89 or 16.5 percent of these patients had a primary problem involving the foot or the leg. It is further reported that a sizable percentage of these patients were over sixty years of age. Likewise, in the metabolic clinic at the University of Oregon Medical School, records of weekly visits are kept. Of the 358 visits made to the clinic during an eighteen week period, 113 visits, or 31.6 percent of the total visits made, utilized the services of the podiatrist. Although this latter figure

only represents utilization of services, it implies that prevention of foot problems represents an educational need at the study hospital.

Foot problems in the diabetic, often disabling, may lead to time lost from work, suffering, hospitalization, and great expense to both the patient and community. It is in the prevention, early detection and treatment of these complex foot problems that the education of the patient himself becomes one of the important facets of care.

A review of the literature follows, which explores patient education as a means of promoting disease management and the instructional content necessary for a module aimed at the development of safe and consistent footcare practices.

Review of Literature

Patient Education and Disease Management

The Presidential Task Force on Patient Education has accepted the concept "that the individual has the right to know the nature of his illness as well as what medical and community resources are available to him" (Task Force, 1974). Information is not only a right but a necessity if the diabetic is to assume responsibility for his own disease management. Studies have shown, however, that the patient in general, has not received the information necessary

and that this is reflected in poor disease management (Martin & Smith, 1969; Trayser, 1973; Watkins, 1966; Hanley, 1970). A study of 60 diabetic patients documented that only four patients demonstrated acceptable practices in insulin dosage, urine testing, meal content and spacing, and footcare (Watkins, 1966). An additional study by Martin and Smith (1969), re-emphasized the knowledge-management relationship. Twenty-six maturity onset diabetics of ten years duration were studied, relating knowledge of footcare to practice. Eight of the patients, those receiving the lowest scores on an observation tool and questionnaire, reported never having received footcare instructions. It was determined that half the patients did not know why footcare was important and all were poorly informed regarding knowledge as to the specifics of management. Hanley (1970) and Trayser (1973), prior to the development of diabetic teaching programs, likewise acknowledged superficial understanding of diabetes on the part of the patient.

Problems in Patient Education

If indeed, patients are not receiving the information and instructions necessary, or exhibit non-compliant behavior following information giving sessions, there is a need to identify the problems existing in our approaches to patient education.

1. Structure. --The Task Force (1974) reported that a search of the literature on hospital-based education programs from 1950 to 1967, documented that organized education programs are an exception, rather than the rule. In most of this same literature, evaluation of the programs was expressed in subjective observation by the staff. If patient education programs lack structure and objective evaluation, then the validity and effectiveness of these programs may be questioned.

2. Insufficient number of adequately trained personnel. --A second weakness in patient education is derived from literature questioning the ability of differing health team members to instruct the diabetic in the various facets of disease management. The ability of the nurse to perform this function is questioned by Burke (1971), researched by Etzwiler (1967), and critiqued by diabetics themselves (Diabetics Speak Out, 1973). In an extensive study of senior nursing students, dieticians, and physicians, an extreme lack of basic understanding in etiology, control and management of diabetes on the part of health professionals was revealed (Etzwiler, 1967). In a round-table discussion with seven diabetics (Diabetics Speak Out, 1973), actual problems confronted in the day to day living with diabetes were presented. The group reported that nurses were unable to adequately answer patient needs, especially when hospitalized for conditions other than diabetes.

In spite of this information, Reader (1974) and Rosenberg (1971a) believe that the nurse and other health team members, could be more successful in patient education than the physician. Rosenberg (1971a) found that the doctor-patient relationship is no longer as close as it once was. Increasingly, the hospital and physician have come to rely on allied health personnel or the health team to provide patient information and education. Not only are these health team members expected to educate patients, but Reader (1974) reported studies at the New York Hospital that demonstrated that a nurse or dietician is more successful in imparting information to the patient about the management of his diabetes and control of diet than the physician. In this study, the nurse was perceived as being a less threatening authority figure, thus enhancing communication.

Regardless of the communication skills heralded by Reader (1974) and Rosenberg (1971a), it seems apparent that an effective and efficient patient educator must also possess knowledge. The general nurse practitioner, as revealed by Etzwiler (1967) and acknowledged by diabetics themselves (Diabetics Speak Out, 1973), does not possess suficiient knowledge of diabetes to plan, implement and evaluate patient care and education programs. It seems evident that an organized teaching program, utilizing the services of a nurse

specially trained in diabetes, would be a more efficient and effective patient education program.

3. Unresolved barriers to communication. --Unresolved barriers resulting in ineffective communication have likewise been a major problem in diabetic education. "Unresolved barriers" and "ineffective communication" are defined as "all those factors preventing the individual from interpreting and integrating imparted information in such a manner as to bring about attitudinal and/or behavior change" (Rosenberg, 1971a). "All those factors preventing. . . " may be further divided into the following categories: language, individual learning differences and specific information.

a. Language barriers - Language barriers to effective communication may be thought to be the most obvious and easy to identify, but they are nevertheless often overlooked. Thrush and Lanese (1962) analyzed the readability levels of printed diabetic educational materials. Samples of literature used in 21 hospitals across the United States revealed the reading level of the literature to be slightly above the ninth-grade level. It is the opinion of these authors that if the reading level of materials exceeds the reading level of the patient, comprehension is reduced, recall is sketchy or inaccurate, and motivation for further learning is diminished.

Following upon the studies of Thrush and Lanese (1962), Mohammed (1964) studied the ability of 300 adult diabetics to

comprehend written health materials. The average education of sample subjects was 6.8 years. The findings showed that only 43 percent or 128 of the patients were at the fourth grade level or above in reading comprehension. It was concluded that the amount of formal education was the best predictor of comprehending written materials.

Shaw (1971), in still another attempt to further study the problem of language barriers, designed a study to assess metabolic patients' understanding of verbal symbols commonly used in diabetes education. Staff members and patients were asked to estimate patient understanding. Patients performed significantly lower than the staff expected, showing poor understanding of verbal symbols used.

In examining low comprehension levels and high staff expectations, one must not overlook the related problem of visual acuity in the diabetic. The increasing problem of visual impairment in the diabetic suggests that comprehension levels may be further lowered if the patient is physically unable to read presented materials. These findings showing low comprehension of both written and verbal symbols, coupled with problems of visual acuity in the diabetic patient group, have implications for the development and production of diabetic educational materials.

b. Individual learning differences - Individual learning

differences are much discussed in medical and educational literature alike. Patients and learners in general differ in their ability to react to or grasp a given idea or concept. Prime determinants of these differences are age, experiential background, and learning readiness. In reference to age, Ley and Spelman (1965) found recall of information to be highest in the 36 to 55 age group. As discussed by Culbert and Kos (1971), age also effects receptiveness, cooperation, adaptation and concentration. Older persons necessitate teaching conducted at a slower rate, reinforced by examples and repetition of subject matter to counteract difficulties in concentration, delayed responses, and forgetfulness (Culbert & Kos, 1971).

Experiential background as an influence of individual learning differences, pertains to education and all those life experiences, (psychological, sociological, physiological, and religious in orgin) which go together to make the individual who and what he is today. It is primarily the experiential background which determines how the individual will react to and in the present situation. It is primarily the experiential background which will determine how the individual will learn more readily, whether it be from pictures and spoken words, the printed word, or manipulation of objects (Noar, 1972).

In contrast, it is primarily learning readiness which will determine the capacity of the individual to learn at a given time.

Learning readiness is determined by how the individual patient perceives his problems, his adjustment to these problems and the need for learning, as well as possessing the necessary mental ability and motor function (Schweer, 1971). Depression, fear, denial, anger, apprehension and regression are all emotions frequently experienced in the adjustment process and may become barriers to communication (O'Neill, 1971). It is not merely the presence of these emotions, however, which is important in learning readiness, but the degree to which they are present. Ley and Spelman (1965) have reported that patients with an average level of anxiety remembered more communicated information than those with low or high level anxiety. Likewise, fear communications may play an important role in developing learning readiness and the learning need. Marston (1970) reported the use of fear communications, when accompanied by practical instructions for reducing or removing the threat, are effective in motivating people to undertake diagnostic and preventive health measures.

Individual learning differences as barriers in the communication of information must be assessed and evaluated before instruction can be effective. Differences in age, experiential background and learning readiness within the patient population have implications for development of programs individualized to the specific needs of the learners.

c. Nature of the communicated information - In addition to language and individual learning differences, the nature of the communicated information itself may present a barrier to effective instruction. Ley and Spelman (1965) stated that effectively communicated information must be understood by the patient, remembered, and utilized to bring about the appropriate decisions and actions. Memory and utilization increase when the information is: perceived as being central to the physical, psychological and social survival of the individual (Dodge, 1969); simple rather than complicated daily care regimens (Marston, 1970; Ley & Spelman, 1965); and statements rather than instructions (Ley & Spelman, 1965). Planning instruction to enhance understanding, remembering and utilization of information can help to resolve communication barriers inherent in the nature of the information itself.

In summary, the problems associated with patient education may be identified and grouped into three main subject headings: those dealing with a lack of structure in patient education; the insufficient number of adequately trained personnel; and barriers to the communication process. Each of these problems carries implications for the design and development of future educational programs to better meet the learning needs of the individual patient.

The Use of Planned Education Programs to Promote Disease Management

The planned approach to education is an effective means in attaining instructional goals and objectives. Literature documents this effectiveness in reports of many patient education programs which have been successful in changing attitudes and behaviors. Each program reported as being successful was: structured, standardized or organized in such a manner that all learners were given the same content using the same method; administered by specially trained personnel; and provided for objective evaluations through experimental or quasi-experimental designs. The cognitive and effective behaviors changed, as reported in the programs' evaluations, are listed in Table 1.

In spite of these achievements reached through planning educational programs, gaps in patient education still exist. Most attempts to standardize education have consisted of hospital or clinic classroom instruction. Because of the great number of patients, the variety in their backgrounds, and the necessity of providing instruction when the learner needs it (Noar, 1972), the classroom approach cannot service the needs of all diabetics seen in treatment centers.

A few programs have been able to focus on the learning needs

TABLE 1

Cognitive and Affective Behaviors Changed Through Patient Education

Authors	Changes in Knowledge	Changes in Skills	Hospital Related Changes	Changes in Compliance	Specific Health Improvements
Bowen, Rich, & Schlotfeldt 1961	general knowledge, diet exchange, hygiene,* insulin*	insulin injection,* urine testing with clinitest			better diabetic control, increased weight loss in obese diabetic patients
Burns, 1973	general knowledge				better diabetic control as measured by blood sugar, triglycerides, and cholesterol
Clark & Bayley 1972	general knowledge*				
Hirst, 1972			decreased number of readmissions		T-wave changes in ECG of coronary heart disease patients, normalized high and low blood pressure, decreased respiratory problems, decreased need of insulin in diabetic patients
Lindeman & Aernam, 1971		increased deep breathing and coughing*	decreased mean length of stay*		
Midgley & Osterhage, 1973				increased compliance with post-discharge orders	
Molen, 1968	general knowledge*				

TABLE 1. (Continued)

Authors	Changes in Knowledge	Changes in Skills	Hospital Related Changes	Changes in Compliance	Specific Health Improvements
Rosenberg, 1971 b	disease* medication* diet*		decreased number of readmissions, decrease in length of readmission days	increased compliance with diet*	
Skelton, 1973	general knowledge*				
Skipper & Leonard, 1968			faster recovery at home, better adaptation in hospital		
Stackman, 1972	general knowledge, discharge orders				
Varenhorst, 1973					decreased amount of tooth plaque in experimental group children
Wandelt, 1954	general knowledge			increased compliance with activity restriction	

*Reported as statistically significant.

of individual patients. Skelton (1973) used the Dale-Chall Readability formula in conjunction with Thrush and Lanese's list of unfamiliar words relating to diabetes, to keep the reading level of the educational program at or about grade six. She also used many diagrams and illustrations in the teaching tool to facilitate those learning more readily from pictures and diagrams. Clark and Bayley (1972) together with Young, Buckley, Weschsler, and Demone (1969), utilized programmed instruction in attempts to individualize instruction to the pace of the learner. Kekich (1970) in still another attempt to better reach the diabetic, developed an illustrated booklet, designed for the patient with little or no reading ability. A previous nursing assessment, using Watkins' assessment guides (Watkins, 1970) determined priorities for teaching and evaluation of patient learning and practice. The DAC Index (Keller, 1973) lists a large selection of printed materials, tape-slide presentations, film strips, movies and records which may be used alone or in conjunction with other educational programs. Each of these attempts to bring the instructional content to the level of the learner emphasizes individualization as a continuing goal in patient education.

In addition to the emphasis on planning and individualizing patient education programs, it is imperative that the content area of these instructional programs be studied also. Conceivably, if the diabetic is to become independent and responsible for the management

of his own care, he must be educated in all aspects of diabetes. The literature here reviewed, reveals that patients are not well informed regarding diabetic care (Trayser, 1973; Bingham, 1973; Watkins, 1966; Hanley, 1970) and are especially lacking in knowledge regarding footcare (Martin & Smith, 1969). Furthermore, those requiring footcare and treatment of foot ailments, constitute a sizeable population at the study hospital, and as reported by Pratt (1965) and Whitehouse (1964). Yet, in spite of the economic, social, physical and psychological implications in the morbidity and loss of a limb, only a limited number of pamphlets and movies on diabetic footcare exist. The DAC Index (Keller, 1973) lists programmed learning units ranging in price from fifty to ninety dollars, but none of these units include diabetic footcare..

In summary, if the individual is to attain independence and responsibility for the management of his own care, then it follows that continued attempts toward advancement in patient education be made. Not only must this advancement include planning and individualizing patient education programs but a close look at the content of these programs in covering all aspects of the disease.

Instructional Content--Diabetic Footcare

Content areas to be considered in teaching the diabetic the importance and procedure of daily footcare, may be grouped into

two main subject headings: Physiological component and the treatment component.

Physiological Component

The physiological component contains a general description of the physical changes or complications of diabetes involving the foot. These physical changes may be further divided into vascular, neurological, and infection.

1. Vascular. --Vascular disease is now responsible for the vast majority of deaths in the diabetic population. In the pre-insulin era, especially in that time before the use of fasting treatment, the cause of death in nearly two-thirds of the diabetic population was diabetic coma (Marble, 1973). Joslin Clinic reported (Marble, 1973) that in the period 1960 through 1968, 5009 deaths were recorded, and of these only one percent of the deaths were due to diabetic coma, whereas 76.7 percent of the deaths could be attributed to vascular disease itself.

Vascular disease in the diabetic consists of both large and small vessel involvement. Large vessel disease or macroangiopathy is described as consisting of sclerotic plaques frequently culminating in thrombus formation and/or occlusion (Levin, 1973). These circulating lipids and cholesterol deposited in the vessel wall, though qualitatively the same in both diabetic and non-diabetic

populations, have been observed to form at a faster rate, at a significantly younger age, to occur 53 times more frequently in the diabetic man and 71 times more frequently in the diabetic woman than in the non-diabetic population (Bell, 1957). Gangrene was found to be 156 times more common in the diabetic than in the non-diabetic in the fifth decade of life (Bell, 1957).

Small vessel or microvascular disease, refers to the thickening of small vessel walls with lipid deposits and periodic acid schiff material along with hypertrophy and proliferation of the intima and endothelium (Levin, 1973). Probably most common and characteristic of this small vessel involvement are the microvascular lesions of the capillary basement membrane, though the exact pathogenesis of this capillary basement membrane thickening is unknown. Studies have been done to conjecture whether this lesion is the cause or the result of the diabetic state. Representing two differing viewpoints are the studies of Siperstein, Unger and Madison (1968) and Williamson, Volger, and Kilo (1971). Siperstein et al. (1968) concluded that the capillary basement membrane thickening is not related to carbohydrate intolerance and may be a primary lesion in diabetes mellitus. Conversely, Williamson et al. (1971) were able to relate thickening to duration of diabetes, age and sex, supporting the belief that the lesion is secondary to carbohydrate intolerance.

In addition to the attempts to identify whether the capillary basement membrane thickening is the cause or result of the diabetic state, studies have been made relating diabetic control and the rate of development of vascular complications in diabetes mellitus. Knowles (1965) thoroughly reviewed the literature and views or experiences of 85 individuals or groups of individuals who have concerned themselves with this subject. Knowles does not feel that there is firm evidence either for or against the beneficial effect of diabetic control. The requirements of experimental design, control and measurement of variables and proper analysis of data for interpretation, had not been met in these pre-1965 studies, and must be met if a true scientific investigation is to be conducted. He further stated that it is in the definition and measurement of "control" of diabetes, that all studies are weak. Following upon these earlier studies, are the studies of Bloodworth, Engerman, Camerini- Davalos, and Powers (1970), Siperstein et al. (1968) and Williamson et al. (1971), each of which made stringent efforts to meet the requirements of a true scientific investigation. All three studies were unable to establish statistically significant differences between good and poor diabetic control and its effect on muscle capillary basement membrane thickening. These studies suggest that, even though a cause-effect relationship between good control and the decreasing rate of developing vascular complications

cannot be accurately drawn at this time, the development of good eating habits and the alleviation of hyperglycemia should be attempted.

2. Neurological. --Eliasson (1973) describes the term "diabetic neuropathy" to be a common name referring to several disorders of the peripheral nervous system. Here, the terms "diabetic neuropathy" or "neurological complications" will refer to all those conditions in the lower extremities affecting the response to touch and pain, position sense, vibratory perception, muscle strength and size, and conditions of the skin, vascular reflexes, nails and hair growth.

In an extensive review of the literature, Eliasson (1973) related the development of diabetic neuropathy to vascular insufficiency of the nervous system structure and impairment of metabolic function in the cord and peripheral nerves. As seen in control of vascular complications, here again control of diabetes was attempted in slowing down the vascular insufficiency and providing normal metabolic function in the cord and nerves. Mayne (1968) studied the course of neuropathy in 73 diabetics over a period of two to four and three-quarter years. Findings revealed that neuropathy often followed a period of relatively poor diabetic control. It was found in four patients, however, that neuropathy symptoms originally occurred during relatively good control. Gregerson (1968) studied

the motor conduction velocity (MCV) in the peroneal nerve of 14 subjects. Thirteen of the subjects were newly diagnosed and previously untreated diabetics. Measurements of the MCV were taken prior to, during and after insulin treatment. The findings were interpreted to show a clear improvement in nerve function during insulin therapy. The length of the study of each subject varied between 8 and 35 days, limiting the validity of further conclusions.

A further parallel between good blood sugar control and the development of neuropathy was discussed in Lancet (Diabetic Neuropathy, 1972). Four studies were explored showing the effect of maintaining normal blood sugar levels in the diabetic to prevent or halt the progress of polyneuropathy. Nerve conduction, related to the degree of segmental demyelination was reduced in all diabetics, but was more pronounced in the diabetic who had relatively poor blood sugar control. The nerve conduction was reported to improve with the treatment of diabetes. Nerve damage was shown to be increased at times of poor control, with definite improvement upon institution of blood sugar control and no tendency toward progression within two years (Diabetic Neuropathy, 1972). It was emphasized that early diagnosis and institution of good metabolic control is important in the treatment of diabetic neuropathy to forestall further neurological damage (Krosnick, 1964).

In summary, the literature reveals that strict diabetic control cannot promise to prevent the development of diabetic neuropathy, but research can document the association of poor control with an increased incidence and severity of neuropathy. As Eliasson (1973) summarizes, "it is fully suggested that the doctor and patient develop a cooperative effort in the establishment and maintenance of the best possible carbohydrate balance."

3. Infection. --Whitehouse (1964) lists the three pathogenic factors considered predisposing causes to morbidity and loss of limb as ischemia (atherosclerosis and microangiopathy), neuropathy and infection. Ischemia, as a complication of atherosclerosis in large vessel or macrovascular disease, results from thrombosis with large vessel occlusion. Extensive gangrene with obligatory amputation commonly follow. Ischemia due to small vessel and microvascular disease can result in patchy or small areas of gangrene. Ulceration of atrophic skin changes may likewise occur. Infection frequently develops, as does moderate-sized areas of gangrene and necessary amptuation (Levin, 1973).

Although morbidity and loss of limb are generally the result of vascular changes in the diabetic leg and foot, the immediate cause is considered to be neuropathic changes (Whitehouse, 1964). Neuropathy affects the autonomic, sensory and motor pathways of the nervous system. Autonomic changes are seen in decreased

perspiration, followed by dry skin, cracks and fissures. Sensory changes result in a loss of sensation, painless trauma of mechanical, chemical or thermal origin, ulceration and finally infection and gangrene. Muscle atrophy, gait change and new pressure points are the result of motor pathway changes (Levin, 1973). Any one of the pathophysiologic changes in vascular disease and neuropathy may result in infection, gangrene and amputation.

Treatment Component

In order to prevent morbidity and loss of limb, a primary goal of treatment is aimed at the prevention of infection through patient education. Better diabetic control, early detection and treatment of vulnerable surface areas and skin lesions, and the cultivation of general hygenic practices in the procedure of daily foot and skin care, are the specific areas stressed in patient education. Likewise, prevention of trauma itself, whether direct or indirect and whether mechanical, chemical, or thermal, is of prime importance in decreasing the occurance of lesions and infections in the diabetic foot.

There is general consensus that instructions to the diabetic in caring for his feet should include: following the advice of his doctor regarding diabetic management; daily inspection of the feet; daily footcare; avoiding all forms of trauma; and visiting his doctor

regularly (Jansen, 1973; Whitehouse, 1971; Locke, 1963; Paulos, 1971; Pratt, 1965; Root, 1954; Simko, 1967; Lippard, 1973). Each of these areas will be discussed in further detail, elaborating upon the precise instructions to be given. The use of exercise as a means of promoting circulation to the lower extremities also will be discussed although unanimous agreement regarding its effectiveness has not been found.

1. Following the advice of his doctor. --The patient must understand that his disease management is, ultimately, dependent upon his willingness to follow the advice of his physician. The lack of control in diabetes (the avoidance of hyperglycemia without the risk of hypoglycemia) has long been connected with increased complications of vascular disease and neuropathy. Although research has been unable to demonstrate a reliable cause and effect relationship between strict diabetic control and the avoidance of these complications, it suggests that diabetic control be maintained (Knowles, 1965; Eliasson, 1973; Krosnick, 1964). It is through patient-physician cooperation that a balance between exercise, medication and diet, can be determined, maintained and adjusted to meet the changing needs of the patient.

2. Inspection of the feet and footwear. --Daily inspection of the feet allows the patient to detect early signs of irritation, swelling, and other indications of trauma, as well as areas of

dryness, corns, calluses, cracks and fissures. If the patient is unable to see the bottom of his feet, it is suggested a mirror be used to facilitate inspection. If, however, the patient is still unable to see the bottoms of his feet, or if he has problems of visual acuity, it is suggested he have someone else perform this procedure for him.

The callus deserves special emphasis here. The softened dermis and sub-callosal epidermis provide an excellent growth milieu for bacteria (Whitehouse, 1964). The patient suffering from neuropathy, may fail to protect the area, resulting in rapid or increased tissue breakdown. An extensive infection may be present before observed by the patient. In the presence of ischemia, gangrene may result. Self-treatment of the callus or infection may only lead to further trauma. For these reasons, special attention must be given to callus formation during foot inspection.

Nails are also to be inspected at this time for length, shape, dryness and signs of infection. The length of the nail should be kept short enough so the end of the nail does not extend beyond the end of the toe, tending to put pressure on the nail bed (Lippard, 1973). The shape of the nail should be straight across the top, with the corners slightly rounded. Hyperkeratotic, porous, deformed toenails are characteristic of a poorly vascularized nail bed. Not only are these patients more susceptible to bacterial infections resulting from a poorly vascularized lower extremity, but are

likewise susceptible to fungus infections of the nail itself (Jansen, 1973).

Inspection of footwear necessitates a close look at shoes, hose and slippers, for the presence of foreign bodies, surfaces which may cause friction or irritation of the foot, evidence of worn heels or run down shoes resulting in improper weight distribution (Locke, 1963; U. S. Dept. of HEW, 1970), and holes, mending or seams in the hose which can be constricting and irritating (Lippard, 1973; U. S. Dept. of HEW, 1970).

3. Washing of the feet. --It is important that the feet of the diabetic be kept clean and dry at all times to minimize the possibility of both bacterial and fungal infections. The daily foot washing procedure should begin with the collection of supplies and adjustment of light. Warm water for the footbath must be tested with the elbow or bath thermometer to insure proper temperature. Feet, especially those with neuropathic complications, are susceptible to accidental burning if the water is not first tested. The feet should be washed with a mild, non-medicated soap and a soft bristled brush or washcloth. If the nails and/or calluses need additional attention, it is suggested that they first be softened by soaking the feet 15 minutes to one-half hour. After removing the feet from the footbath, and following careful drying, the remaining

softened debris around and under the nail should be removed with an orangewood stick.

Specific problem areas of the foot, as determined during inspection of the feet, should be considered now. In trimming the toenails, caution is emphasized in the use of any sharply pointed instruments. Because of the vascular and neuropathic complications in diabetes, as well as the increased risk of infection, care must be taken in trimming nails so as not to damage the sub-ungual and peri-ungual tissue. For this reason it is recommended that only the toenail cutter, which allows for straight cutting of the nail, and an emery board to gently round nail corners, be used exclusively (Lippard, 1973; Whitehouse, 1971). If the patient is not suffering from visual impairment and is capable of reaching his feet without excessive strain, he is encouraged to perform this procedure himself. For nails which are difficult to cut or are quite thick, the podiatrist or the patient's doctor should be consulted.

After bathing the feet and caring for the nails, additional precautions are suggested to further reduce the risk of infection and subsequent morbidity. A light dusting with nonmedicated powder, especially between the toes, helps to reduce moisture conducive to fungal growth. Pressure points resulting from overlapping toes, may be prevented through the use of cotton to separate toes. Finally, calluses, corns, and dry areas are given care. Throughout the

literature, it is recommended that care to taken in the home treatment of corns and calluses. Commercial keratolytic preparations for the removal of corns and calluses must not be used as this results in chemical trauma. The only home treatment for the removal of corns or calluses is the sparing use of an emery board (Lippard, 1973) or the use of gauze rubbed across the affected area (Root, 1954). The use of a moisture restoring compound has been suggested by Locke (1963) and is used at the study hospital in the softening of calluses and restoring water combining capacity to the skin. Small amounts of the compound may be applied to dry and callused areas once daily. Bland jellies such as vaseline, likewise soften dried areas and may be rubbed around nail beds to enhance soft, non-brittle and more pliable nails. Lanolin, likewise beneficial for softening nails and skin, can be over-used, and thus, its use must be limited (Locke, 1963; Whitehouse, 1971; Pratt, 1965).

4. Prevention of trauma. --Because of the role of the callus in the development of foot probems, it is considered a form of trauma. Emphasis is given to the importance of preventing the formation of corns and calluses through the proper selection of foot wear. Footwear should be neither loose nor binding, preferably have round toes and be of leather upper construction (Eliasson, 1973). According to the pamphlet Feet First (U. S. Dept. of HEW, 1970) several points need to be checked to determine proper fit in

shoes. The widest part of the foot should fit into the widest part of the shoe. The shoe should extend about 3/4 inch past the end of the large toe when standing and should follow the natural outline of the foot. The counter should be firm with a snug fit. The heel should be high enough to give the foot support but no higher than 1-1/4 inches. The toe box should be high to allow space for toes. The sole should be made of a flexible material that bends easily and the lining should be smooth, without ridges or wrinkles. The common construction of house slippers does not give the foot the support needed, contraindicating the wearing of slippers in place of shoes (Whitehouse, 1971). Similarly, shoes of open-heeled or open-toed construction, create new pressure points and should be avoided. Hose should be absorbent, made of cotton or wool, allow for ample toe room, and be changed daily.

In addition to the previously mentioned care to be taken in cutting of nails and treating of calluses, trauma to the foot is also prevented by the wearing of shoes at all times, and by avoiding extremes of heat and cold which could easily result in burns or frostbite. Blood flow, especially in the presence of vascular disease, may be further decreased by wearing constricting garments, hose, garters and shoes, as well as by cigarette smoking. All of these practices reduce circulation to the lower extremities, increase the risk of morbidity, and must be discouraged.

Early treatment of injuries and abrasions to the foot and leg is a must in the promotion of rapid healing and the prevention of infection. Washing the affected area with a mild soap, drying the area thoroughly and applying a mild antiseptic such as merthiolate or isopropyl alcohol, is followed by the application of a sterile, non-adhering dressing (Eliasson, 1973). Ideally, a gauze wrap alone is sufficient to hold the dressing in place, and if tape is needed, it may be secured to the gauze wrap (The Diabetic Foot, 1971). If tape must be used on the skin, it is recommended that only cellophane (Eliasson, 1973) or paper tape be used. Once the dressing is applied, the injured area should be checked daily for signs of infection or failure to heal, and a clean dressing re-applied. If the injury either appears infected or very slow in healing the doctor should be notified.

5. Visit the doctor regularly. --Proper management and control of diabetes requires regular and sometimes frequent patient assessment. Evaluation of the present therapeutic measures being employed for their effectiveness and possible revision are of prime importance in the management of the disease process. The clinic visit likewise supplies the patient with the opportunity to report and discuss with his doctor any problems or changes which may have arisen since his last appointment.

6. Exercises. --The use of Beurger Allen and other exercises

have been suggested by some (Root, 1954; Paulos, 1971; The Diabetic Foot, 1971; Whitehouse, 1971) to increase the circulation of blood to the foot, but are believed by others (Lippard, 1973; Stuart, 1971) to be of little benefit. According to Locke (1963), Beurger Allen exercises have had some benefit in delaying morbidity in his patients when carried out religiously. He states that perhaps the most beneficial effect of these exercises, is the feeling of independence it restores to the patient. The inclusion of an exercise program into the existing diabetic teaching program at the study hospital has not been made, because it is believed that the benefit of specific exercises is minimal, especially in the presence of atherosclerosis and microvascular disease.

Purpose of the Study

It is the purpose of this study to develop and plan for the evaluation of an educational program for teaching the diabetic the importance and procedures of daily footcare. It will be the function of the program to structure content and method; to individualize instruction to the rate and place most appropriate to the patient; to provide instruction when the patient needs it; to allow the patient easy monitoring of the instructional program; and to provide instruction in an area often overlooked in the education of the diabetic patient.

CHAPTER II

METHODOLOGY

Unit Development Theory

The development of an instructional unit consists of a series of steps, each of which is differently described and sequenced by Kemp (1971) and General Programmed Teaching (1973). The authors do agree, however, that it is not the steps but rather the process of organized thought, that allows the designer to proceed from an idea to a developed program of instruction.

Probably foremost in the development of a teaching method is the definition of purpose for which the instruction is intended. The purpose is a general statement of what one hopes to accomplish with the students, with reference to each topic identified. It is usually considered to be the aim or the goal of the instructor.

Identification of the student group according to age, sex, previous education and other meaningful characteristics which may be of importance in developing specific learning objectives, is considered next. Kemp (1971) and Noar (1972) suggest that a clear definition of individual learning styles does not exist, but some students do profit more from a visual or picture centered approach,

others from verbal experiences, and still others from physical activities and manipulation of objects. Not all students accomplish a task in the same length of time. Identification of individual learning differences must be considered in the plan for student learning activities. Another important aspect which one may wish to define here, are specific entry level requirements to be possessed by all students before admitance into the specific instructional program, such as a specific reading ability, visual acuity, work experience background, or fundamental pre-requisite courses.

When the purposes, student group and entry level requirements have been identified, specific learning objectives may be stated. Having identified the abilities of the student population, the written learning objectives can more clearly parallel correct estimates of student performance. A learning objective is best stated in behavioral terms or action verbs which accurately describe the terminal behavior the student is expected to demonstrate upon completion of the learning experience (General Programmed Teaching, 1973; Kemp, 1971; Mager, 1962). To give the learner more direction, it is likewise helpful to include in this objective the conditions under which this behavior is expected to occur and the minimum level or standard of performance acceptable as evidence of achievement of the objective (General Programmed Teaching, 1973). Stating objectives in this manner, and providing the learner

with a copy of the stated objectives, gives direction to both the instruction and the student. During instruction, objectives assist the student in directing his attention to the critical information and as a means of self-evaluation of progress. The learner is informed regarding where he is entering in the subject matter and how he will know when he reaches the objective, by means of the terminal performance expected.

From the general purpose and statement of learning objectives, subject content is developed. Content, as referred to herein, includes all those knowledges, skills and attitudes related to a given topic. A broad review of the literature is considered essential in the development of content, since content in many areas frequently changes, is updated, or reorganized. For this reason, it is often preferred to first review the literature, list subject areas to be covered, and then develop precisely stated learning objectives (Kemp, 1971). Whichever sequencing is used, it is important to remember that subject content should support each objective and it is subject content upon which student learning experiences are based.

The construction of a pretest at this point, assists in more accurately assessing the knowledge and skills of each student in relation to the course content and objectives. The results of a pretest tell us if the entry level performance on the part of the

learner has been overestimated or underestimated. Early course objectives may be eliminated or new objectives may be added, depending upon the needs of the student population. Likewise, individual student needs may be readily identified.

The selection of teaching/learning activities and resources, as described by Kemp (1971), includes the selection of instructional materials. In the selection of teaching and learning activities, those which enable the largest number of students to master the objectives at an acceptable level of achievement, at the least cost and within the shortest period of time, are considered the most efficient and effective (Kemp, 1971). Teaching/learning activities, traditionally consist of the basic methods of teacher presentation, independent study, and interaction between teacher and student or among the student group. The selection of instructional resources includes all those materials which motivate students or support and explain subject content. Commonly, these resources consist of printed materials, audio-visual aids and community resources. The resources are selected according to their ability to meet the needs of the student group. The question to be answered is, "Which resource serves the learning objectives most efficiently and effectively?" (Kemp, 1971).

Criterion test items, based on each learning objective are a successful means of evaluating teaching effectiveness and

achievement of the objective on the part of the learner. When a pretest has been utilized along with a posttest of criterion test items, the learning (change in behavior across time) can be more accurately assessed. A program so developed, is now ready for validation. Developmental testing refers to the process of testing and revision of instruction as a part of the initial development of instruction (General Programmed Teaching, 1973). It is a part of the validation process in which weaknesses in the instructional material are identified and corrected. Further, if interaction between the instructor and the student has been integrated into the design, the exact place where the breakdown in communication occurred, can be identified. Finally, developmental testing allows the designer to question the individual student regarding a specific weakness in instruction, discovering what he did and did not learn. The process of validation is concluded with validation testing (General Programmed Teaching, 1973). This last stage following developmental testing and revision, takes place in the classroom and involves a rather large group of students in testing whether the instructional intent has been achieved. The ability of the students to demonstrate achievement of some maximum number of objectives determines the effectiveness of the program (General Programmed Teaching, 1973).

Following the process of validation, the instructional unit is

ready to be put into action. It is often the manner in which a unit is implemented that determines how given students will react to this or similar information in the future. As Mager (1968) has emphasized, it is important that the student leave a particular unit of instruction with at least the same amount of interest in the subject as when he first arrived. It is the desire of most educators to positively influence the attitude of the learner toward a given subject, so that in the future, the learner will approach it with a more positive attitude. By influencing the development of a favorable attitude, the teacher maximizes the possibility that the student will remember what he has been taught and in the future, will want to learn more about the subject (Mager, 1968).

Probably the best place to begin in influencing the learner toward a favorable attitude of a particular unit of instruction, is to clearly state useful and behaviorally defined objectives. These objectives, as priorly referenced, help to inform the student of the precise behavior that is expected to occur and the method of measurement to be used in determining whether an objective will be considered achieved. Next, the teaching/learning activities and resources may be looked at, as previously defined in the unit development, to determine if indeed these practices will assist the learner in achievement of the objective. Finally, through introspection and analysis,

the conditions and consequences of one's own instruction can be identified.

Unit Development Procedure

A program for teaching the diabetic and/or his family, the importance and procedure of daily footcare, was developed according to the steps and procedures referenced above.

Purpose

The primary purposes of the instructional unit are: to develop an understanding of the importance of footcare in the diabetic; and to acquaint the diabetic with the general rules and procedures of good footcare.

Identifying the Learner

The learner has been defined as any diabetic patient or his family, needing or desiring instruction. A patient assessment made by clinic or hospital personnel, will determine the patient's readiness to learn as well as the necessity of educating a significant other person. The importance in teaching more than the diabetic himself is frequently seen in the older, visually handicapped or physically incapacitated individual who is either unable or unwilling to take the time and care necessary. Specific entry level

requirements of participants in the program are limited to physical dexterity, visual acuity, ability to remember, and motivation on the part of the patient or family members.

Identifying Objectives

Learning objectives are defined below. A statement of these learning objectives is included in the program itself. Upon completion of the unit of instruction, the learner will be able to select from a list of given answers:

1). Three reasons why the feet of the diabetic require special attention.

2). How often feet and footwear should be inspected.

3). How often feet should be washed.

4). Two methods of testing bath water.

5). Correct treatment for corns and calluses.

6). Instruments used in caring for toenails.

7). Good footcare practices and poor footcare practices.

8). What should be considered in selecting shoes and socks for oneself.

9). One suggested method for warming cold feet.

10). Correct supplies needed for caring for foot injuries at home, including the cleansing agent, antiseptic, and bandaging supplies.

Developing the Content

The content was developed through an extensive review of the literature, as seen in Chapter I.

Selecting Teaching/Learning Activities and Resources

Teaching/learning activities are primarily confined to independent study. Resources for teaching and learning consist of the program itself, and the diabetes nurse specialist as a resource person. The instructional unit is comprised of a series of slides and audio script which have been converted to video tape. Slides or still pictures rather than a live or moving picture were preferred because they allow the viewer more time to concentrate on one given object or idea. Likewise, areas of the program were easily filmed during diabetes clinic and for this a color slide camera was the available equipment. The videotape, as a means of audio-visual communication, was selected for patient use over other media, for its features of synchronized sound with visuals, ease in operational use, and present availability in the clinic. Additional video tapes for diabetic instruction are currently being made by clinic personnel.

Based on Pohl's (1973) principles of learning, active participation as a necessary adjunct to effective learning, was incorporated

into the teaching program. During the instructional unit, the learner is asked to turn off the machine, practice some of the footcare procedures involved, and record replies in a workbook. Also incorporated into the program is the ability of the learner to easily stop or repeat sections which are unclear or need re-emphasis, in an attempt to strengthen learning through repetition (Pohl, 1973).

Developmental Testing and Evaluation

A pretest and posttest, based on criterion referenced test items were developed and incorporated into the instructional unit (see Appendix A). In developmental testing, selected learners were asked to view various segments of the program. The learners' interaction with the instruction, and his achievement of the objectives helped determine the effectiveness of the program and pinpoint possible errors in communication. Revisions of the program based on these early findings during developmental testing were made prior to its piloting in the general clinic population. Further discussion of the testing procedures and results are discussed in Chapter IV.

The instructional unit as designed, will be utilized in conjunction with the existing classroom instruction provided at the study hospital. Classroom instruction as currently implemented, covers various aspects of diabetic management, with footcare

instructions given every six weeks on a rotating basis. The video tape, however, will be available to hospitalized and clinic patients requiring initial footcare instructions or review, at the time, place and pace of their individual needs.

CHAPTER III

THE PROGRAM: FOOTCARE IN DIABETES

The Script and Workbook

The Script

The program you are about to see is on footcare. It is hoped that this program will help you to solve any problems or questions you may be having regarding the care of your feet. Upon finishing this program you should be able to list three reasons why your feet require special care; how often your feet need to be washed; two methods of testing the bath water; correct treatments for corns and calluses; instruments used in caring for your toenails; good and poor footcare practices; what to look for in selecting shoes and socks for yourself; one method for warming cold feet; and, the supplies needed for caring for foot injuries at home.

At different points in the program you will be asked to stop and practice some of the things you have seen. Please take as much time with the program as you need. Turn off the machine at any time you feel you are having trouble keeping up with the program. You may also repeat sections if you desire.

	Slides
As a person with diabetes, your feet need special care.	(# 1)
Your feet need this special care because. . .	(# 2)
You may have a greater chance of infection, you may have poor circulation or blood flow to your feet, and you may be less able to feel pain and heat. Now each of these three reasons for special attention to footcare will be discussed briefly.	(# 3)
Any break in the skin, such as dry cracked areas, cuts, burns, and blisters can become infected. A break in the skin allows germs to enter and grow. Germs may also hide out and grow in very thick and porous toenails.	(# 4)
You may have poor blood flow or circulation to your feet. Changes which take place in diabetes may cause your blood vessels to become rigid and thick.	(# 5)
Rigid and thick blood vessels, as in the picture, can be injured more easily or become plugged. If this happens your feet may not receive all the blood they need. When injured your feet may heal slowly or become easily infected.	(# 6)
Changes may take place in your nerves, making you less able to feel pain and heat. These changes in the nerves may also take place when your blood sugar is high. One or more of these three changes may occur in your feet.	(# 7)
Good footcare has been found helpful in slowing down some of these problems. Many other problems, however, can be avoided completely. The following instructions	(# 8)

are aimed at helping you recognize what you can do to keep your feet healthy.

There are five important rules to follow in caring for your feet at home: (1) control your diabetes; (2) inspect your feet daily; (3) keep your feet clean and dry; (4) avoid all possible injury; (5) see your doctor regularly and follow his advice. Each of these rules will now be discussed individually. (# 9)

Rule number one, control your diabetes. It is important that your diet and medication be maintained in balance. When your diet and medication are not in balance, your blood sugar may become high or low. (#10)

As you already know, when your blood sugar is high, you may be less able to feel pain and heat. Also, your chances of infection are increased. Because of these two reasons, it is important to follow your diet regularly and use prescribed medications just as the doctor has ordered. (#11)

Rule number two, inspect your feet daily. Because your feet may be easily injured and when injured, may heal slowly, it is necessary that you inspect both your feet and footwear daily. (#12)

When beginning inspection, adjust the light so that you may easily see. If you wear glasses for reading or other activities, be sure and wear them for this procedure. Now, as the tape guides you, you will be asked to practice inspecting your feet and footwear. First, if you have not already done so, adjust the light and put on your glasses. (#13)

Now take off both shoes. Closely look at the sole of each shoe and remove any thumb tacks, carpet tacks or other sharp objects which could come through the shoe and into your foot. Does the sole of the shoe look especially worn? Is it cracked or does it have holes? (#14)

Do your shoes look run-down like these? Are the heels extremely worn? If your shoes look like these, your feet may not be getting the support and protection they need. Shoes such as these can put pressure on different areas of your feet, forming corns, calluses, or sores known as ulcers. (#15)

Now look inside your shoes. Run your hand slowly and carefully inside each shoe. Are any areas rough, sharp, or bumpy? Make sure there is nothing in your shoe, such as pins, tacks, or gravel. These things can put pressure on your feet as well as cause a break in the skin where germs may enter and grow. (#16)

Do your shoes pass inspection? Stop the tape, answer question number one in your workbook, then restart the tape. (#17)

If you found that your shoes do not pass this inspection, if you have run down heels or holes. . . (#18)

. . . they should be replaced or repaired as soon as possible. Tips to help you in selecting and wearing new shoes will be given later. (#19)

Now remove your socks and inspect your feet. (#20)

It is important to look closely at your entire foot. (#21)

If you are unable to see the bottom of your feet, have someone else check them for you. (#22)

Some people have found that a mirror is quite helpful in checking the bottoms of their feet. (#23)

During this inspection of your feet, look for signs of redness, swelling, cracks between the toes, corns, calluses, cuts, dry areas, or any break in the skin. (#24)

Be sure and check between your toes. The doctor should be told of any break in the skin which does not seem to heal or which appears to be red, hot, or swollen. (#25)
Remember what you have found during inspection, for you will want to take care of these areas after your bath.

Check the length of your toenails for need of trimming. Do your nails extend beyond the end of your toes? Nails which do grow past the end of your toe, can put pressure on the nail bed. Are your nails cut straight across with the corners slightly rounded? Do your toes overlap one another? (#26)

Now turn to question two in your workbook. Mark every item you found when you inspected your feet, then restart the tape. (#27)
Those questions which you answered with a yes, are the areas which you will want to give special care after your footbath. You will find this same checklist helpful when you inspect your feet at home.

Rule number three, keep your feet clean and dry. It is important that you wash your feet and change your socks daily to lower your risk of infection. You may wash (#28)

your feet with the rest of the bath or separately. The instructions given here can be applied to both.

You will not be asked to practice this foot washing procedure here. When practicing this procedure at home, it is important to select a time of the day when you know you will be unhurried and unrushed. Rushing through footcare you may fail to be careful. For the bath and footcare you should have the following on hand: basin, warm water, soap, towel, wash cloth, gauze, emery board, orangewood stick or soft brush, toenail clippers, clean socks, shoes, non-medicated or baby powder, cotton and prescribed foot cream, vaseline or petroleum jelly. (#29)

Before putting your feet in the water, always test it to be sure it is warm and not hot. Since your feet may not always be able to tell you if the water is hot, test the water with your elbow. Of course you may use a bath thermometer for this if you have one. A reading of 85 - 90^{o} is considered warm. (#30)

Once you have collected the supplies and tested the water you may begin to wash your feet. If your nails, corns or calluses need special care, first soak your feet for fifteen to thirty minutes. (#31)

Then wash your feet gently with soap and a washcloth or a soft bristled brush. Here we are using a wash cloth. (#32)

If you wish to use a brush, remember that it must have soft bristles, which allow for gentle cleaning. Scrubbing too hard can injure your foot. Using the brush or washcloth gently remove loosened dead skin and particles of dirt from around and under the nails. (#33)

Now remove your feet from the water and dry them thoroughly. Be sure to dry carefully between your toes. Use the towel to blot this area, being careful not to rub it roughly. (#34)

Next, you may care for your corns and calluses. With the gauze you have on hand or a terry washcloth, rub your corns and calluses as we are doing in the picture to remove loosened dead skin. If your feet have been soaked for fifteen to thirty minutes, this is a rather easy task. (#35)

Never attempt to cut calluses or remove corns with plasters. Corn plasters and other over-the-counter products for your feet contain acids which damage your feet. Foot soaks, other than soap and water, are harsh and can hurt your feet. (#36)

Now give your nails another look. Use the orangewood stick gently, around. . . (#37)

. . . and under the nails to remove loosened particles not removed during the bath. (#38)

Now you are ready to cut your nails. Having soaked your feet for fifteen to thirty minutes during the bath allows you to cut your nails more easily. Softening your nails by soaking them keeps them from splitting and cracking when cut. (#39)

Extremely thick nails such as these, are common in diabetes. If your nails are extremely thick, do not attempt to cut them yourself. Have your doctor cut them for you. (#40)

Always cut your nails in good light and if you wear glasses for reading and other activities, wear them for this activity also. If for other reasons you are unable to adequately see or reach your feet, do not attempt to cut your nails yourself. Have someone else who is properly trained cut them for you. (#41)

Cut your nails straight across as shown, and keep them short enough so that the end of the nail does not extend past the end of the toe. Long nails can be sources of pressure for the nail bed and provide a good area for germs to grow. (#42)

Never cut your nails out into the corners of the toe and do not use sharply pointed scissors. We have found the toenail clipper pictured here, to be the safest for cutting nails. (#43)

After cutting your nails straight across, you will find the corners are sharp. Use an emery board to gently round the corners to keep them from cutting into the sides of the toe or other toes. Do not use a sharp metal file to round these corners. (#44)

Now take care of any areas of injury you noticed during your foot inspection Injuries are always first washed with soap and water as done in the foot bath. When clean, wipe the injured area with a mild antiseptic such as peroxide. (#45)

Never try to break blisters. Cover blisters and all injuries with a dry sterile gauze dressing. (#46)

Use plain gauze wrap to hold the dressing in place, tying it loosely. (#47)

If you feel you must use tape to hold a dressing in place, use paper or cellophane tape. (#48)

Adhesive tape should not be used, as it can injure the skin when it is removed. (#49)

If your doctor has given you a cream such as carmol cream for dry and callused areas on your feet, now apply it to those areas found during inspection. (#50)

If you do not have a special cream, use vaseline on dry, callused areas and corns. Whether you use a cream for dryness that your doctor has given you, or vaseline, be sure to rub it well into the skin. (#51)

If your nails are brittle, rub some vaseline around them to soften them. (#52)

Now dust your feet with a non-medicated powder, such as baby powder. (#53)

Be sure to dust the area between your toes, as this is where moisture is likely to collect. A light dusting of powder is all that is necessary to cut down on moisture. (#54)

If your toes overlap like those in the picture. . . (#55)

. . . separate them with a small piece of cotton or lambswoll. The cotton or lambswool acts as a cushion to keep pressure off the adjoining toes. (#56)

Now you are ready to put clean socks on your feet. When buying socks for yourself, do you look for those that are made of cotton or wool? These fibers are (#57)

absorbent and would prevent excess moisture from collecting in your shoes.

When you do buy socks, select those which are slightly larger than your foot so that you will be able to move your toes freely. (#58)

If you are a woman who spends most of her day in nylon stockings, nylon hose with a cotton sole are the best variety. (#59)

When putting on clean socks, quickly check them to make sure there are no ridges or seams which will press against your foot. Holes and areas of mending can also put pressure on your foot. For this reason, socks should not be mended, but replaced when worn out. (#60)

Now check your socks. Are they made of cotton or wool? Do nylons have a cotton sole? If you can't tell what the fiber is, and you know your socks are usually quite damp when you take them off your feet, you would probably be better off buying new socks of cotton or wool. Are your socks slightly larger than your foot to allow your toes to move freely? Are your socks free of mended areas, ridges, seams and holes? (#61)

Now turn to your workbook and answer question number three, then restart the tape. (#62)
If your answer to any of these questions was no, your socks should be replaced promptly.

If a change in shoes is made after your footbath, be sure and inspect these shoes also. It is important to remember to inspect shoes every time a change in shoes (#63)

is made. Small objects are frequently placed in shoes by children, or dropped there accidentally. Be sure you will not be stepping on a toy, tack, or small piece of gravel.

Slippers such as these may be worn for short periods of time. These slippers and most others do not offer the same support and protection as a shoe and should not be worn in place of shoes. (#64)

Rule number four, avoid all possible injury. You have already learned several ways to keep from injuring your feet. See how many of these ways you can remember. (#65)

Open your workbook. Read and answer question number four, then restart the tape.
Now with your workbook still open, check your answers and correct them if necessary. Your answers to these questions on footcare should read:
Do inspect your feet and footwear daily. Do adjust light and wear glasses for inspecting feet and cutting nails. Do not test bath water with your feet, use your elbow or bath thermometer. Do not cut calluses with a razor blade and do not use corn plasters. Do not use a sharply pointed scissors to cut toenails, but do use an emery board. Do use cotton to separate overlapping toes. Slippers do not offer the same protection as shoes. Wear slippers for only short periods of time. (#66)

In addition to preventing foot injury in these ways, other precautions need to be taken. Shoes should be long enough and broad enough to fit the foot without rubbing or binding. (#67)

The widest part of your foot should fit into the widest part of your shoe.	(#68)
The shoe should extend about 3/4 inch past the end of your large toe when standing.	(#69)
The shoe should follow the natural outline of your foot.	(#70)
The counter should be firm with a snug fit to keep your foot in position.	(#71)
The heel should be high enough to give your foot support, but no higher than 1-1/4 inches.	(#72)
The toe box should be round and high to allow space for your toes. The toe box should be made of soft material. Leather is usually suggested as the best material because it is soft, moves with the foot, and yet gives your toes protection.	(#73)
The sole should be made of a material that bends easily. The lining of the shoe or the inside of it, as you already know, should be smooth, with no ridges or wrinkles.	(#74)
When wearing new shoes, break them in slowly. Wear new shoes 1/2 hour the first day. Increase the wearing time by 1/2 hour each additional day. After each wearing, check your feet for signs of redness and blisters.	(#75)
Do not wear slippers or shoes with pointed toes, open heels or open toes. Corns and calluses result from direct pressure on the toes and foot. By being careful in the selection of footwear, these can be prevented.	(#76)

Never go barefoot. Your foot needs to be protected from all possible injury. Shoes keep your foot from being injured when stepping on small and sharp objects. (#77)

When your feet are bare, they have no protection. Calluses may get bigger, putting more pressure on the areas directly under them. (#78)

This can cause a sore or ulcer to form under the callus. When you wear well fitting shoes you can keep your foot from being injured in this way. (#79)

Because your feet may be getting less blood than they need, your feet may frequently be cold. Remember, if your feet do not get all the blood they need, they will heal slowly when injured and may become infected more easily. Don't take a chance in burning your feet by heating them too fast. If your feet are cold, wear heavy wool socks. Do not use a hot water bottle, a heating pad or hot foot bath to warm your feet. Do not sit close to fires or heaters. (#80)

Avoid getting sunburned. Sunbathing is just as dangerous as warming your feet too quickly. This man is just asking for trouble. (#81)

Garters, girdles which cut into your leg, and other tight clothing, keeps the blood from flowing to your feet as it should. (#82)

Smoking and sitting with crossed legs put pressure on your blood vessels, so that less blood can flow through them. Don't cause trouble for your feet by putting pressure on your blood vessels. (#83)

Rule number five, see your doctor regularly. Keep all doctor's appointments. During these appointments, be sure to tell the doctor about any problem you may be having with your feet. (#84)

Now, let's review what has been covered. Today, you have learned three reasons why special footcare is important to you. (#85)

Because of changes taking place in your body, you may have a greater chance of infection, you may have poor blood flow to your feet, and you may be less able to feel pain and heat. (#86)

Five rules have been given to help prevent foot problems. Number one, control your diabetes. Follow your diet regularly and use medications precisely as the doctor has ordered. (#87)

Rule number two, inspect your feet daily. During inspection, look for breaks in the skin and areas to be cared for after the bath. Use questions one, two and three in your workbook as guides for inspection of feet and footwear. (#88)

Rule number three, keep your feet clean and dry. (#89)

Rule number four, avoid all possible injury. (#90)

Rule number five, keep all doctor's appointments. (#91)

In discussing the five rules of footcare, it was stressed that care must be taken to keep your feet healthy. Adjust light and wear glasses for cutting nails and inspection. (#92)

Always test your bath water with your elbow or a bath thermometer. (#93)

After soaking foot for 15 to 30 minutes, rub corns and calluses with gauze. (#94)

Use a toenail cutter to cut toenails. Never use a scissors. (#95)

Round corners of nails with an emery board. (#96)

Rub dry areas on your feet with vaseline or cream to keep them from cracking. (#97)

Use cotton to separate overlapping toes. (#98)

Slippers do not offer the same protection as shoes and should only be worn for short periods of time. (#99)

Treat all injuries early. Wash the injury, wipe with peroxide, and cover with gauze and, if necessary, paper tape. Do not use adhesive tape. (#100)

Be careful in the selection of new shoes. (#101)

Question number five in your workbook will help you to remember these points when buying new shoes. (#102)

Never go barefoot. (#103)

Avoid extremes of heat. Wear heavy wool socks to warm cold feet. (#104)

Break yourself of bad habits. (#105)

It is hoped that this program has helped you with some of the problems and questions you may have regarding the care of your feet. The workbook is yours to keep and use in the future to help remember what you have learned today. (#106)

The Workbook

1. (Circle yes or no for each question, then return to the program.)

   Do your shoes have. . .

Tacks in the sole?	yes	no
Holes in the sole?	yes	no
Heels that are run-down?	yes	no
Sharp, bumpy, rough areas inside the shoe?	yes	no

   (Now return to the program)

2. (Circle yes or no for each question, then return to the program.)

   Do your feet need special care for. . .

Corns?	yes	no
Calluses?	yes	no
Dry areas?	yes	no
Breaks in the skin (cracks, cuts, blisters)?	yes	no
Do your nails go past the ends of your toes?	yes	no
Are the corners of your nails sharp?	yes	no
Are your toes squeezed together or do they overlap?	yes	no

   (Now return to the program.)

3. (Circle yes or no for each question, then return to the program.)

Are your socks made of cotton or wool? yes no

Are your socks slightly larger than your foot? yes no

If you are wearing nylon stockings, is the foot made of cotton? yes no

Are your socks free of mended areas, seams, holes and ridges? yes no

(Now return to the program.)

4. (Circle do or don't for each question, then return to the program.)

Inspect feet and footwear daily. do don't

Adjust light and wear glasses for inspecting feet and cutting nails. do don't

Test bath water with your feet. do don't

Cut calluses with a razor blade. do don't

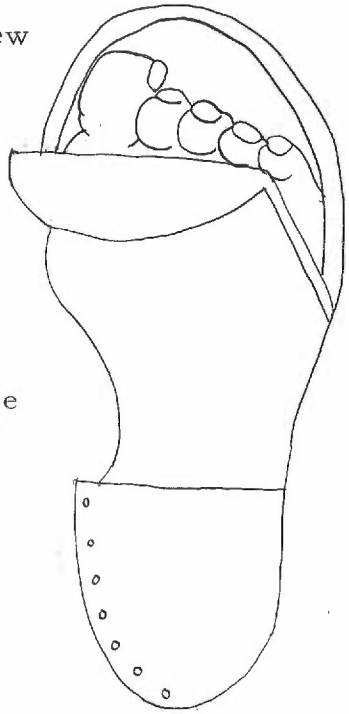
Use a sharply pointed scissors to cut nails. do don't

Round corners of nails with an emery board. do don't

Use cotton to separate overlapping toes. do don't

Slippers offer the same protection as shoes. do don't

5. What should you look for in selecting new shoes.



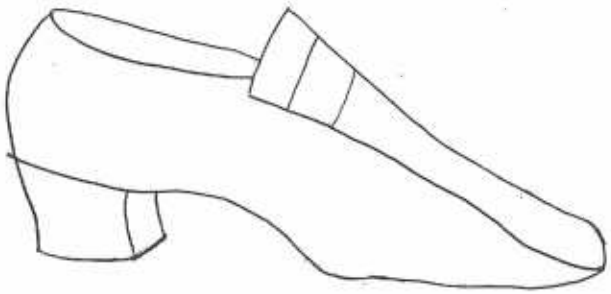
Shoe should be long enough and broad enough

Widest part of foot should fit into widest part of shoe

Shoe should extend 3/4 inch past end of large toe when standing

Shoe should follow natural outline of foot

Counter should be firm with snug fit



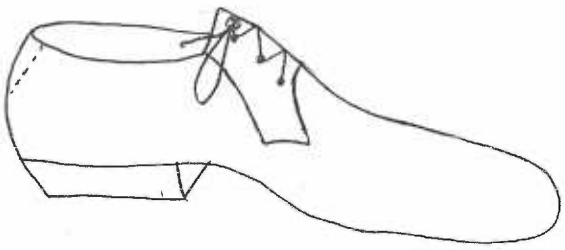
Heel should be high enough to give foot support, but no higher than 1-1/4 inches

Toe box should be round and high

Toe box should be made of soft material

Sole should be made of a material that bends easily

Lining should be smooth



CHAPTER IV

TESTING THE PROGRAM

The instructional program as developed, necessitated pilot testing procedures conducted in two stages. In stage one of the developmental or pilot testing, the pretest was administered to four learners. After testing, the learners individually viewed various segments of the tape-slide program using the accompanying workbook for recording interaction and responses. Informal questioning by the researcher then followed. Early revisions of the program based on learner responses, consisted of changes in terminology within the program and the addition of slides for clarification of footcare procedures.

Further testing, as well as piloting of the evaluation plan, was conducted in stage two, presenting the revised tape-slide program, and accompanying pretest, workbook, and posttest, to a class of fifteen learners meeting for weekly diabetes classes at the study hospital. The pretest was administered immediately preceding the program and the posttest was administered immediately following the program. Since some questions necessitated more than one correct response, instructions to circle every answer considered to be correct were given. Learners were asked not to

guess and not to answer questions about which they were unsure. Raw scores for the two tests were determined according to the number of correct answers circled. The highest possible raw score was calculated to be 21 on the pretest and 27 on the posttest. After scoring each of the pre and posttests, the raw scores were corrected to percent equivalents so that direct comparisons of pre and post program performances could be made. The resulting gain scores are presented in Table 2.

The multiple choice format of both tests administered provided opportunity for guessing. Having given instructions to avoid guessing, a correction for guessing formula,

$$\text{Score} = \text{Right} - \frac{\text{Wrong}}{n - 1}$$

with n representing the number of alternatives in each item (Gronlund, 1968), was applied to tests showing incorrect responses (Table 2). Since all questions were not accompanied by the same number of alternative responses, the average number of alternatives (six) was used in the correction for guessing formula.

Problems related to the format of the pretest and posttest were encountered during analysis of the testing. The varying number of answers for each question made scoring difficult and necessitated correction for error when incorrect responses were given. Likewise, this form of testing appeared confusing to the

TABLE 2

Summary of Pretest and Posttest Scores, Gain Scores in Percent, and Client Information

	Pretest Scores				Posttest Scores							
Client	# Right (n = 21)	Score in %	# Incorrect	Correction for error %	# Right (n = 27)	Score in %	# Incorrect	Correction for error %	Gain Scores in %	Age in Years	Educational Level in Years	Length of Disease in Years
1.	4	19.0	5	14.3	22	81.5	0	81.5	67.2	62	12	0.16
2.	9	42.9	3	40.0	21	77.8	3	76.0	36.0	71	8	24
3.	9	42.9	3	40.0	24	88.9	3	87.0	47.0	51	12	0.25
4.	11	52.4	3	49.5	25	92.6	1	92.0	42.5	78	9	10
5.	4	19.0	1	18.0	15	55.6	1	54.8	36.8	62	11	0
6.	6	28.6	1	27.6	20	74.1	2	72.6	45.0	61	8	10
7.	3	14.3	0	14.3	23	85.2	0	85.2	70.9	40	13	0
8.	6	28.6	6	22.9	19	70.4	2	68.9	46.0	57	12	18
9.	5	23.8	7	17.1	12	44.4	1	43.7	26.6	67	10	3
10.	14	66.6	1	65.7	19	70.4	2	68.9	3.2	59	3	25
11.	3	14.3	3	11.4	15	55.6	0	55.6	44.2	33	12	10
12.	15	71.4	0	71.4	27	100.0	0	100.0	28.6	27	12	2.5
13.	6	28.6	3	25.5	20	74.1	2	72.6	46.9	59	10	2
14.	17	81.0	0	81.0	26	96.3	0	96.3	15.3	53	11	12
15.	4	19.0	0	19.0	18	66.7	6	62.2	47.7	77	10	18
Means	7		2.4	34.5	20.4		1.5	74.8	40.3	57	10.2	9

learners, since the learner was given no indication as to how many responses for each question were considered to be correct. Furthermore, three alternatives for each answer existed. Answers could be considered correct, incorrect, or omitted. In general, learners omitted circling correct answers more frequently than they circled incorrect answers. Inspection of test results (Table 3) reveals that in the pretest, only 33.6 percent of the total possible correct responses were given and 66.4 percent of the total possible correct responses were omitted. Of all the responses given (142), 27 percent were incorrect. In contrast, posttest results reveal 75.5 percent of possible correct responses were given, 24.5 percent of possible correct responses were omitted, and of the total responses given (329), 7 percent were incorrect. Comparison of the pre and posttest results reveals difficulty on the part of the test taker in giving the correct responses and the correct number of responses in relation to each question. Difficulty in response selection, although still present, is less evident on the posttest, and may possibly be explained by increased subject knowledge on the part of the test taker and/or increased sensitization to the instrument itself, its format and behavior solicited.

Illustrating the difficulty in response selection is Table 4. Test items number one and five of the posttest are used as examples. Referring to Table 4, it is seen that in item one, only 33.0 percent

TABLE 3

Percent of Responses on Pretest and Posttest Considered Correct, Incorrect, and Omitted

	Pretest %	Posttest %
Correct responses/ total possible correct	33.6	75.5
Incorrect responses/ total responses given	27.0	7.0
Omitted responses/ total possible correct	66.4	24.5

TABLE 4

Responses to Two Posttest Items, Percent Responding and Percent Making All Appropriate Selections for Each Item

Item #1		Item #5	
Response	f	Response	f
a.	0	a.	2
b.*	7	b.*	3
c.	0	c.	0
d.*	10	d.*	15
e.*	9		
f.	1		
Percent responding	87%	Percent responding	100%
Percent making all appropriate selections	33%	Percent making both appropriate selections	20%

*Responses considered correct.

of the respondents made all the appropriate selections. Similarly, in item five, only 20.0 percent of the respondents selected both correct answers.

In view of the above findings, it is suggested that further revision and testing of the pretest and posttest be made before its implementation as an evaluation instrument. If the format of multiple correct answers is retained, it is suggested that various combinations of right and wrong answers in each of several alternatives be considered. Options such as "A., B., and C., but not D.," or "A., B., and D., but not C.," would test essentially the same behavior as the instrument now tests, but only one response for each item would be considered correct.

In order to provide some indication as to the effectiveness of the teaching program, differences between pretest and posttest scores of stage two testing were analyzed by means of the t-Test. As predicted, the posttest showed a significant change in knowledge from the pretest, $t(14) = 8.97$, $p < .001$. The significance suggests that the instructional program did effectively change cognitive behavior as related to immediate recall of factual information. Stronger evidence of the ability of the program to significantly change cognitive behavior may be substantiated by additional testing, administering the pretest and posttest without administering the instructional program and/or, administering the program and

posttest without the sensitization of the pretest. Further testing would likewise be necessary to evaluate the ability of the learner to translate and apply the knowledge gained to his own footcare.

During the second stage of developmental testing or piloting of the program, each learner was asked to read and sign a Research Study Participation Agreement (Appendix B) and supply answers to a General Information Questionnaire (Appendix C). The general information was later used, together with the test scores, to supply multiple correlations among six variables (Table 5). It was the researcher's intent to identify variables affecting entry level performance, terminal performance and gain score. Five significant values were identified (Table 5). As expected, a positive correlation between the pretest and posttest scores was found supporting the literature that stated entry level performance does play a role in determining course achievement (General Programmed Teaching, 1973; Kemp, 1971). A high pretest score can predict a high posttest score. Likewise identified and expected was a negative correlation between pretest scores and gain. The correlation may be easily explained since a high pretest score can impose a ceiling on possible gain scores to be achieved. Further, a low pretest score would allow for a greater possible gain.

Inspection of the remaining three correlations found to be significant, reveals an interrelationship between length of disease,

TABLE 5

A Correlation Matrix Among Six Variables

	Age	Educational Level	Length of Disease	Pretest Score	Posttest Score	Gain
Age	1	-.432	.3986	-.1563	-.2281	-.0120
Educational Level		1	-.6528**	-.3621	.0872	.6405**
Length of Disease			1	.2361	-.1566	-.5016*
Pretest				1	.6796**	-.7475**
Posttest					1	-.104
Gain						1

* $p < .05$

** $p < .005$

educational level, and gain score. Length of disease is negatively associated with both educational level and gain score, and gain score is positively associated with educational level. Although it might be expected that length of disease and educational level would be negatively correlated, it is difficult to explain without considering age. One would expect the older diabetic to have less education and a longer history of diabetes. A trend in the expected direction is seen as the negative association between age and educational level (-. 432) and the positive association between age and legnth of disease (. 3986) approach significance. The negative association of length of dieases with gain score may easily be interpreted, since it would be expected that the longer the disease, the greater the knowledge of the disease, hence a lower possible gain. If this were entirely true, however, one would also expect a correlation between length of disease and pretest score, which was not supported.

Hypothetically, from the above findings, one might identify two basic profiles in the clinic population at the study hospital. The first profile may be described as a person who has had diabetes for a number of years, demonstrates a lower gain score, is less well educated, but shows a high pretest and a high posttest score. The opposite profile, is the person with more education, having diabetes for a shorter period of time, showing a higher gain score and exhibiting lower pretest and posttest scores.

Findings identified which are relevant to this study showed: entry level performance or pretest scores could not be predicted by any one of the tested variables; the terminal performance or post-test score was positively associated with the pretest score; and gain score or ability to benefit from the instructional program was positively associated with educational level and negatively associated with pretest and posttest scores. Thus it was concluded that persons fitting the second profile described above, benefitted more from the instructional program as developed. Looking at the means in Table 2, this profile is more accurately described as someone who has had diabetes for nine or less years and has an education of at least 10.2 years.

In summary, the t-Test and multiple correlations were used in an initial attempt to summarize data. Pilot testing of the instructional program provided verification of the effectiveness of the program in changing cognitive behavior as measured in the immediate recall period. Problems with the evaluation instrument were encountered and identified. Further testing of the instructional program, and both testing and revision of the evaluation tool are suggested by the researcher.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was concerned with the development of an instructional program for teaching the diabetic patient the importance and procedures involved in daily footcare. In a review of the literature a lack of understanding of footcare procedures in the diabetic population was identified; general problems in patient education were reviewed; and organized education as a means of effectively changing behaviors in various groups of individuals was documented.

The physiological component of diabetic foot problems has contributed to research investigations attempting to relate good diabetic control to decreased vascular and neuropathic complications (Williamson et al., 1971; Sliperstein et al., 1968). Although research has been unable to demonstrate a reliable cause and effect relationship between strict diabetic control and the avoidance of these complications, it suggests that poor control can be associated with increased severity in complications. It is for this reason that diabetic management has as its goal, diabetic control.

Based upon the above literature, a tape-slide program was

developed and later converted to video tape, providing reasons and procedures for the safe practice of daily footcare. A pilot testing of the program, conducted in two stages, revealed the ability of the program to effectively increase knowledge regarding diabetic footcare as measured in the immediate recall period; identified a need for the further testing and revision of the evaluation tool; and generated data later used to identify possible predictors of success in those using the program.

Conclusions

The purpose of the present study was concerned with the development and plan for evaluation of an educational program. A teching program was developed utilizing principles of unit development (General Programmed Teaching, 1973; Kemp, 1971). Two purposes of the instructional unit were identified and ten learning objectives were defined. Instructional content was developed through an extensive review of the literature. Finally, developmental or pilot testing of the program was utilized to evaluate achievement of objectives and provide data for further revision of the program. From the data provided, it was concluded that those benefitting most from the program as measured by gain in knowledge, were those who have had diabetes for a length of nine years or less and have an education of at least 10.2 years.

Based on the evaluation of the program as discussed in the testing process, it is further concluded that the developed program is a successful means of changing knowledge regarding footcare practice. The program provides instruction in an area often overlooked in diabetic education; it provides a teaching media readily accessible and easily used by the individual learner. The physical characteristics of the video tape itself, provide for adjustment to the rate of learning most suitable to the individual patient. Finally, the program, designed by a nurse specially trained in diabetes, provides accuracy and consistency in instructional content and method, allowing for more effective (and possibly efficient) use of the nurse specialist's time.

Recommendations

The following recommendations for further study are suggested by this investigator:

1. Additional evaluation of the program, involving use of the program with hospitalized patients, identification of individual differences in length of time to complete the program, and ease in manipulation of equipment.

2. Revision and testing of the present evaluation instrument to include various combinations of right and wrong answers, or,

development and testing of a new instrument for evaluation of the program.

3. Evaluation of the program regarding its effectiveness in changing footcare practices, occurrence of foot problems, reporting of foot problems, and/or hospitalization for foot problems at the study hospital over a given period of time.

4. Further testing of the teaching instrument using a large group, identifying demographic and health related factors influencing the effectiveness of the program.

5. Development of additional instructional programs related to other areas of diabetic education.

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APPENDICES

APPENDIX A

PRETEST AND POSTTEST

PRETEST

1. Why should you, as a person with diabetes, pay special attention to your feet?

   a. because I may have thin blood

   b. because of physical changes taking place in my body

   c. because my nails grow fast

   d. because my feet are soft

2. How often do you need to look closely at your shoes and socks?

   a. at least once a month

   b. once a week

   c. three or four times a week

   d. every day

3. How often do you need to look closely at your feet?

   a. every day

   b. three or four times a week

   c. about once a week

   d. only when they hurt

4. How often do you need to wash your feet?

   a. at least twice a day

   b. once a day

   c. three or four times a week

   d. only when thy're dirty

5. How should you test the bath water to find out if it is warm or hot?

   a. with my foot
   b. with my elbow
   c. with a bath thermometer
   d. with my hand

6. As a person with diabetes, which of the following items may you use to remove corns and calluses?

   a. nothing
   b. carmol cream
   c. washcloth or gauze
   d. foot soaks
   e. razor blades
   f. corn plasters

7. Which of the following clippers and files should you use in caring for your toenails?

   a. scissors
   b. toenail clipper
   c. sharp nail file
   d. emery board
   e. nothing--the doctor does it

8. Which of these items show good practice of footcare?

   a. going barefoot
   b. putting cotton between toes
   c. smoking
   d. wearing tight garters
   e. hot foot baths
   f. cutting nails straight across and rounding corners
   g. letting nails grow past ends of toes

9. What should you look for in selecting shoes for yourself?

   a. shoes made of leather
   b. shoes made of rubber
   c. shoes that fit tight
   d. shoes with pointed toes
   e. shoes with a two inch heel
   f. shoes two inches longer than foot

10. What should you look for in selecting socks for yourself?

   a. socks made of cotton
   b. socks made of wool
   c. socks with seams
   d. socks that fight tight
   e. socks slightly larger than foot
   f. socks that keep feet warm
   g. socks that have holes mended

11. When your feet are cold, how should you warm them?

   a. warm them quickly in hot water
   b. use a hot water bottle
   c. use a heating pad on low setting
   d. put on heavy socks

12. Which of these items should be used when caring for a foot injury at home?

   a. soap and water
   b. paper tape
   c. bandaids
   d. gauze
   e. peroxide
   f. iodine
   g. adhesive tape
   h. nothing--only the doctor should treat injuries

POSTTEST

1. As a person with diabetes, why should you pay special attention to your feet?
   a. I don't know
   b. because I may not be able to feel pain and heat
   c. because I bleed easier
   d. because I may have poor blood flow to my feet
   e. because of an increased chance of infection
   f. because blood flows faster to my feet
2. How often should you inspect your shoes and socks?
   a. once a week
   b. twice a week
   c. every day
   d. twice a day
3. How often should you inspect your feet?
   a. twice a day
   b. every day
   c. once a week
   d. only when they hurt
4. How often should you wash your feet?
   a. at least twice a day
   b. once a day

c. three or four times a week

d. after going barefoot

5. How should you test the bath water to find out if it is warm or hot?

a. with my hand

b. with a bath thermometer

c. with my foot

d. with my elbow

6. As a person with diabetes, which of the following items may you use to remove corns and calluses?

a. washcloth or gauze

b. stiff brush

c. razor blades

d. foot soaks

e. corn plasters

f. nothing

7. Which of the following clippers and files should you use in caring for your toenails?

a. toenail clippers

b. sharp scissors to cut into corners

c. emery board

d. sharp nail file

e. nothing--only the doctor should do it

8. Which of these items should you use when caring for a foot injury at home?

   a. soap and water
   b. adhesive tape
   c. paper tape
   d. gauze
   e. peroxide
   f. vaseline
   g. bandaids
   h. nothing--only the doctor should treat injuries

9. How should you warm your feet when they are cold?

   a. put on heavy socks
   b. use a hot water bottle
   c. use a heating pad on low setting
   d. warm them quickly in hot water
   e. warm them by a heater

10. What should you look for in selecting socks for yourself?

   a. socks made of cotton or wool
   b. socks made of nylon
   c. socks that fit tight
   d. socks that have holes mended
   e. socks without seams
   f. socks slightly larger than the foot

11. What should you look for in selecting shoes for yourself?

   a. shoes made of cloth
   b. shoes made of leather

c. shoes with pointed toes

d. shoes with an open heel

e. shoes that fit tight

f. shoes with a heel at least 1-1/2 inches high

g. shoes two inches longer than the foot

12. Which of these items shows poor footcare practice?

a. going barefoot

b. wearing tight garters

c. sunbathing for long periods of time

d. careful smoking

e. wearing new shoes only four hours the first day

f. hot foot soaks

g. letting nails grow past the ends of the toes

APPENDIX B

RESEARCH STUDY PARTICIPATION AGREEMENT

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Colleen Lucas R. N., a graduate student at the University of Oregon School of Nursing,, requires the following consent from the patient:

Date _____

Hour _____

I volunteer to participate in the study designed to evaluate a teaching program on diabetic footcare. The study will involve answering written questions before, during and after viewing a series of slides. This study has been discussed with me and I have had an opportunity to ask questions. I understand I have the right to refuse to participate in this study and the results of any testing will remain anonymous.

Patient signature _____

APPENDIX C

GENERAL INFORMATION QUESTIONNAIRE

GENERAL INFORMATION QUESTIONNAIRE

Name _____ Age _____

Clinic # _____ Sex M F

Date _____ Marital Status M S W D

Address _____

Source of income: employment public assistance

social security retirement other

Education: circle highest grade completed

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Height _____ Weight _____

What is the reason for your present visit? Routine

Specific problem

How long have you known you had diabetes? _____

Type of diabetes: Juvenile onset or Adult onset

Diabetes controlled by: Insulin Oral drugs Diet

Surgeries and/or hospitalizations for foot problems? yes no

If yes, approximately when and how long were you hospitalized? _____

AN ABSTRACT OF THE FIELD STUDY OF

COLLEEN M. LUCAS

FOR THE MASTER OF NURSING

Date of receiving this degree: June 13, 1975

Title: THE DEVELOPMENT OF AN INSTRUCTIONAL PROGRAM FOR TEACHING DIABETIC FOOTCARE

Approved: _____

May Rawlinson, Associate Professor, Field Study Advisor

ABSTRACT

The ability of the diabetic patient to follow a prescribed disease management regimen, has been identified as being largely dependent upon the quality and consistency of instruction received. The lack of structure in diabetic education programs, the insufficient number of adequately trained personnel, as well as the continuing barriers to effective communication, have been reported as contributing factors responsible for the lack of knowledge and poor disease management in the diabetic population. Effective patient education programs should be individualized to the needs of the learner; standardized or organized in such a manner that all learners receive the same content; administered by specially trained personnel; and include all aspects of the disease.

Footcare instructions for the diabetic patient are often overlooked or neglected completely. The purpose of the present study was to develop a teaching method or program providing instructions in the purpose and procedure of daily footcare practice. An extensive review of the literature assisted in the development of content. Development of the program consisted of a step-wise approach, identifying the purpose of instruction, learning objectives, group identification characteristics, teaching/learning activities and resources, plan for evaluation, and developmental or pilot

testing of the program. The program itself consists of a tape-slide presentation which has been covereted to video tape.

Testing of the program took place in two stages. Early revision of the program was based on the findings in stage one. Stage two testing, consisting of a sample of fifteen subjects selected from the diabetic clinic population, was conducted to provide further evaluation of the program. Initial analysis of the data identified problems in the evaluation instrument and confirmed the effectiveness of the teaching instrument in significantly changing cognitive behavior as measured in the immediate recall period. The use of a multiple correlation matrix was used to identify predictors of success in those using the program. Five significant values were identified: positive correlations between pretest and posttest scores, and between educational level and gain score; negative correlations between educational level and length of disease, length of disease and gain score, and pretest and gain score. Success in the program as measured by gain score, is identified as being dependent on a shorter length of disease (< 9 years), above average education (> 10.2 years) and low pretest score ($< 34.5\%$).

On the basis of the findings, it is concluded that the developed program is an effective means of patient education. The program fills a need, addressing itself to a frequently overlooked aspect of disease education, given at the pace and place most appropriate to the individual patient.