Cynthia Hill Johnson. A STUDY TO IDENTIFY A HIGH RISK PROFILE FOR DEVELOPMENT OF DECUBITUS ULCERS. (Under the direction of Corre J. Garrett) School of Nursing, April 1988.

The purpose of this study was to determine the correlation between the presence of these variables and decubitus ulcer development. The research question examined was: Are age, mobility, malnutrition, dehydration, heat, smoking habits, and psychological factors variables that influence the individual's adaptation, therefore increasing the risk of developing decubitus ulcers.

Decubitus ulcers or pressure sores are a problem for the chronically ill, debilitated, disabled, and elderly. Their development is not a simple problem but occurs as a result of the interrelationship of a number of variables. The literature identifies many interventions for the prevention and treatment of decubitus ulcers; however, one point is clear: prevention is unequivocally the best approach.

The sample consisted of 100 subjects, age sixty-five and above, who had been hospitalized in a large

tertiary care center for fifteen to thirty days within the last three years. The subjects were divided into two groups: those individuals who developed decubitus ulcers during their hospital stay, and those who did not. A tool developed for this study was used to collect the data.

Results of the study indicate that a relationship exists between age, mobility, malnutrition, and pathological changes and the development of decubitus ulcers. No relationship was found between dehydration, heat, smoking habits, and psychological factors and the development of decubitus ulcers. The identification of variables which are highly correlated with the development of decubitus ulcers should assist nurses in the early recognition of high risk patients and help them institute interventions for prevention.

A Study to Identify a High Risk Profile for Development of Decubitus Ulcers

by

Cynthia Hill Johnson

Thesis

Presented to the Faculty of the Graduate School

East Carolina University

in Partial Fulfillment

of the Requirements

for the Degree of a

Masters Science of Nursing

East Carolina University

April 11, 1988

Running Head: Decubitus Ulcers

A Study to Identify a High Risk Profile for Development of Decubitus Ulcers

by

Cynthia Hill Johnson

Approved by Thesis Committee

Director Of Thesis	Corre Garrett, Ed.D.
Committee Member	Frances R. Eason, Ed.D.
Committee Member	G. Michael Poteat, Ed.D.
Committee Member	Betty J. Reynolds, Ed.D.
Assistant Dean Of The Graduate Program School Of Nursing	Gaye W. Poteet, Ed.D.
Dean Of The Graduate School	Joseph Boyette, Ph.D.

ACKNOWLEDGMENTS

The author would like to thank the people who participated in this thesis. Dr. C. Garrett, the director has provided valuable suggestions and facilitated the study completion. The other members of the thesis committee, Dr. F. Eason, Dr. B. Reynolds and Dr. M. Poteat have also provided valuable feedback and suggestions which were used to improve both the quality of the data collection and reporting of the study.

Table of Contents

Chapter 1

Introduction

Decubitus ulcers or pressure sores have historically been a problem for the chronically ill, debilitated, disabled, and elderly. They occur as a result of the individual's physical inability to adapt to changes in their internal and external environment. Decubitus ulcer development has a major effect on patient morbidity, mortality, rehabilitation, and health care expenditures. The magnitude of this problem has grown as increased life expectancy and advances in medical technology have drastically changed the characteristics of individuals seen by health care professionals. Today, there are increasing numbers of high risk elderly and chronically ill individuals both in hospitals and in the community. Identification of variables that increase an individual's risk for development of decubitus ulcers would facilitate appropriate nursing interventions aimed at promoting adaptation and prevention of decubitus ulcer development.

American Hospital Association (1983) figures on

the prevalence of decubitus ulcers indicate that 20 percent of all patients admitted to hospitals are at risk for the development of decubitus ulcers, and 20 percent of this high risk group will develop them. According to Cooney and Reuler (1984) pressure sores occur most frequently in two populations: patients with spinal cord injuries and the elderly. Lee (1985) reports that of the 10,000 new cases of paraplegia and quadriplegia which occur annually in the United States, 50 to 75 percent will suffer from decubitus ulcers. The complications resulting from their development will account for 7 to 8 percent of the deaths of spinal cord injured patients (Cooney and Reuler, 1984). Statistics indicate the over age 65 population has increased twice as fast as the rest of the American population in the past two decades, and projections are that this number will double between the years 1980 and 2020 (Tames, 1984). In addition to a larger group of elderly citizens, research shows that 65 to 75 percent of people over age 65 have at least one chronic disease other than the diagnosis for which they are admitted into hospitals, increasing their risk for the

development of decubitus ulcers (Kelyman, 1984).

Individuals developing decubitus ulcers require long term expenditures of health care resources. A study done by Agris and Spira (1979), examining the treatment and prevention of decubitus, estimated the cost of treating a single ulcer at $8,000. Blom (1985) estimated the cost to range from $5,000 to $34,000. Health care institutions are faced with a growing challenge as they attempt to provide health care services to high risk groups under the constraints of a prospective reimbursement system. The average reimbursement for a diagnosis of decubitus ulcer is $4,518, with an approved length of stay of 18 days (American Hospital Association, 1983). Jones and Millman (1984) studied the average length of stay associated with decubitus ulcers in a large metropolitan hospital. They examined 55 patients and reported that length of stay ranged from 42 to 104 days, with a direct correlation between severity and length of stay.

Costs associated with the development of decubitus ulcers include more than just the expense of treatment.

The failure of the individual to adapt to changes in the environment, that result in the development of decubitus ulcers, affects both patients and families emotionally. The ulcer's appearance is frightening and demoralizing to the individual. It represents necrosis, as body tissue decomposes due to lack of adequate oxygen and nutrients. This reinforces feelings of helplessness, loss of control, and may represent impending death. The development of decubitus ulcers negatively affects the health care team, because development often carries with it underlying connotations of neglect and/or mismanagement, and feelings of failure, disappointment and guilt (Anderson and Andberg, 1979).

Decubitus ulcers are localized areas of cellular necrosis caused by inadequate blood supply (Berecek, 1981). While it is agreed upon in the literature that pressure and shearing are the primary causes of decubitus ulcers, authors have identified a number of other variables as contributing or increasing the risk for their development. These variables include age, mobility, malnutrition, dehydration, pathological

changes, heat, smoking habits and psychosocial factors. A variety of tools have been developed using these variables as a mechanism to identify the individual who is at high risk for the development of decubitus ulcers (Arnell, 1983; Gosnell, 1973; Kerr, Simon, & Shanon, 1981; Lee, 1985; Norton, McLaren, & Exton-Smith, 1975; Rampino, 1976; Stamper, 1978). No single study reviewed has examined all of these variables and their significance to the high risk patient.

Review of the literature identifies a large number of interventions for the prevention and treatment of decubitus ulcers, both systemic and local in nature. Although few studies examine the value of one approach versus the other, one point is consistently clear, prevention is unequivocally the best approach. Intervention at this level requires early identification of the factors in the patient's internal and external environment that inhibit adaptation. Roy's Model of Adaptation provides a conceptual framework to examine each variable and determine which factors increase the individual's risk of developing decubitus ulcers.

The purpose of this study was to determine the correlation between the presence of these variables and the occurrence of decubitus ulcer development. Identification of the variables that are highly correlated with the occurrence of decubitus ulcer development would facilitate early identification of the high risk patients and should direct nursing interventions towards preventive measures.

The research question being examined was: Are age, mobility, malnutrition, dehydration, pathological changes, heat, smoking habits, and psychological factors variables that influence the individual's adaptation, therefore increasing the risk of developing decubitus ulcers.

Chapter 2

Review of Literature

The conceptual framework used in this study was that of Sister Callista Roy. Roy's Model of Adaptation is consistent with the concept of adaptation as it relates to physiological changes which were examined in this study. Review of definitions of adaptation from various disciplines identifies a number of critical attributes which appear essential and sufficient to define the concept. These include living organism, stimuli, process, response, maintenance of integrity and survival, and environment (Burhoe, 1982; Lewontin, 1978; Mergler & Goldstein, 1983; Parker, 1984; Scheer, 1982; Theodorson & Theodorson, 1979; Wolman, 1973). Utilizing these as critical attributes, the following theoretical definition of adaptation has been developed for this study. Adaptation is the act or process of responding to constantly changing environmental stimuli for the maintenance of integrity and/or survival of an individual. Roy's model provides a framework to examine this process of adaptation and to direct health professionals' interventions.

Roy describes man as a biopsychosocial being in constant interaction with the environment, an adaptive system (Roy, 1984). Man's environment is defined as both the internal and external factors that interact with the individual and influence the condition of his existence and survival. Internal variables that increase an individual's risk of developing decubitus ulcers are age, mobility, malnutrition, dehydration, pathological changes, heat, and smoking habits. External variables are pressure, shearing forces, and psychological factors.

As a system, man uses internal processes to cope with environmental changes. These internal processes are defined as regulator and cognator subsystems. The regulator subsystem involves physiological responses to environmental changes. The cognator subsystem involves psychological processes for dealing cognitively and emotionally with changes (Roy, 1976). Some of the responses in these two subsystems are genetic and others are learned. These adaptive mechanisms assist man to maintain integrity and to adapt by allowing internal and external changes to occur.

Roy (1971) identifies four effector modes in which man manifests cognator and regulator activity. When there are need excesses or deficits in any of the four modes, man responds to maintain biopsychosocial integrity. These are physiological function, self-concept, role function, and interdependence. The four modes are briefly defined as:

1. physiological function - the physiological responses that maintain body integrity;
2. self-concept - internal need to maintain psychological integrity;
3. role function - concept of oneself as defined by others;
4. interdependence - the need for love and support (Roy,1970).

Roy discusses these modes as the intervening variables between basic needs and behaviors. The output of this process is either adaptive or ineffective responses. This model identifies three origins of stimuli in the environment. These are focal, contextual, and residual. Focal stimuli are defined as stimuli currently present and affecting the

individual. Contextual stimuli are those present in the environment, which could have a measurable outcome on the individual's response. Residual stimuli are stimuli the individual has had past experience with under similar situations, which have an undetermined effect on the present situation (Roy, 1976). The interaction between these stimuli and the individual creates a zone, which allows for a positive response. This zone, or adaptation level determines the range of stimulation that will have a positive response. If an individual is confronted with stimuli that fall outside this adaptation level, they are unable to respond positively or adapt, jeopardizing their state of health (Roy, 1970). Health is viewed as man's ability to adapt. An individual's state of health is seen as existing on a continuum, with illness at one end and peak health at the other. The individual's position on this continuum, at any given time, is directly related to the environmental stimuli present and his ability to adapt (Roy, 1984).

The chronically ill, debilitated, disabled or elderly individual has a much higher risk of stimuli

from environmental variables falling outside of the adaptation level and negatively impacting the state of health. Historically, decubitus ulcer development has occurred as result of failure to adapt. The literature identifies a number of environmental stimuli that require a regulator or cognator response. These include pressure, shearing forces, age, mobility, malnutrition, dehydration, pathological changes, heat, smoking habits and psychosocial factors.

Ischemia due to pressure and shearing has been identified as the primary pathophysiological factor associated with the development of decubitus ulcers. Early studies document the effects of ischemia due to pressure or shearing on supporting tissue. Kosiak (1959) studied the etiology and pathology of ischemic ulcers in the laboratory setting using dogs. He documented pathological changes in tissue subjected to as little pressure as 60 mm Hg for only one hour. His study identified the time-pressure relationship, establishing the significance of the length of the ischemic insult to the tissue. Dinsdale (1973) studied the microscopic effects of pressure and friction in the

tissue of pigs. This study documented the physiological changes that occur in the skin and muscle layers as a result of continuous pressure. Barton (1976) examined disruptive damage to the skin commonly caused by intermittent blows or shearing forces which damage blood vessels and cause platelet thrombosis of the microcirculation. He concluded that ischemia and damage occurs from pressures in excess of the mean capillary pressure. Larsen, Holstein and Lassen (1979) reported that external pressure exceeding the actual mean pressure was required to stop circulation of blood to an area of skin. In 1981, Daniel, Priest and Wheatly questioned the etiology of ischemia as the sole primary variable in the development of decubitus ulcers. They conducted a study to examine the effects of pressure in normal and paraplegic swine. A continuously monitored computer controlled electromechanical pressure applicator was designed to produce decubitus ulcers over the greater femoral trochanter. They found that skin destruction required increased pressure for long durations of time, supporting the previous work done by Kosiak (1959).

Skin breakdown did not occur with a pressure of 200 mmHg for 15 hours in the normal swine, thus contradicting the results found by Barton (1976). They supported their hypothesis that normal tissue has a higher resistance to pressure than previously noted in the literature, but this threshold is lowered dramatically following changes in the soft tissue due to a number of variables.

Cooney and Reuler (1984) identify the elderly as one of the two populations in which decubitus ulcers are most frequently found. Their identification of age as a variable influencing the development of decubitus ulcers is supported by a review of studies examining variables (Andersen, Jensen, Kvorning & Bach, 1982; Daniel, Priest & Wheatly, 1981; Ek & Boman, 1982; Moolten, 1972; Pinchcofsky-Devine & Kaminski, 1986; Thiyagarjan & Silver, 1984). Rationale offered in these studies suggests that about one percent of the collagen in skin is lost per year, and therefore, the risk of skin damage due to pressure and shearing increases with age.

Mobility is the body's normal defense mechanism to

prevent ischemia to areas of tissue. When pressure or shearing create decreased circulation of blood supply to a body surface a pain stimulus occurs and the natural reaction is to attempt to relieve the pain by movement. Decreased mobility creates areas of tissue that sustain prolonged pressure obstructing capillary circulation causing irreparable damage to cells with subsequent necrosis. Seiler and Stahelin (1985) found that any condition which decreases the frequency of involuntary movement is a risk factor. They report the probability of an immobile individual, without some intervention, developing a decubitus ulcer is 100 percent.

The nutritional status of an individual impacts tissue vitality, which is the capacity of the tissue to resist the complications of ischemia by restoring and maintaining blood circulation after an ischemic insult. Gosnell (1973) included a nutritional category in the development of her high risk tool. Studies support nutritional status as a variable in the development of decubitus ulcers. Michocki and Lamy (1976) reported that 45 percent of the individuals they studied with

decubitus ulcers were anemic. Anemia decreases the blood's oxygen carrying power. The result is decreased oxygen saturated blood to an area of decreased blood circulation, increasing the potential for tissue necrosis. Protein is another essential element for normal tissue growth and healing. Some studies have identified protein deficiencies in individuals who develop decubitus ulcers. Allman et al. (1986) identified hypoalbuminemia as a significant variable in their cross sectional study of 624 adult patients with decubitus ulcers. Pinchcofsky-Devine and Kaminski (1986) developed a study to determine whether a correlation existed between deteriorating nutritional status and the development of decubitus ulcers. Their sample consisted of 232 nursing home patients with a mean age of 72. They classified the sample into three groups, adequate nutrition, malnutrition, and severe malnutrition. The nutritional status of each individual was determined by biochemical and anthropometric measures. The findings indicated that 59 percent of the sample had some degree of malnutrition, and all of the individuals categorized as

having severe states of malnutrition had developed decubitus ulcers. The results of this study infer a definite correlation between the development of decubitus ulcers and deteriorating nutritional status. Rowell and Steffl (1984) emphasize adequate hydration is essential as a nutritional factor. Their rationale is that adequate hydration is necessary to maintain skin turgor and prevent infections. Key nutritional components identified in the literature for maintaining tissue vitality are nitrogen balance, blood oxygen carrying power and adequate hydration.

Pathological changes that create illness, infection, metabolic disturbances, vascular deficiencies and changes in the skin condition increase the individual's risk of developing decubitus ulcers. Rationale supporting this factor is closely associated with other variables accompanying the pathological change, such as decreased nutritional status, mobility, and sensation. Individuals who are ill or injured lose more protein through tissue breakdown than normal, creating a negative nitrogen balance (Allman et al., 1986). Therefore, protein is not available to maintain

tissue integrity. Infections create a demand for nutrients to heal tissue (Eriksson, 1980). Metabolic disturbances created by illness can cause a state of anemia reducing the body's ability to supply oxygen to cells. Vascular deficiencies impede blood flow to tissue and can cause edema which extends the distance between cells and capillaries, further reducing the circulation (Rowell and Steffl, 1984). The skin is the body's first line of defense against bacterial invasion, and changes in skin condition which create breaks in the skin increases the risk of infection and decubitus ulcers.

An indicator for pathological condition was identified in all of the tools reviewed. The presentation varied to include one or a combination of three categories; current disease states, skin condition, or skin sensation (Arnell, 1983; Gosnell, 1973; Kerr, Simon & Shanon, 1981; Lee, 1985; Norton, McLaren, Exton-Smith, 1975; Rampino, 1976; Stamper, 1978). No research was found on the specific incidence of decubitus ulcer development of a specific diagnosis, with the exception of spinal cord injured patients.

External irritants have been identified as variables in several studies (Anderson, Jensen, Kvorning & Bach, 1982; Ek & Boman, 1982; Goldstone, 1982; Rowell & Steffl, 1984). Goldstone (1982) examined variables most frequently associated with the development of decubitus ulcers. This study found that skin subjected to prolonged moisture becomes softened and easily irritated, and was therefore more susceptible to skin maceration. The study found a significant correlation between diaphoresis and development of decubitus ulcers. Other studies support these findings (Kosiak, 1959; Reed, 1981; Seymour & Lacefield, 1985).

Lamid and Ghatit (1983) found a positive correlation between cigarette smoking and the development of decubitus ulcers in spinal cord injured patients. Their study included a sample of 17 paraplegic and 21 quadriplegic patients who were admitted to a spinal cord injured unit. All of the participants were male from ages 21 to 68. Their rationale for examining cigarette smoking was that nicotine is a vasoactive agent, which could impair

wound contraction and delay healing due to constriction of the blood vessels.

Psychosocial factors have also been considered as a variable. Andersen and Andberg (1979) found in a study of elderly adults that the absence of a consistent person to help with skin care and a lack of satisfaction with activities of life correlated to an increased incidence of decubitus ulcers. Thiyagarajan and Silver (1984) supported these findings when studying spinal cord injured patients. They found the presence of a caring relative or friend and adequate home facilities to be essential to prevent decubitus ulcers after discharge from the acute care setting.

A variety of tools have been developed using many of these variables as a mechanism to identify the individual who is at a high risk for the development of decubitus ulcers. Norton, et al (1975) devised one of the first and most frequently used scoring systems. Norton identified physical condition, mental awareness, activity, mobility, and incontinence as the major variables. This tool supported a study by Gosnell in 1973 which had used similar variables. The Gosnell

tool included categories of mental status, incontinence, mobility, nutritional status, vital signs, skin appearance, and skin sensation. Rampino (1976) reported the use of a scale similar to Norton's. Stamper (1978) developed a system which contains four categories: age, control of function, body structure, and degree of integrity. Kerr, Simon and Shanon (1981) used a five variable assessment as suggested by Norton, but presented them in a format describing each variable and the associated rating. Arnell (1983) developed a scale with the categories of mental status, incontinence, activity, mobility, nutrition, and skin appearance and sensation. Lee (1985) combined the work of Norton and Gosnell to develop her tool. She identifies the most useful variables as general state of health, mental status, activity, mobility, incontinence, oral intake, and predisposing diseases.

In summary, a review of the literature has identified many variables that can increase the risk of an individual to develop a decubitus ulcer, and require a regulator or cognator response from the individual. There were no studies found that examined all of the

variables to identify which were most closely related to increasing the individual's risk. Roy's Model of Adaptation provides a framework to identify the source of the stimuli and to direct nursing interventions. The nurse's role is described by Roy as promoting adaptation. In order to fulfill this role nurses need to focus their interventions directly on stimuli which can be eliminated or manipulated so they fall inside the individual adaptation zone.

Chapter 3

Method of Study

Introduction

This ex post facto correlational study examined the relationship between selected variables and the presence or absence of decubitus ulcers. The criterion variable for this study was the presence or absence of decubitus ulcers. The predictor variables examined included age, sex, mobility, nutritional status, dehydration, pathological changes, heat, smoking habits and psychological factors. The purpose of this study was to determine the correlation between the presence of these variables and the development of decubitus ulcers.

Sample

The sample was obtained from a large tertiary care center in Eastern North Carolina. Permission was obtained from the Human Resource Review Committee of

the institution to conduct the study. The sample was manually retrieved from log books in the medical records department which listed all patients admitted into the facility over the past three years. A list was made of all patients who had a length of stay from fifteen to thirty days and were sixty-five years old or older. The sample was then divided into two groups: those who developed decubitus ulcers while in the hospital and those who did not. Fifty patients were randomly selected from each group to assess for the presence of predictor variables.

The subjects in Group A, those who developed decubitus ulcers, consisted of 24 females and 26 males. This group was found to have a mean age of 72 years, an average length of stay of 22 days, and had spent an average of 7 days in the critical care area. The subjects in Group B, those who did not develop decubitus ulcers, consisted of 19 females and 31 males. The mean age of this group was 70 years of age, the average length of stay was 17 days, with an average of just less than 2 days spent in a critical care area.

Data Collection Techniques

The Medical Records Supervisor was approached to assist in obtaining the medical records logs to identify the sample and pulling patient records. Information was obtained from the admission record, the nurses notes, the physicians progress notes, and the laboratory report sheets. The investigator collected all of the data on the subjects using a tool designed for the study. Confidentiality of the individuals in the sample was maintained through assigning each identification number which corresponded to their data.

Instrument

A data collection tool (Appendix A) was developed to record the presence of the predictor variables for each patient in both groups. The tool was pilot tested on three patient charts to determine its ability to obtain the desired information from the patients records, and found to satisfactory. A guide (Appendix B) was used in recording the data on the tool.

Data Analysis

The data analyses included descriptive statistics, contingency tables, and analyses of variance to determine the relationship of the predictor variables to the diagnosis of decubitus ulcer. In addition, point biserial coefficients were calculated to determine the magnitude of the relationship between numerical variables (e.g., age, length of stay) and the presence or absence of decubitus ulcers.

Chapter 4

Analysis of Data

The results of the data analysis used to answer the research question postulated in Chapter 1 are reported in this chapter. This information will be presented in the following format: the descriptive statistics of the data, the statistical testing of the research question, and a summary of the findings. The data were analyzed using the Statistical Analysis System (SAS, 1985).

Descriptive statistics were computed for the quantitative independent variables of age, height (ht), weight (wt), length of stay (LOS), up ad lib (UAD), up with assistance (UWA), bedrest (BR), admission lab values for hemoglobin (Adm Hemo), hematocrit (Adm Hct), total protein (Adm TP), specific gravity (Adm SpGr), albumin (Adm Alb), the same lab values on day fifteen (15 Hemo), (15 Hct), (15 TP), (15 SpGr), and (15 Alb), and the number of days spent in a critical care unit (DCCU). The results are presented in Table I. Separate data for the two sample groups are presented together in the table to facilitate comparison. Group A were

those individuals who did not develop decubitus ulcers during their hospital stay, Group B were those who did. An asterick has been placed by those variables where a significant difference was found in the group means, using analysis of variance.

Table I

Descriptive Statistics of the Quantitative Variables for Patients Who Developed and Did Not Develop Decubitus Ulcers

		N		Mean		Standard Deviation	
Groups		A	B	A	B	A	B
age	*	50	50	70.2	72.8	4.3174	6.2931
ht		31	28	66.8	66.2	4.0473	5.4978
wt		47	44	155.4	158.8	25.3306	42.0564
LOS	*	50	50	17.7	22.3	3.6787	5.3015
UAD	*	49	50	6.0	0.6	4.0926	1.1177
UWA		49	50	5.9	6.0	4.1575	3.5884
BR	*	49	50	2.5	8.2	2.4925	3.5702
Adm Hemo		50	50	12.5	12.4	1.3955	2.2781
Adm Hct		50	50	37.5	37.1	4.3414	6.5736
Adm TP		49	44	6.7	6.5	0.5442	0.7538
Adm SpGr		43	48	1.017	1.018	0.0066	0.0077
Adm Alb		37	38	3.9	3.6	0.5317	0.7172
15 Hemo		47	49	11.2	11.0	1.2669	1.3398
15 Hct		47	50	33.4	32.7	3.6889	3.7687
15 TP	**	28	27	6.5	5.9	0.7665	0.9638
15 SpGr		26	30	1.015	1.017	0.0060	0.0068
15 Alb	*	22	22	3.8	3.2	0.6643	0.7354
DCCU	*	50	50	1.8	7.6	2.2978	4.9617

* = significant difference between groups, see Table 4

** = a significant relationship between total protein at day 15 was found for males, but not for females

Group A = No decubitus development

Group B = Decubitus development

The mean age of Group B, those individuals who developed decubitus ulcers, was 2.6 years older than

Group A, those who did not develop the ulcer during their hospital stay. Group B had a length of stay of 4.6 more days, spent an average of 5.4 less days up ad lib, 5.7 more days on bedrest, and 5.8 more days in a critical care unit than Group A. Group B was found to have less grams of total protein and albumin per deciliter of blood on day fifteen than Group A, both total protein and albumin were .6 grams less. There were also differences in the decline seen in total protein and albumin between the two Groups from the admission labs values to the values on day fifteen. Group B experienced a mean decline in total protein of .6 grams and albumin of .4 grams per deciliter. In Group A, the decline experienced from admission to day fifteen was less than that of Group B. Group A had a mean decline of .2 grams of total protein and .1 gram of albumin per deciliter.

The analysis of the data was controlled for gender to determine if the group differences were consistent across sexes. No differences were noted in the results of Group A or B when divided into males and females, with the exception that females were older in both

groups. In Group A, females had a mean age of 72 and males had a mean age of 69, a difference of three years. Females in Group B had a mean age of 75 and males had a mean age of 70, a difference of 5 years.

Cross tabulation tables were used to examine the relationship between the independent categorical variables of sex, race, martial status, smoking, living at home prior to admission, and pathology with the dependent variable, decubitus ulcers. The results are presented in Table II.

This analysis showed a pattern of a larger percentage of females, widows, current smokers, and individuals who were admitted from a nursing home, or living with a relative developed decubitus ulcers. However, significance was not found to be present for any of these variables.

In this sample of 100, 76 were white and 23 were black; 50% of the white individuals and 52% of the black individuals in the sample developed decubitus ulcers. There was only one individual in the total sample who fell into the category of other when indicating race, this individual did not develop a

decubitus during hospitalization. There was a strong relationship (p = .003) noted between those who had pathology and the development of decubitus ulcers. No one who did not have some pathology developed decubitus ulcers and 54.23% of those who did have pathology developed decubitus ulcers.

Table II

Contingency Table Analysis of the Relationship

Between Categorical Variables and the Development of Decubitus Ulcers

	% of sample (n) that developed Decubitus Ulcers	df	Statistics for the Table Chi - Square	P Value	PHI
Sex					
Female	55.81 (43)	1	1.020	.313	-.101
Male	45.61 (57)				
Race					
White	50.0 (76)	2	1.043	.593	.102
Black	52.1 (23)				
Other	00.0 (0)				
Martial Status					
Married	44.29 (70)	2	4.248	.120	.206
Single	33.33 (3)				
Widowed	66.67 (27)				
Smoking					
Never	42.11 (38)	2	2.623	.269	.164
Past	43.48 (23)				
Current	59.46 (37)				
Admission From					
Nursing Home	75.00 (4)	3	3.248	.355	.180
Home / Spouse	44.44 (63)				
Home / Relative	64.71 (17)				
Home / Alone	50.00 (16)				
Pathology					
No	00.00 (8)	2	8.696*	.003	.295
Yes	54.23 (92)				

* = significant value

When the variables were controlled for gender the finding remained the same with two exceptions, a larger number of white females and black males developed decubitus ulcers. These exceptions were noted as a pattern, but were not found to have significance. Sixty-two percent of the black male sample developed decubitus ulcers, (chi-square equal to 3.186, p = .203). White females were identified as developing decubitus in 61% of the female sample population (chi-square equal to 2.516, p =.113).

Cross tabulation tables were also used to determine if individuals were at greater risk of developing decubitus ulcers if they had low lab values reported for hemoglobin, hematocrit, total protein, specific gravity, and albumin at admission and on day fifteen. A larger number (64.29%) of those individuals who fell below the normal range of total protein at admission developed decubitus ulcers; however, this relationship was weak (chi-square equal to 1.905, p = 0.163). In addition, those individuals who fell below the normal ranges for total protein and albumin on day fifteen were found to have more consistently developed

decubitus ulcers. Total protein values were obtained for 55 patients at day fifteen. The results indicated that 80% of patients with total protein values below the normal range on day fifteen developed decubitus ulcers, compared to 31% who had total protein values in the normal range (chi-square equal to 12.014, p = .007).

Analysis of variance was used to examine all of the independent variables in the study. This analysis was done to determine the amount of reduction in error as a result of knowledge about one of the variables or as a result of the interaction of variables. Each variable was examined in relationship to having decubitus ulcer, the individual's sex, and the interaction between decubitus ulcer and sex. Table III reports those variables which were found to have a significant relationship with decubitus ulcer.

A significant relationship (p = .0256) was found between the development of decubitus ulcers and the age of the individuals in the sample. There was also significance found in the relationship between age and the sex of the sample (p = .0004). When the

interaction of decubitus and sex were examined to determine the effect on age no significance was found. Significance was found between the length of stay of the individual and the development of decubitus ulcers ($p = .0001$). There was no relationship seen between the length of stay and sex and no interaction between decubitus ulcers and sex. The number of days spent in the critical care unit was found to be significant between the two groups ($p = .0001$). There was however no significance found between the number of days in critical care and sex or the interaction of sex and decubitus. The subjects' ability to be up ad lib was found to be significant ($p = .0001$). This variable correlated with both decubitus ulcer ($p = .0001$) and sex ($p = .0263$), however there was no significant interaction between the variables. Significance was found between males and females in ability to be up with assistance ($p = .0004$); however being up with assistance did not relate to decubitus ulcers or the interaction of decubitus ulcers and sex. The number of days the sample spent on bedrest was found to be significant ($p = .0001$). There was also a significant

relationship noted between bedrest and sex (p = .0226); however, there was no significant interaction between the two variables. There was no significant statistical interactions noted between any of the other variables examined.

Table III
Analysis of Variances for Quantitative Variables for Decubitus Ulcers, Sex, and the Interaction of Decubitus and Sex

	N		F Value	P > F
Age	100	Decubitus	5.14*	.0256
		Sex	13.57*	.0004
		Decubitus/Sex	0.71	.4030
Length of Stay	100	Decubitus	22.60*	.0001
		Sex	0.07	.7901
		Decubitus/Sex	0.94	.3351
Days in CCU	100	Decubitus	51.61*	.0001
		Sex	0.32	.5701
		Decubitus/Sex	0.80	.3719
Up Ad Lib	99	Decubitus	72.39	.0001
		Sex	5.09*	.0263
		Decubitus/Sex	0.66	.4190
Up With Assistance	99	Decubitus	0.08	.7809
		Sex	13.53	.0004
		Decubitus/Sex	0.00	.9986
Bedrest	99	Decubitus	89.12*	.0001
		Sex	5.37*	.0226
		Decubitus/Sex	0.48	.4892

* = significant value

Analyses of variance were done with the same variables examining the relationship to only decubitus ulcers. The significant findings are presented in Table IV.

Table IV
Analysis of Variance for the
Quantitative Variable: Decubitus Ulcer

	N	F Value	P > F	R - Square
Age	100	5.80*	.0179	.06
Length of Stay	100	25.19*	.0001	.20
Days in CCU	100	54.72*	.0001	.36
Up Ad Lib	99	79.11*	.0001	.45
Bedrest	99	86.03*	.0001	.47
Albumin Day 15	44	7.94*	.0073	.16

* = significant value

The findings support the relationships identified in the first analysis. This analysis identified a relationship between albumin on day 15 and decubitus ulcers.

Point biserial correlations were tabulated to measure the association between interval level variables and decubitus ulcers. Table V presents these correlations. Length of stay, up ad lib, bedrest, and days in critical care were found to be significant at $p = .0001$. Age and total protein and albumin day 15 were also found to be significant at $p = .0179$, $p = .0124$ and $p = .0073$ respectively.

When the sample was controlled for gender some

variation between sexes were noted, as seen in Table V.

Table V
Point Biserial Correlations Tabulated To Measure the Association Between the Interval Level Variables and Decubitus Ulcers

	Total Sample (n = 100)			Females (n = 43)			Males (n = 57)		
	N	R	p	N	R	p	N	R	p
Age	100	.24*	.0179	43	.25	.0983	57	.18	.1800
Height	59	-.06	.6352	24	-.31	.1293	35	.17	.3278
Weight	91	.05	.6376	37	.10	.5482	54	.05	.6908
Weight Loss	81	.03	.7591	33	.33	.0610	48	-.08	.5486
Length of Stay	100	.45*	.0001	43	.36*	.0170	57	.51*	.0001
Weight Day 15	83	.02	.8620	35	.05	.7508	48	.03	.8007
Up Ad Lib	99	-.67*	.0001	42	-.72*	.0001	57	-.64*	.0001
Up With Assistance	99	.01	.8966	42	-.02	.8630	57	-.03	.8232
Bedrest	100	.68*	.0001	42	.71*	.0001	57	.69*	.0001
Adm Hemo	100	-.05	.6125	43	-.06	.6741	57	-.01	.9440
Adm Hct	100	-.04	.6858	43	-.04	.7785	57	-.01	.9667
Adm TP	93	-.15	.1506	41	-.10	.5041	52	-.20	.1583
Adm SpGr	91	.07	.4858	39	.19	.2352	52	.05	.7474
Adm Alb	75	-.19	.0982	34	-.22	.2049	41	-.20	.1939
15 Hemo	96	-.09	.3675	43	-.03	.8170	53	-.16	.2528
15 Hct	97	-.09	.3502	43	-.02	.8870	54	-.17	.2066
15 TP	55	-.33*	.0124	24	-.27	.2011	31	-.38*	.0347
15 SpGr	56	.16	.2127	25	.13	.5180	31	.22	.2269
15 Alb	44	-.40*	.0073	19	-.57*	.0098	25	-.30	.1382
Days in CCU	100	.60*	.0001	43	.53*	.0002	57	.65*	.0001

* = significant values

The female portion of the sample showed statistical significance in all of the factors found in the total sample, except for age and total protein on day fifteen. For males, the relationship between decubitus ulcers and length of stay, up ad lib, bedrest, and days in the critical care unit was found to be significant. However, age was not significantly related to decubitus ulcers for males. In addition, the total protein at day 15 was found to be significant in the male sample.

In summary, the data was examined through descriptive and statistical testing of the research question. The descriptive analysis identified group differences in the following variables: age, length of stay, up ad lib, bedrest, total protein and albumin on day fifteen, and the number of days spent in critical care. Through the use of contingency tables, a significant relationship was found between pathology and the development of decubitus ulcers. The tables also indicated that a large number of the sample who developed decubitus ulcers were females, widowed, currently smoked, and were admitted from a nursing home

or were living with a relative, but no significance was found in these relationships. Analysis of the variance of the quantitative variables and point biserial correlations supported the significance of age, length of stay, up ad lib, bedrest, albumin and total protein on day fifteen, and the number of days in critical care in the development of decubitus ulcers. There was no correlation found between the development of decubitus ulcers and dehydration, heat, smoking habits and psychological factors.

Chapter 5

Discussion

This chapter presents a discussion of the research findings, recommendations for further research, and implications of these findings for nursing. Data collected demonstrated support for the association of the following variables and the development of decubitus ulcers: age, mobility, malnutrition, and pathological changes. There was no significant relationship found between dehydration, heat, smoking habits, and psychological factors and the development of decubitus ulcers.

Subject's age, which ranged from 65 to 88 years, was found to be one of the significant variable associated with the development of decubitus ulcers. Group A, those who did not develop decubitus ulcers ranged in age from 65 to 83, and Group B, those who developed decubitus ulcers, ranged in age from 65 to 88 years. Group B had an age range which exceeded Group A's range by five years, with a mean difference between the two groups of 2.6 years. In this sample, the older the individual the greater their risk of developing

decubitus ulcers. This finding supports a number of previous research studies (Cooney and Reuler, 1984; Andersen, Jensen, Kvorning and Bach, 1982; Daniel, Priest and Wheatly, 1981; Ek and Bowman, 1982; Moolten, 1972).

While age was found to be significant, the actual ages of the groups or the group means can not be used to make broad generalizations. Because, the sample was controlled for age and only included individuals 65 years or older. Nevertheless, this information can be beneficial to staff nurses caring for an elderly individual. Knowing that age increases an individual's risk of developing decubitus ulcers alerts the nurse to implement preventive measures early in the hospital stay. Further research is needed to study whether age would continue to remain a significant variable if the sample were selected randomly and not stratified using age as an identifying variables.

The sample's mobility was measured by the number of days each individual was up ad lib, up with assistance or on bedrest during the first fifteen days of hospitalization. Data showed a significant

correlation between the number of days an individual was up ad lib or on bedrest and the development of decubitus ulcers. Data, available on 99 percent of the sample, was obtained from the recorded nursing assessment of the patient's activity level for each 24 hour period. The larger the number of days the individual was up ad lib, the less the risk of decubitus ulcer development, and the more days spent on bedrest the greater the risk of decubitus ulcer development. This conclusion supports the findings of Seiler and Stahelin (1985), who suggested that a decrease in the frequency of involuntary movement increases risk factors associated with decubitus ulcer development.

There was, however, no significant relationship found between the amount of time the individual was up with assistance and development of decubitus ulcers. This could be explained by the fact that this study did not determine the exact number of times the individual was up with assistance or the amount of time spent up. Further research is needed to determine the impact of the frequency and the amount of time spent mobile which

would influence an individual's risk of developing decubitus ulcers. Mobility has been considered the body's first line of normal defense to prevent ischemia to areas of tissue. Nurses need to encourage high risk patients to ambulate to prevent ischemia to tissue. If a patient's condition is such that he/she cannot ambulate or move independently, a plan of care should include nursing interventions to increase an individual's mobility.

The nutritional status of each subject was measured through the use of a number of lab values obtained at two different intervals, on admission and on the fifteenth day of hospitalization. Availability of this information on patient's charts varied. Data analysis identified two significant relationships with the development of decubitus ulcers: albumin and total protein on day fifteen. When the sample was controlled for gender, total protein on day fifteen remained significant for males, while albumin on day fifteen remained significant for females. Significance was also seen when the sample was examined to determine if individuals who developed decubitus ulcers fell below

the normal lab value ranges. These results may have been influenced by the data available for the sample: total protein values on day fifteen were available on only 55% of the subjects and albumin on day fifteen on 44% of the subjects. Some researchers suggest that nutrition impacts tissue vitality and therefore malnutrition increases the individual's risk of developing decubitus ulcers (Allman, et al, 1986; Pinchcofsky-Devine and Kaminski, 1986; Rowell and Steffl, 1984). This study partially supports these researcher's findings, in that the individual's level of total protein and albumin on day fifteen may be an indication that they are at risk. The nutritional status of the individual was difficult to assess in a retrospective study. Further research concurrently measuring nutritional status would be beneficial to identify what combination of nutritional factors should alert the nurse to a patient at risk of developing decubitus ulcers.

The analysis of the data strongly supports the relation between pathology and the development decubitus ulcers. There was no evidence that one

specific pathological condition was more frequently seen with the diagnosis of decubitus ulcers. In this study, 92 percent of the sample had some pathological condition associated with their hospitalization. Pathological changes influence many other factors which would place the individual at risk of developing decubitus (such as mobility and nutritional status). The strong association between the presence of pathological conditions and the development of decubitus ulcers could be reflective of the effect of the specific pathology on many of the other variables.

The findings of this study support the use of Roy's Model of Adaptation as the conceptual framework. Factors found significantly associated with decubitus ulcer development were the internal factors that interact with the individual and influence the condition of his existence and survival. A nurse using this conceptual framework can identify patients who have present the high risk variables of age, decreased mobility, low total protein and albumin on day fifteen, and who were experiencing pathological changes and plan nursing interventions which adjust environmental

stimuli to fall within the adaptation zone of the individual.

No significant relationship was found between dehydration, heat, smoking habits, and psychological factors and the development of decubitus ulcers. Although research has shown an association between dehydration and the development of decubitus ulcers (Rowell and Steffl, 1984), this retrospective review of data was unable to support this finding. Dehydration was measured by evaluating the specific gravity of the patient on admission and at day fifteen. This information was available on 91 percent of the sample at admission and 44 percent of the sample on day fifteen. Many other factors could have influenced the hydration status of the subjects in the sample; for example, factors associated with some of the diagnoses such as hemorrhage, congestive heart failure, etc.

Researchers have also reported an association between diaphoresis and the development of decubitus ulcers (Kosiak, 1959; Reed, 1981; Seymour & Lacefield, 1985), a finding not supported by this researcher. In this study, body heat was measured by recording the

number of days that each subject experienced a temperature of 99 or greater during their first fifteen days of hospitalization. Information was available on 100 percent of the sample.

Smoking tobacco products has been associated with the development of decubitus ulcers (Lamid & Ghatit, 1983), the rationale being that nicotine is a vasoactive agent which impairs wound contraction and delays healing due to constriction of the blood vessels. Information on smoking, available on 98 percent of the sample, was recorded as never smoked, past history of smoking, and current smoker. The sample was divided into the following categories: never smoked n = 38, past history of smoking n = 23, and current smoker n = 37. Although, a larger number of current smokers (59.46%) developed decubitus ulcers, no statistical significance was found.

Psychological factors felt to influence decubitus ulcer development and reported in the literature included the absence of presence of a consistent person to help with skin care and the lack of satisfaction with activities of life (Andersen & Andberg, 1979;

Thiyagarajan & Silver, 1984). In this study, psychological factors were measured through determining where the individual resided prior to admission and martial status. The findings indicated that these factors were not significant; however, a larger number of widowed, individuals admitted from nursing homes or living with a relative developed decubitus. This pattern could have been influenced by the fact that data was not available on many of the subjects in this study.

In summary, this study provided information on a number of variables which were closely associated with the development of decubitus ulcers, including age, mobility, malnutrition, and pathological changes. No significant relationship was found between dehydration, heat, smoking habits, and psychological factors and the development of decubitus ulcers. Recommendations for further research included determination if age would remain significant if the sample were randomly selected; evaluation of the effects of the degree of frequency and amount of time associated with ambulation; and concurrent assessment of the effects of

nutritional factors, level of hydration, psychological factors, and diaphoresis on decubitus ulcers. The information obtained from this study has many implications for nursing. The information can be used not only to plan individual care, but also to develop a high risk profile that can assist in the identification of patients who were at risk. The use of such a profile would facilitate early intervene and prevention of decubitus ulcers in hospitalized patients.

APPENDICES

Group_____

Identification
Number
Demographic
Data
Age
Race
Sex
Height
Adm. Wt.
Marital St.
Adm. Date
Disch. Date
No. D CCU

Research Data
1st Wt. D15
Path/Pro
UAL
UWA
BR
Adm. Hemo
Adm. Hct
Adm. T Pro.
Adm. SpGr.
1st Hemo 15
1st Hct 15
1st SpGr. 15
Above 99.0
Above 101.0
Smoking
Adm. Home
Spouse
Relative
Alone
Adm. Nurs H

Primary Dx
At Discharge

Secondary Dx
At Discharge

Tool Instructions

1. The age, race, and sex of the individual will be recorded from the admission sheet on the front of the patient's record.
   A. The age will reflect the numerical chronological age of the individual.
   B. The race will be designated as follows: Caucasian (W), Negro (N), Indian (I), or other (O).
   C. The individuals sex will be recorded F for female or M for male.
2. The individual's height will be recorded from the Nursing Admission Record. It will be recorded as the numerical value identified at the time of admission.
3. Weight will be recorded twice.
   A. At the time of admission, from the admission record.
   B. The first recorded weight in the nurses notes during the fifteenth to twentieth day of the hospital stay.
4. Two indicators will be collected to attempt to determine the activity level of the patient.
   A. The first will be the identification of any evidence of pathology or procedures that would impair the individual's mobility throughout the hospital stay. "Yes" mobility was impaired will be indicated by (Y) and "no" by (N).
   B. The second indicator will attempt to identify the activity level of the patient during the hospital stay. The first fifteen days of nurses notes will be reviewed to determine if the patient was up ad lib, up with assistance, or on bedrest.
      1. If the patient was "up ad lib" throughout the 24 hours, the day would be recorded as up ad lib.
      2. If the patient required assistance during the day, the day would be recorded as "up with assistance".
      3. If the patient was on bedrest any time during the day, the day would be recorded as "bedrest".

4. The number of days the patient spent in the critical care unit.

The data collection sheet will reflect the number of days in each category.

5. The nutritional status of the patient will be assessed by using four laboratory values: hemoglobin, hematocrit, serum albumin, and urine specific gravity.
   A. These values will be recorded from the admission labs.
   B. Again upon the first values recorded from the fifteenth to the twentieth day of the hospital stay.
6. The documentation of elevated body temperature will be recorded by using information from the nurses notes and the temperature graphics sheets, from the first fifteen days of the patients hospitalization. Any day that is recorded as having temperatures in the ranges (greater than 99.0 and 101.0) will be included in a numerical value on the data sheet.
7. The participants' habits of smoking will be designated as:
   A. 0-has never smoked;
   B. 1-past history, but does not currently smoke;
   C. 2-currently smokes.
8. Psychological factors will be reflected by the environment from which the patient came and the available support of a significant other.
   A. The data will be collected by indicating where the patient was admitted from (home or nursing home).
   B. If the patient is married.
   C. If a spouse or relative was living with the patient.
9. Pathological changes will be recorded for the patient by recording the primary and secondary DRG diagnosis found on the front of the patients record.

References

Agris, J. and Spira, M. (1979). Pressure Ulcers: Prevention and Treatment. CIBA Symposia, 10:5.

Allman, R., Laprade, C., Noel, L., Walker, M., Moorer, C., Dear, M., and Smith, C. (1986). Pressure Sores Among Hospitalized Patients. Annals of Internal Medicine. Vol.105, 337-342.

American Hospital Association (1983). Medicare Prospective Pricing: Legislative Summary and Management Implications. Illinois, Special Report 3, April.

American Psychological Association (1983). Publication Manual,3rd ed. Washington,D.C.

Andersen, K., Jensen, O., Kvorning, S., and Bach, E. (1982). Prevention of Pressure Sores By Identifying Patients At Risk. British Medical Journal. Vol.284, 1370.

Anderson, T. and Andberg, M. (1979). Psycosocial Factors Associated With Pressure Sores. Arch. Phys. Med. Rehabil. Vol. 60, August.

Arnell, I. (1983). Treating Decubitus Ulcers. Nursing Research Vol.6, 50-55.

Barton, A. (1976). The Pathogenesis of Skin Wounds Due to Pressure. Bedsore Biomechanics, University Park Press, Baltimore 55-62.

Berecek, K. (1981). Etiology of Decubitus Ulcers. Preventing Decubitus Ulcers. CURN Project, Michigan Nurses Association. Grune and Stratton Publication.

Blom, M. (1985). Dramatic Decrease in Decubitus Ulcer's. Geriatric Nursing. Vol.6, No. 2. 29-31.

Burhoe, R. (1982). Pleasure and Reason: Adaptation to Nature's Zygon Requirements. Journal of Religion and Science. June 113-126.

Cooney, T. and Reuler, J. (1984). Topics in Primary Care Medicine The Western Journal of Medicine. April, Vol.140, No. 4, 622-24.

Daniel, R., Priest, D., and Wheatley, D. (1982). Etiology Factors in Pressure Sores: An Experimental Model. Archives of Physical Medicine and Rehabilitation. Oct., Vol.62, 492-497.

Dinsdale, S. (1973). Decubitus Ulcers In Swine: Light and Electron Microscopy Study of Pathogenesis.

Archives of Physical Medicine and Rehabilitation. Vol.54, 51.

Ek, A.C. and Boman, G. (1982). A Descriptive Study of Pressure Sores: The Prevalence Of Pressure Sores And The Characteristics Of Patients. Journal of Advanced Nursing. Vol.7, 51-57.

Eriksson, E. (1980). Etiology: Microcirculatory Effects of Pressure. In:Pressure Ulcers: Principles and Techniques of Management. Little, Brown and Co., Boston, 7-15.

Goldstone, L. (1982). The Norton Score: An Early Warning Of Pressure Sores? Journal of Advanced Nursing. Vol.7,419-426.

Gosnell, D. (1973). An Assessment Tool to Identify Pressure Sores Nursing Research. Vol.22, 55-59.

Jones, P. and Millman, A. (1984). Pressure Sores, Length of Stay and Mortality in a VA Medical Center. The Geronitologist. Vol. 24. 113.

Kerr, J., Simon, S., and Shanon, M. (1981). Pressure Sores: Distinguishing Facts From Fiction. Canadian Nurse. July-Aug. 23-28.

Kelyman, P. (1984). Home Care Controversy. The Coordinator. Sept. 16-17.

Kosiak, M. (1959). Etiology and Pathology of Ischemic Ulcers. Archives of Physical Medicine and Rehabilitation. Feb., Vol.40, 62-69.

Lamid, S. and Ghatit, A. (1983). Smoking, Spasticity and Pressure Sores in Spinal Cord Injuried Patients. American Journal of Physical Medicine. Vol.62, No.6, 300-306.

Larson, B. Holstein, P. and Lassen, N. (1979). On The Pathogenesis of Bedsores. Scand. Journal of Plastic Reconstructive Surgery. Vol.13, 347.

Lee, B. Y. (1985). Chronic Ulcers Of The Skin. McGraw-Hill Book Company. New York, New York.

Lewontin, R. (1978). Adaptation. Scientific America. March, 156-169.

Mergler, N. and Goldstein, M. (1983). Why Are There Old People? Human Development. March - April, 72-90.

Michocki, R. and Lamy, P. (1976). The Problem of Pressure Sores In A Nursing Home Population: Statistical Data. Journal of American Geriatric Society. Vol.24, No.7, 323-28.

Moolten, S. (1972). Bedsores In The Chronically Ill Patient.Archives of Physical Medicine and Rehabilitaion. Vol.53, 430-438.

Norton, D., McLaren, R., Exton-Smith, A. (1975). An Investigation of Geriatric Nursing Problems in Hospitals. Edinburgh:Churchill Livingston.

Parker, S. (1984). Dictionary of Scientific and Technical Terms. 3rd. Library of Congress Catologing in Publication Data.

Pinchcofsky-Devin, G. and Kaminski, M. (1986). Correlation of Pressure Sores and Nutritional Status. Journal of American Geriatric Society. Vol.34, 435-440.

Rampino, E. (1976). Did We Do That To Him? Journal Pract. Nurse June, 18-21.

Reed, J. (1981). Pressure Ulcers in the Elderly: Prevention and Treatment Utilizing the Team Approach.Maryland State Medical Journal.November, 45-50.

Riehl, J. and Roy, C. (1980). Conceptual Models for Nursing Practice, 2nd Ed.. Appleton-Century-Crofts, Chapter 15.

Rowell, G. and Steffl, B. (1984). Pressure Ulcers: Prevention and Treatment. In: Handbook of Gerontological Nursing. New York: Van Nostrand Reinhold Co.

Roy, C. (1970). Adaptation: A Conceptual Framework For Nursing. Nursing Outlook. March, 42-46.

Roy, C. (1971). Adaptation: A Basis For Nursing Practice. Nursing Outlook. July, 254-257.

Roy, C. (1976). Introduction to Nursing: An Adaptation Model. Englewood Cliffs, N.J., Prentice-Hall.

Roy, C. (1981). Theory Construction in Nursing: An Adaptation Model. Englewood Cliffs, N.J., Prentice-Hall.

Roy, C. (1984). Introduction to Nursing: An Adaptation Model, 2nd Ed.. Englewood Cliffs, N.J., Prentice-Hall.

SAS Institute. (1985). SAS User's Guide: Statistics (Version 5 Edition.

Scales, J. (1975). Pressure On The Patient. In: Bedsore Biomechanics. University Park Press, Baltimore, Maryland. 11-17.

Scheer, B. (1982). Encyclopedia of Science and Technology, 5th Ed.. McGraw-Hill Book Co., 14.

Seiler, W. and Stahelin, H. (1985). Decubitus Ulcers: Prevention Techniques For The Elderly Patient. Geriatrics. Vol.40, No.7, July, 53-60.

Seymour, R. and Lacefield, W. (1985). Wheelchair Cushion Effect on Pressure and Skin Temperature. Archives of Physical Medicine and Rehabilitation. Vol.66, Feb., 103-108.

Stamper, J. (1978). SCOPE; Skin Condition of Patients Encountered Journal Gerontology Nursing. Vol.4, 48-51.

Tames, S. (1984). Washington/Austerity Politics Shadowed By GOA Study. The Coordinator. Jan.,14.

Theodorson, G. and Theodorson, A. (1979).A Modern Dictionary of Sociology. Thomas Croswell Co.

Thiyagarajan, C. and Silver, J. (1984). Etiology of Pressure Sores in Patients With Spinal Cord Injury. British Medical Journal. Dec., Vol.289, 1487-90.

Walldorf, S. (1981). The Effectiveness of An Assessment Tools In Specifying Nursing Care. Nursing Research. Vol.22, 68-72.

Websters New International Dictionary, 3rd Ed. (1976). G.C. Merrian Co.

Wolman, B. (1973). Dictionary of Behavioral Sciences. New York, New York, Litton Educational Publishing, Inc., 16.

Table I

Descriptive Statistics of the Quantitative Variables for Patients Who Developed and Did Not Develop Decubitus Ulcers

Groups		N		Mean		Standard Deviation	
		A	B	A	B	A	B
age	*	50	50	70.2	72.8	4.3174	6.2931
ht		31	28	66.8	66.2	4.0473	5.4978
wt		47	44	155.4	158.8	25.3306	42.0564
LOS	*	50	50	17.7	22.3	3.6787	5.3015
UAD	*	49	50	6.0	0.6	4.0926	1.1177
UWA		49	50	5.9	6.0	4.1575	3.5884
BR	*	49	50	2.5	8.2	2.4925	3.5702
Adm Hemo		50	50	12.5	12.4	1.3955	2.2781
Adm Hct		50	50	37.5	37.1	4.3414	6.5736
Adm TP		49	44	6.7	6.5	0.5442	0.7538
Adm SpGr		43	48	1.017	1.018	0.0066	0.0077
Adm Alb		37	38	3.9	3.6	0.5317	0.7172
15 Hemo		47	49	11.2	11.0	1.2669	1.3398
15 Hct		47	50	33.4	32.7	3.6889	3.7687
15 TP	**	28	27	6.5	5.9	0.7665	0.9638
15 SpGr		26	30	1.015	1.017	0.0060	0.0068
15 Alb	*	22	22	3.8	3.2	0.6643	0.7354
DCCU	*	50	50	1.8	7.6	2.2978	4.9617

* = significant difference between groups, see Table 4

** = a significant relationship between total protein at day 15 was found for males, but not for females

Group A = No decubitus development

Group B = Decubitus development

Table II

Contingency Table Analysis of the Relationship
Between Categorical Variables and the Development of Decubitus Ulcers

	% of sample (n) that developed Decubitus Ulcers	df	Statistics for the Table Chi - Square	P Value	PHI
Sex					
Female	55.81 (43)	1	1.020	.313	-.101
Male	45.61 (57)				
Race					
White	50.0 (76)	2	1.043	.593	.102
Black	52.1 (23)				
Other	00.0 (0)				
Martial Status					
Married	44.29 (70)	2	4.248	.120	.206
Single	33.33 (3)				
Widowed	66.67 (27)				
Smoking					
Never	42.11 (38)	2	2.623	.269	.164
Past	43.48 (23)				
Current	59.46 (37)				
Admission From					
Nursing Home	75.00 (4)	3	3.248	.355	.180
Home / Spouse	44.44 (63)				
Home / Relative	64.71 (17)				
Home / Alone	50.00 (16)				
Pathology					
No	00.00 (8)	2	8.696*	.003	.295
Yes	54.23 (92)				

* = significant value

Table III
Analysis of Variances for Quantitative Variables for Decubitus Ulcers, Sex, and the Interaction of Decubitus and Sex

	N		F Value	P > F
Age	100	Decubitus	5.14*	.0256
		Sex	13.57*	.0004
		Decubitus/Sex	0.71	.4030
Length of Stay	100	Decubitus	22.60*	.0001
		Sex	0.07	.7901
		Decubitus/Sex	0.94	.3351
Days in CCU	100	Decubitus	51.61*	.0001
		Sex	0.32	.5701
		Decubitus/Sex	0.80	.3719
Up Ad Lib	99	Decubitus	72.39	.0001
		Sex	5.09*	.0263
		Decubitus/Sex	0.66	.4190
Up With Assistance	99	Decubitus	0.08	.7809
		Sex	13.53	.0004
		Decubitus/Sex	0.00	.9986
Bedrest	99	Decubitus	89.12*	.0001
		Sex	5.37*	.0226
		Decubitus/Sex	0.48	.4892

* = significant value

Table IV
Analysis of Variance for the
Quantitative Variable: Decubitus Ulcer

	N	F Value	P > F	R - Square
Age	100	5.80*	.0179	.06
Length of Stay	100	25.19*	.0001	.20
Days in CCU	100	54.72*	.0001	.36
Up Ad Lib	99	79.11*	.0001	.45
Bedrest	99	86.03*	.0001	.47
Albumin Day 15	44	7.94*	.0073	.16

* = significant value

Table V

Point Biserial Correlations Tabulated To Measure the Association Between the Interval Level Variables and Decubitus Ulcers

	Total Sample (n = 100)			Females (n = 43)			Males (n = 57)		
	N	R	p	N	R	p	N	R	p
Age	100	.24*	.0179	43	.25	.0983	57	.18	.1800
Height	59	-.06	.6352	24	-.31	.1293	35	.17	.3278
Weight	91	.05	.6376	37	.10	.5482	54	.05	.6908
Weight Loss	81	.03	.7591	33	.33	.0610	48	-.08	.5486
Length of Stay	100	.45*	.0001	43	.36*	.0170	57	.51*	.0001
Weight Day 15	83	.02	.8620	35	.05	.7508	48	.03	.8007
Up Ad Lib	99	-.67*	.0001	42	-.72*	.0001	57	-.64*	.0001
Up With Assistance	99	.01	.8966	42	-.02	.8630	57	-.03	.8232
Bedrest	100	.68*	.0001	42	.71*	.0001	57	.69*	.0001
Adm Hemo	100	-.05	.6125	43	-.06	.6741	57	-.01	.9440
Adm Hct	100	-.04	.6858	43	-.04	.7785	57	-.01	.9667
Adm TP	93	-.15	.1506	41	-.10	.5041	52	-.20	.1583
Adm SpGr	91	.07	.4858	39	.19	.2352	52	.05	.7474
Adm Alb	75	-.19	.0982	34	-.22	.2049	41	-.20	.1939
15 Hemo	96	-.09	.3675	43	-.03	.8170	53	-.16	.2528
15 Hct	97	-.09	.3502	43	-.02	.8870	54	-.17	.2066
15 TP	55	-.33*	.0124	24	-.27	.2011	31	-.38*	.0347
15 SpGr	56	.16	.2127	25	.13	.5180	31	.22	.2269
15 Alb	44	-.40*	.0073	19	-.57*	.0098	25	-.30	.1382
Days in CCU	100	.60*	.0001	43	.53*	.0002	57	.65*	.0001

* = significant values