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THE DEVELOPMENT OF THE WOUND ASSESSMENT CHECKLIST

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THE DEVELOPMENT OF THE WOUND ASSESSMENT CHECKLIST

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This thesis is lovingly dedicated
to my late grandfather, Peter Hansen,
and to my mother, Myrna Hansen Campbell,
for their love and support undaunted
by distance and death.

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ABSTRACT

A descriptive design was employed to determine the reliability and validity of the Wound Assessment Checklist. The study sample consisted of 34 subjects recruited from long-term care facilities and one Veterans Administration Medical Center in a large southwestern city. A total of 44 decubitus ulcers from the 34 subjects were assessed with the Wound Assessment Checklist. Two trained raters completed the initial assessment for each subject with the Wound Assessment Checklist. The primary investigator obtained two additional measurements at five day intervals.

A computation of Kappa revealed low interrater reliability for five of the eight categories of the tool. Content validity was established by a panel of four experts. Criterion-related validity approaches adequacy for the Location category. While the analysis of variance for repeated measures revealed a statistically significant change in the wounds over time, the low reliability of the instrument weakens the construct validity.

CHAPTER 1

INTRODUCTION

A wound may be defined as a structural deficiency in the body's architecture (Roberts, 1970). Since man lacks the ability to duplicate injured tissue, with the exception of the liver and the surface layers of the skin, he must rely upon the process of wound healing to restore disrupted tissue continuity (Roberts, 1970; Ross, 1980). The process of wound healing is intimately related to health, comfort (Ross, 1980), survival (Schilling, 1968; Bruno, 1979; Ross, 1980), and evolution (Ross, 1980) of the organism.

Two general types of wounds are commonly encountered in the practice of medical-surgical nursing: acute wounds, and chronic "stubborn" wounds, characterized by prolonged inflammation and fibroplasia (Bryant, 1977). While the healing of either type of wound is often taken for granted, favorable wound healing is not inevitable (Hunt, 1974; Bryant, 1977). Evidence for this lies in the observation of wound complications which represent wound failure-infection (Hunt, 1974), delayed healing, or excessive scar formation (Bryant, 1977). The wound infection rate in large surgical services is estimated at 1-2 percent for clean wounds (Hunt, 1974). The complication rate, which includes infection, is estimated at 30-60 percent for contaminated wounds and trauma surgery (Hunt, 1974).

The adage "God Heals and the Doctor Keeps the Patient Amused in the Meantime" is currently being replaced (Roberts, 1970, p.10). The new goal incorporates an understanding of wound healing to control the variables that retard or complicate that healing (Roberts, 1970). This is possible with the knowledge that biologic and behavioral characteristics influence wound repair, and certain diseases influence the healing capacity (Schumann, 1979).

The expanded role of the present day nurse emphasizes independent nursing action in many areas. One of these areas relates to the care of wounds. Wound care implies systematic observation of wound characteristics to monitor healing progression, control of variables that impact upon the wound healing process, and the traditional wound care. As professionals providing a major portion of care to patients with various types of wounds, nurses have an opportunity to significantly influence the healing of wounds encountered in patients.

Statement of the Problem

From the nursing perspective, total assessment of the patient is necessary for the establishment of priorities of care. Total assessment is also a prerequisite for effective wound care (Cooper and Schumann, 1979). However, assessment rests entirely upon observation, and therefore may be considered only as valid as the observations upon which it is based. In an effort to provide accurate observations, various instruments are designed to assist the process.

One tool found in the literature that deals specifically with wound characteristics is the Criterion-Measure for Decubiti Observation

(Verhonick, 1961). This tool is specific for decubitus ulcers, rather than any general wound, and there are no data in the literature describing validity and/or reliability testing. There is no description of its actual use either in clinical practice or research, other than that conducted by Verhonick (1961, 1973).

The Criterion-Measure for Decubiti Observation (Verhonick, 1961) consists of the following eight categories: size; color; skin tone; skin condition; drainage; sensation; infectious process; and other factors. The tool follows the format of a checklist, and there is no item quantification. The tool was developed to systematically study the effectiveness of different types of nursing interventions used in the treatment of decubitus ulcers. The tool provided a means of monitoring wound changes, and thus healing progression.

The Norton Pressure Sore Risk Calculator (Norton, 1961) does not provide for the assessment of wounds already present, but is designed to facilitate detection of patients at risk for the development of decubiti. These could then be prevented through the early initiation of nursing interventions (Norton, 1975). The tool consists of five categories of items: physical condition; mental condition; activity, mobility, and incontinence. These categories represent factors that predispose to decubitus ulcer formation. The items are quantified on a four point scale, with possible scores ranging from a maximum of 20 to a minimum of five points. Patients with a score of 12 or below represent a high risk patient for the development of decubitus ulcers (Norton, 1975). Again, the tool is specific for decubitus ulcers, and no validity or

reliability data are available in the literature. The description of its use in clinical practice is scant (Norton, 1975; Jones, 1980).

A final tool has been distributed by the Burroughs Wellcome Company. The Burroughs Wellcome Lesion Size measure is a series of circles of various sizes mounted on clear plastic. The instrument permits determination of lesion size when the tool is placed against the lesion. The circle corresponding most closely to the lesion provides information on lesion size. The chief limitations of this tool relate to the lack of wound characteristics described other than size, and difficulty measuring non-circular wounds.

While there are several tools available for wound description, the tools described in the literature are specific for decubitus ulcers. In addition, the tools available to assess decubitus ulcers lack both reliability and validity. There is thus a perceived need for a reliable and valid tool that facilitates systematic observation of any wound encountered in the clinical setting.

The development of the Wound Assessment Checklist by the primary investigator addresses the need for a tool that facilitates the systematic observation of any general wound encountered in the clinical setting. The Wound Assessment Checklist is a scale consisting of nine categories. The first eight categories describe the following wound characteristics: Wound Type; Location; Tissue Involvement; Size; Wound Development; Drainage; Odor; and Phase of Wound Healing. The categories of the tool permit measurement of different wound

characteristics that may be present in the observed wound. The ninth category, Interventions, provides information regarding specific interventions used in the care of the wound.

The purpose of this study was to test the Wound Assessment Checklist for reliability and validity, which addresses the need for a reliable and valid wound assessment instrument. Without reliable and valid observations, as determined with a measuring instrument, the assessment of wounds and healing progression is speculative (Kerlinger, 1973). The development and testing of the Wound Assessment Checklist is an attempt to provide a reliable and valid measuring instrument for wounds.

Significance of the Problem

The importance of observation in nursing cannot be overstated. Assessment is the first step of the nursing process and is based upon pertinent observations. Since the remainder of the nursing process is derived from assessment, it can only be as meaningful as the observations which give rise to the assessments. While observation provides information unequalled by any other data collection method, observation methods are more vulnerable to human perceptual error than any other system (Polit and Hungler, 1978). Some of the errors associated with observation as data collection methods are observer bias, loss of observer objectivity, and/or inappropriate sampling of the events to be observed (Polit and Hungler, 1978). A second problem with the current method of observation used in clinical nursing practice today is the lack of structure and the lack of a common frame of reference for

phenomena. Kerlinger (1973) described the plight of the social scientist, similar to that of the present-day nurse, as dissatisfied with the inadequacy of uncontrolled observations. "He seeks reliable and objective observations from which he can draw valid inferences" (Kerlinger, 1973, p. 537).

For nurses, the inferences form the basis of assessments at the beginning of the nursing process, and for evaluation at the completion of the nursing process. The entire nursing process depends upon systematic, reliable, and objective observations.

Documentation of patient care in the clinical setting is often performed in the same manner as observation - unstructured and in the reference of each nurse. After a review of patient medical records, Inzer and Aspinall (1981) found that most nurses recorded patient responses in judgmental, interpretative terms rather than in specific behavioral terminology. In addition, there was a lack of specific criteria that could be used as evaluation indices by all nurses to unite all recorders under one frame of reference. They further stated that "without specificity, recordings are unreliable as indicators of patient progress" (Inzer and Aspinall, 1981, p. 178).

Documentation has other implications. Beland and Passos (1981) described the degeneration of nursing documentation since World War II to the point that in some institutions where excellent nursing care is given, the nursing contribution is not retrievable from the nursing record. For some patients, this form of documentation poses additional difficulty in the area of Medicare reimbursement.

The practice area related to wound healing is only one such area that suffers from unsystematic and unstructured observation and documentation. Since observation is crucial to the performance of the nursing process and documentation is crucial to accountability, the development of an assessment tool that facilitates both of these processes in an area of threat to patients would be beneficial.

Verhonick (1961) lists four specifications applicable to a measuring instrument. These specifications are: relevance or validity, freedom from bias, reliability or precision, and convenience or availability. While freedom from bias and convenience may be addressed in the development of an instrument, validity and reliability may be addressed only through instrument testing. The validity and reliability of an instrument determine the quality of the measurements obtained. Accurate measurements can be obtained only with a reliable and valid instrument. In the clinical setting, the quality of the measurements obtained with an instrument profoundly affects the assessment and intervention phases of the nursing process. In the research arena, measurement lies at the heart of scientific investigation (Carmines and Zeller, 1979).

Purpose of the Study

The purpose of this study was to test the Wound Assessment Checklist for reliability and validity. This instrument would facilitate

observation and documentation of wounds. This study attempted to answer the following questions:

1) Does the instrument demonstrate interrater reliability?
2) Does the instrument demonstrate content validity?
3) Does the instrument demonstrate concurrent validity?
4) Does the instrument demonstrate support for the wound construct?
5) Does the instrument demonstrate support for the wound healing construct?

Summary

Observation lies at the heart of nursing practice. Due to a lack of reliable and valid observational tools that facilitate the process of observation, nursing practice and nursing research are at a disadvantage. The development and testing of the Wound Assessment Checklist provides a systematic method for facilitating the observation and documentation of wounds.

CHAPTER 2

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

This chapter presents the conceptual framework for this study that is based upon wounds and wound healing. Types of wounds are explored in relation to the Wound Taxonomy and the wound healing process. As the wound model for this study, the incidence and predisposing factors associated with decubitus ulcers is presented. The Wound Healing Taxonomy displays the conceptual framework for the wound healing process. Finally, normal wound healing and factors associated with wound failure are explored.

The development of the Wound Assessment Checklist was based on wounds and wound healing. Figure 1 and Figure 2 depict these two areas.

A wound is the result of a destructive process and is a structural deficiency in the architecture of the body (Roberts, 1970). There may also be a loss of all or part of a wounded organ's function that is not necessarily related to the magnitude of the wound (Schilling, 1976).

Wound healing is the restoration of disrupted cellular and anatomic continuity (Schilling, 1976). While often taken for granted, favorable wound healing is not always inevitable, as evidenced by the complications of delayed wound healing and/or scar formation (Bryant, 1977) and death (Schilling, 1968; Bruno, 1979). The healing process is viewed as completed when disrupted surfaces have been cemented together;

obliteration of dead space has occurred; the surface has been recovered; and function has been restored (Schilling, 1968; Roberts, 1970).

Types of Wounds

Schilling has stated that "despite the great variety of wounds and wounding agents, the similarities of the wound-healing process are remarkable" (1968, p. 377). The differences are quantitative rather than qualitative. To visualize the quantitative differences that occur in the healing process with different types of wounds, wounds may be further classified as closed wounds, without tissue loss, and open wounds, which may or may not involve tissue loss (Luckmann and Sorensen, 1974; Bruno, 1979; Bruno, 1982)(Figure 1). Wounds without tissue loss, such as incisions and puntures, heal by primary intention. Wounds with tissue loss, such as abrasions and lacerations, heal by secondary healing (Bruno, 1979; Irvin, 1981). Both healing by primary intention and secondary healing consist of the four phases of healing and in the same sequence. The primary difference between the two types of healing relates to the defect created with tissue loss that must be replaced by the healing process. The quantitative differences with secondary healing are: a prolonged time required for the completion of the healing sequence (Bruno, 1979; Bruno, 1982); a shift in repair emphasis toward contraction of surrounding tissue into the wound to fill the defect (Hunt, 1974); an emphasis on new tissue synthesis, as epithelization (Hunt; 1974) and formation of an increased amount of granulation tissue (Irvin, 1981); and a heightened inflammatory response (Irvin, 1981).

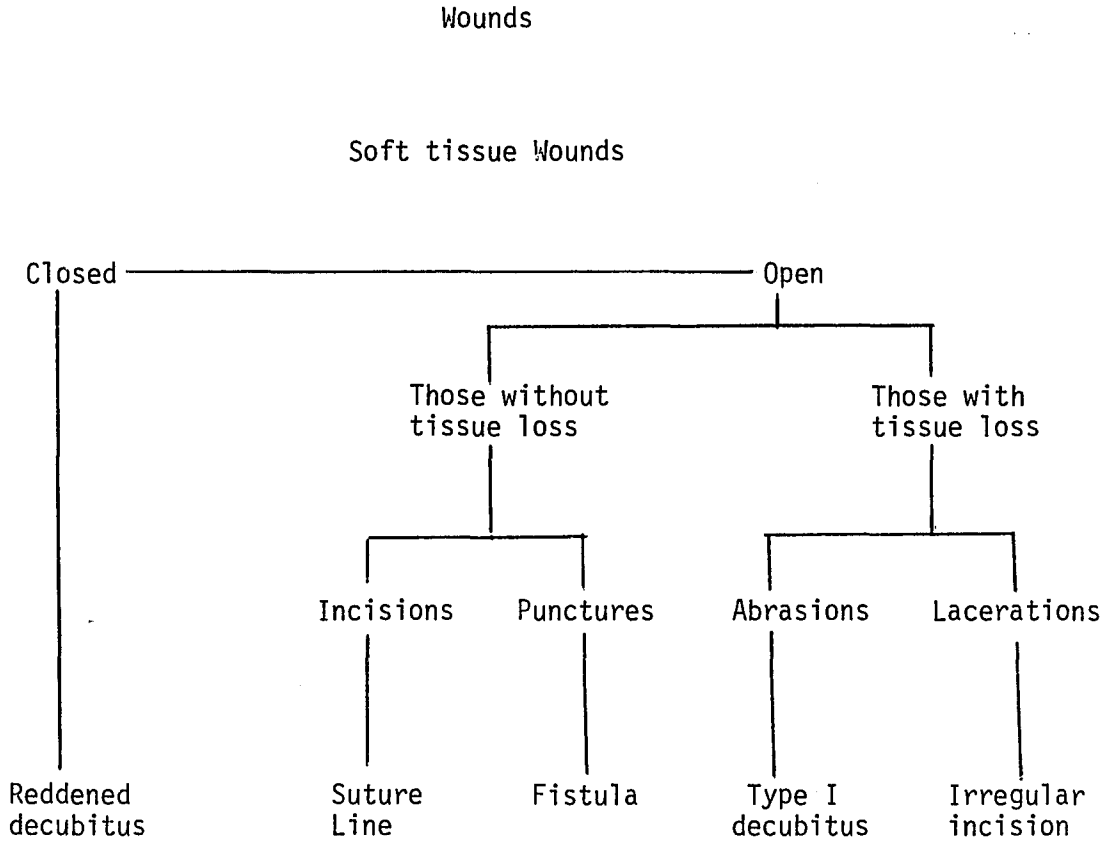

Figure 1 Taxonomy of Wounds

Decubitus ulcers are defined as soft tissue wounds (Sather, Weber, and George, 1977). Often they are classified as open wounds with tissue loss that heal by secondary healing (Bruno, 1979). Furthermore, their incidence is more commonly associated with chronic debilitating states, such as malignancies, orthopedic conditions, and spinal cord injuries (Sather, Weber, and George, 1977). Edberg, Cerny, and Stauffer (1973) state that about 68 percentof spinal cord injured patients develop pressure sores, and Roberts and Goldstone (1979) reported an incidence of 20 percent in a survey of 64 elderly orthopedic patients. For chronically ill and debilitated patients, conservative treatment is the treatment of choice (Vasil and Chaitin, 1972; Morgan, 1975). Therefore, decubitus ulcers are selected as a wound model for this study as an example of a soft tissue wound, commonly encountered in medical units, that heals through secondary healing.

Factors associated with the development of decubitus ulcers, and commonly found in the above conditions, are similar to the factors specified as contributing to wound failure or complications. These factors are paralysis (Agris and Spira, 1979; Kerr, Shannon, and Stinson, 1981); malnutrition (Sather, Weber, and George, 1977; Agris and Spira, 1979; Roberts and Goldstone, 1979; Kerr, Shannon, and Stinson, 1981); advanced age (Agris and Spira, 1979; Kerr, Shannon, and Stinson, 1981); anemia (Sather, Weber, and George, 1977; Agris and Spira, 1979; Roberts and Goldstone, 1979); and incontinence (Rubin, 1974; Roberts and Goldstone, 1979). Most of these are derived from empirical observation, but correspond well with factors identified by Norton (1961) as predisposing factors for the development of decubitus ulcers.

In a study of 27 nonambulatory patients over a 14 week period, Williams (1972) reported a decubitus ulcer incidence rate of 26.9 percent. Body weight was the most effective predictor of skin breakdown, with thin patients most susceptible. Other factors that predicted breakdown were being male, the presence of infections other than genitourinary, higher than normal body temperatures, and the administration of corticosteroids.

Gerson (1975) in a study of 5,648 patients in three active treatment hospitals over four months reported an incidence rate of 2.69 percent. The primary indicators of decubitus formation in this study were age, immobility, and length of hospital stay. Gerson furhter stated that "older patients, long-term patients, and patients with neoplastic disease, diseases of the circulatory system, and those with accidents" are over-represented in the group that develops decubiti (1975, p.204). The difference in incidence rates, 26.9 percent and 2.69 percent, reported by Williams (1972) and Gerson (1975) may reflect differences in patient status as seen in chronic versus acute care facilities.

Wound Healing

Wound healing is a complex biological process dependent on numerous intrinsic and extrinsic factors. Successful wound healing requires two general conditions; the provision of adequate amounts of substances required during the stages of healing, namely nutrients and immunological materials, and the successful transport of these materials to the wound site (Hunt, 1974). This implies that adequate nutritional, immunological, and circulatory status is required for successful healing.

An individual's nutritional status, as well as immunological and circulatory systems may be compromised by either disease or its treatment (Schumann, 1979).

Nutrient substances required by the wound are proteins, carbohydrates, fats, vitamins, iron, copper (Schumann, 1979), ascorbic acid, and zinc (Hunt, 1974). Vitamin C is required for hydroxylation of proline within the fibroblast (Schilling, 1976). Zinc appears to exert major influence during the proliferative phase, and by an unknown mechanism, involves the epithelial cells primarily (Schilling, 1976). Protein exerts influence during both the inflammatory and proliferative phases of healing as it is required for synthesis of immunological substances, as well as collagen. In addition, adequate nutritional status is a prerequisite for immunocompetence. Malnurished patients lack immunocompetency in humoral as well as cell-mediated immunity (Schumann, 1979).

Oxygen, like Vitamin C, is essential in the hydroxylation of proline and lysine during collagen synthesis (Irvin, 1981). Research indicates that the tissue supply of oxygen is at maximum with a hemoglobin of 10gm/100ml (Schumann, 1979). According to Hunt, normovolemia is more significant to wound healing than anemia alone, unless severe (less than 20-30 percent), for hypovolemia results in vasoconstriction (1974).

An adequate transport system is required to transport necessary nutrient, immunological substances and oxygen to the wound. Adequate transport is required for each stage of healing.

For chronically ill patients, wounds with tissue loss represent the greater threat. Wounds with tissue loss heal by secondary healing

and "secondary healing is much more precarious than primary healing" (Hunt, 1974, p. 289). There are two major reasons why secondary healing is more precarious. First, nutritional demands for this type of healing are much greater since a large amount of tissue must be synthesized to replace that lost (Hunt, 1974). For patients with an inadequate nutritional status, this demand for increased nutrients may be impossible, making secondary healing even more precarious. Secondly, the open surface wound is exposed to further injuries - drying, injury, and bacterial contamination and infection (Hunt, 1974). Delayed wound healing due to inadequate nutritional status results in an increased length of time to which the wound is susceptible to these agents, magnifying their risk. In addition, the immunosuppressed status of some patients represents a reduced response to this secondary injury if it does occur. "Impaired inflammation and white cell function is obviously more likely to affect secondary healing of open wounds than to impair primarily healing wounds" (Hunt, 1974, p. 288).

Stages of Healing

The general process of wound healing (Figure 2) is essentially the same for all wounds (Schilling, 1968; Bruno, 1979). This general process can be divided into phases characterized by the activities of particular populations of cells that predominate in the wound at a particular time. Bryant identified the phases of healing (Figure 2) as the Inflammatory Phase; the Migratory Phase; the Proliferative Phase; and the Maturation Phase (1977). Bruno (1979) identified the phases with more overlap - the Defensive phase (Inflammatory Phase); the

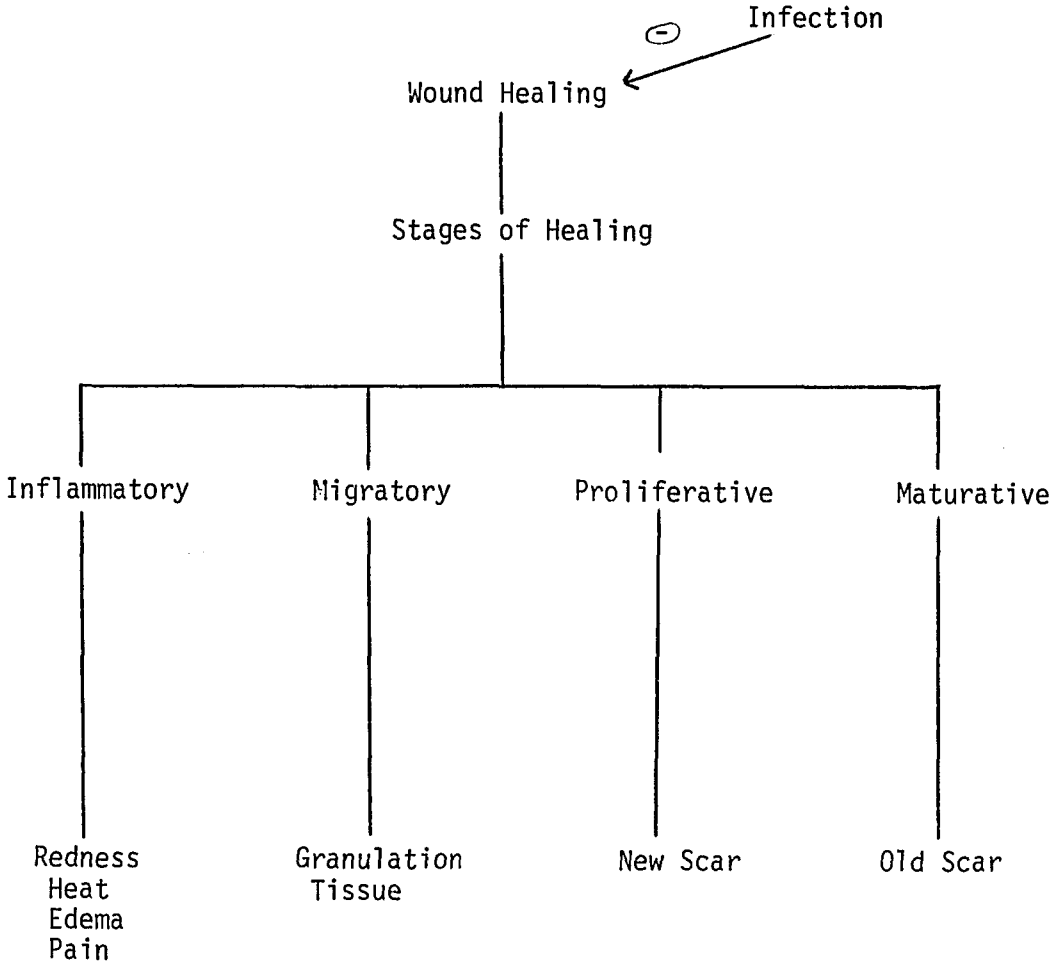

Figure 2 Taxonomy of Wound Healing

Reconstructive Phase (Migratory Phase); and the Maturative Phase. Schilling (1976) further identified the three biologic processes that occur in each of these healing stages in greater or lesser degrees. These biologic processes are: cell regeneration; cell proliferation; and collagen production.

Inflammation is the initial phase in the healing process (Figure 2) and serves to cleanse the wound of foreign debris prior to repair (Bryant, 1977). Inflammation consists of both a vascular component and a cellular component, and is characterized by three major events. These are: changes in vascular caliber resulting in vasodilation; increased vascular permeability with resultant capillary fluid leakage, evident as edema; and leukocyte infiltration into the wound, first as neutrophils and then monocytes, for phagoctyosis (Ryan, 1976).

It is possible to view the Migratory Phase and Proliferative Phase as one united in a Reconstructive Phase, for their overall purpose is actual wound repair. The major differences lie in event progression with the addition of time to the process. The major events of the Migratory Phase are epithelial cell proliferation and migration; fibroblast migration into the wound; and capillary budding (Bryant, 1977). As a continuation of the Migratory Phase, the major events of the Proliferative Phase are the continuation of epidermal cell migration and proliferation, with increased epithelial thickness; formation of capillary networks; and collagen synthesis by fibroblasts (Bryant, 1977).

The final stage in the healing process is the Maturative Phase (Figure 2), the purpose of which is to increase the wound strength

through a remodeling process (Bryant, 1977). While the emphasis during the Proliferative Phase is on collagen synthesis and its organization in a random pattern, the focus during the Maturative Phase is on collagen lysis (Bryant, 1977). During this phase, collagen lysis organizes the mass of collagen already present in the wound; the scab sloughs; and the vascular network is restored (Bryant, 1977).

One infers that for any type of wound, such as decubitus ulcer, the various phases of healing have occurred through the appearance of their characteristic products (Figure 2). The presence of inflammation in a specific type of wound is inferred through the presence of redness, heat, pain, and edema as these characteristics reflect the processes occurring in this phase. The presence of the Migratory Phase (Figure 2) is inferred by the presence of its product in a wound, granulation tissue (Bryant, 1977). The Proliferative Phase (Figure 2) occurrence is inferred with scab slough and the presence of a new scar in a wound, while the Maturative Phase in inferred from the presence of an old scar in a wound (Bryant, 1977).

Factors Associated with Wound Failure

While one goal is to discover knowledge that can be used to accelerate the healing process, a more realistic approach is control of the variables that retard or complicate wound healing (Schilling, 1968). This becomes clearer with the realization that there are only three instances of accelerated wound healing: the resutured wound, and the acceleration of epidermal regeneration with an occlusive oxygen permeable dressing (Winter, 1978), and cartilage powder (Irvin, 1981).

Irvin (1981) classified the factors associated with wound failure into groups: local factors and systemic factors. Local factors included surgical technique, blood supply, mechanical stress, suture materials and technique, radiation, and infection. Systemic factors were identified as age, malnutrition, vitamin deficiency, zinc deficiency, trauma with resulting hypovolemia and hypoxia, anemia, uremia, malignant disease, jaundice, corticosteroids, and cytotoxic drugs. Other authors have identified many of these factors, but not with the same completeness (Roberts, 1970; Hunt, 1974; Schilling, 1976; Cooper and Schumann, 1979; Schumann, 1979).

Of the local factors, Irvin (1981) identifies bacterial infection as the most common wound healing complication. Infection signifies wound healing failure and the incidence varies from one percent in clean, primarily closed surgical wounds to 25 percent in emergency operations of "dirty areas" such as an injured colon (Hunt, 1974). There are no estimates for the incidence of infection in non-surgical wounds. While infection is assumed to occur simply from an adequate number of infecting organisms, the compromised host is especially susceptible to infection (Hunt, 1974).

The systemic factors are less well understood, but are even more important in wound healing in chronically ill patients with non-surgical wounds. Most authors agree that malnutrition is one of the major causes of inadequate or delayed healing (Hunt, 1974; Schilling, 1976; Schumann, 1979; Irvin, 1981). Various diseases, such as cancer, or treatments may interfere with the intake of nutrients, the digestion of nutrients,

and/or the absorption of nutrients (Hunker, 1981). Pain may also interfere with the intake of nutrients (Cooper and Schumann, 1979). Starved, protein-depleted patients are vulnerable to infection, and have an increased number of complications associated with the inflammatory phase (Schilling, 1976). In addition, amino acids are required for the synthesis of collagen (Hunt, 1974), and in the absence of sepsis, protein depletion results in an early lag (Schilling, 1976). Vitamin C deficiency results in bloody granulations and a weak wound, while zinc deficiency is associated with delayed wound healing (Schilling, 1976).

Age, like malignant disease, does not in and of itself appear to interfere with wound healing. Surgical wound complications such as wound dehiscence appear to be more prevalent in the elderly. Also, elderly patients have a higher incidence of malnutrition, vitamin deficiencies, and other systemic abnormalities that would affect the wound healing process (Irvin, 1981; Bruno, 1982). Likewise, cancer alone does not make an individual prone to wound infection or delayed healing, but the potential for healing becomes compromised by the presence of local and systemic factors that interfere with healing (Shumann, 1979).

The major classifications of drugs that are implicated in delayed wound healing are anti-inflammatory steroids and chemotherapy (Hunt, 1974; Schilling, 1976; Irvin, 1981). Hunt (1974) identifies anti-inflammatory steroids as the most commonly used inhibitors of wound healing, interfering with contraction and epithelization of secondarily healing wounds, and inhibiting resistance to infection. Similarly, chemotherapeutic agents have a profound influence on cells of the bone

marrow, gut, and reticuloendothelial system, exerting a tremendous effect on the inflammatory response and resistance to infection (Schilling, 1976).

Hypoxia is a major inhibitor of wound healing, and is a common mediator between hypovolemia, diabetes, arterial hypoxia, inadequate local blood flow, scleroderma, and radiation injury (Hunt, 1974). In a study of prognostic factors in decubitus ulcers of the aged, Vasile and Chaitin (1972) found the blood hemoglobin, and thus oxygen carrying capacity, to be a critical criterion. The average hemoglobin in patients who survived was 12.7 percent, while the average reading was only 9.4 percent in the patients who died (Vasile and Chaitin, 1972, p. 128).

Definition of Terms

Assessment - The initial step in the nursing process which includes data collection, analysis, and interpretation (Beland and Passos, 1981).

Observation - The act of noting and recording facts or occurrences in language or another code (Beland and Passos, 1981).

Wound - Cellular injury in any part of the body that may be microscopic or macroscopic and resulting from a number of causes (Schilling, 1968).

Wound healing - The process through which the disrupted anatomic or functional continuity of the living tissue is restored (Schilling, 1968).

Decubitus ulcer - Ulceration resulting from either prolonged or extreme application of pressure to soft tissue structures (Sather, Weber and George, 1977).

Summary

Wound healing is a complex process, dependent upon both intrinsic and extrinsic factors, that differs only quantitatively for different types of wounds. For the wound model of decubitus ulcers, a review of the literature reveals that not only are chronically ill patients at high risk for this wound type, but once a decubitus ulcer occurs, the healing response may be compromised by numerous factors. The lack of reliable and valid tools to assess wounds and healing progression is evident from the research concerning the treatment of decubitus ulcers.

CHAPTER 3

METHODOLOGY

This chapter describes the research design, the setting, the sample, and the tool. The data collection methods and the data analysis are also discussed.

Study Design

This descriptive study was designed to test the Wound Assessment Checklist which facilitates systematic observation and documentation of wound characteristics in patients. The instrument was tested for interrater reliability, contant validity, concurrent validity, and construct validity.

Study Setting

Five institutions were used for this study. They were: four long-term care facilities and a Veterans Administration Medical Center in a southwestern city.

Patients are admitted to the long-term care facilities for long-term residence and skilled nursing care. The patients display an array of chronic medical problems requiring supervised care. The length of hospitalization ranges from months to years.

The medical and surgical units at the Veterans Administration Medical Center were also used. Patients are admitted to these units on

the basis of the type of treatment required during hospitalization and the available bed space. The average length of hospitalization varies from days to months.

Permission was obtained from the appropriate persons in each of the institutions for both access to the medical records to obtain demographic data and for data collection. In the long-term care facilities, this permission was granted by the Directors of Nursing and the institution administrators. Permission was obtained from the Research Committee at the Veterans Administration Medical Center.

Study Sample

A convenience sample of 24 subjects was used for this study. Criteria for admission to this study were:

1. Ability to understand English.
2. The presence of at least one decubitus ulcer on any body part.

Protection of Human Subjects

The research project was submitted for approval to the Ethical Review Committee of the University of Arizona College of Nursing. To protect the subjects and the confidentiality of the information gathered, all forms were coded to protect anonymity. Each participant was free to withdraw from the study at any time without stating the reason for doing so.

The disclaimer used in this study granted permission for three wound visualizations: one by the two nurse raters, and two additional

ones by the primary investigator. A copy of the disclaimer appears in Appendix B. In the case of patient incompetence, the patient's guardian was contacted for consent to participate in the study.

Instruments

Two instruments were used in this study: the Demographic Sheet and the Wound Assessment Checklist.

The Demographic Sheet, shown in Appendix C, elicits the following information: age; sex; diagnosis; stage and grade; concurrent illnesses; duration of present hospitalization; current treatment; current medications; age of wound; diet and weight. The Demographic Sheet accompanies the Wound Assessment Checklist. Information to complete the sheet was obtained from the patient's medical record every time the Wound Assessment Checklist was completed. The information obtained with the Demographic Sheet provided information on characteristics of the sample.

Development of the Wound Assessment Checklist

Based upon a review of the literature pertaining to wounds and wound healing, the Wound Assessment Checklist was developed by the investigator. The instrument consists of nine categories. Categories I through VII relate specifically to wound characteristics. Category VIII relates to phase of wound healing, and Category IX deals with both dependent and independent nursing interventions used in the care of the wound being assessed. The final form of the Wound Assessment Checklist to be used in this study appears in Appendix D.

The first seven categories that relate to wound characteristics are designed to provide for adequate description of any wound. The categories are: Wound Type; Location; Tissue Involvement; Size; Wound Development; Drainage; and Odor. Type and location provide descriptive data on the nature of the wound (Luckmann and Sorensen, 1974). Tissue involvement and size describe the extent of injury in terms of wound depth and wound diameter respectively (Sather, Weber, and George, 1977). Wound development, drainage, and odor indicate the presence of wound complication, such as tissue death and infection (Luckmann and Sorensen, 1974).

The category Phase of Wound Healing summarizes actual wound healing progression. Determination of a wound's stage of healing is inferred from the wound characteristics or the presence of each stage's product in the wound at a point in time (Bryant, 1977). The presence of redness, heat, pain, and edema in a wound is evidence of the inflammatory phase. The appearance of granulation tissue in a wound signals the migratory phase of wound healing. Scab slough and the appearance of a new scar herald the proliferative phase, while the appearance of an old scar in a wound is evidence of the maturative phase of wound healing.

The Intervention category describes nursing interventions used in the care of a particular wound according to the major types identified in the literature (Mikulic, 1980; Kerr, Stinson, and Shannon, 1981). These types of interventions, under the category Intervention, are: physical measures; mechanical measures; topical agents, and dressings. The types are broad to cover the array of interventions that may be used

in wound care. There are two purposes for inclusion of the intervention category: one, for documentation of interventions used in wound care, and secondly, as a basis for evaluation. Evaluation is more easily accomplished when data are available which allow comparison between specific interventions and wound characteristics over time. In this way, it becomes possible to answer the question: Is this intervention affecting the wound?

Completion of the checklist involves placing one checkmark per category next to the characteristic, phase of healing, or intervention that best corresponds to the particular wound being assessed. Each category, except interventions, will have only one checkmark as only one characteristic should best describe the wound. The intervention category may have more than one checkmark if more than one intervention is being used with a particular wound. For a completed assessment at one point in time, all the checkmarks for each category should be in a vertical column under one initialed box at the top of the checklist.

Quantification of the tool is based upon the wound healing continuum. Wound healing is conceptualized as one pole of the continuum, and non-healing is viewed as the opposite pole. Since one of the major purposes of the tool is detection of the wound complication infection, emphasis in numerical scoring is placed on items corresponding to infection. Items associated with healing are assigned lower values, while items associated with non-healing, or infection, are assigned higher numerical values. A minimum sum score of eight signifies a well-healing wound, while a maximum sum score of 27 indicates inadequate healing or infection.

For the category Wound Type, wounds are assigned numerical values on the basis of severity. Closed wounds, with no tissue loss or broken skin, are evaluated as the least severe, and receive a value of one. Wounds with broken skin but without tissue loss, such as punctures and incisions, receive a value of two on the assumption that these wounds require less tissue replacement. Wounds with tissue loss, such as abrasions and lacerations, are assigned values of three on the assumption that more tissue replacement would be required and thus healing more precarious (Hunt, 1974).

For the category Location, areas are rated according to the number of variables inherent in the location that may impede healing. The two variables identified that impede healing are reduced circulation and urine/fecal contamination. For the body locations which lack association with either variable, such as the head/neck, anterior chest, and arms, a value of one is assigned. For those locations associated with only one variable, a value of two is assigned. This included reduced circulation associated with the posterior chest and the legs, and urine/fecal contamination associated with the perineum. Locations associated with both variables, such as the pelvis, buttocks, and sacrum, receive a value of three.

For the categories of Tissue Involvement and Size, each item is ranked on the basis of increasing severity, with increasing depth of tissue involvement and increasing size respectively. The smallest wounds, those involving only the skin or a diameter of four cemtimeters, were evaluated as the least severe and assigned the lowest numerical

value of one. The largest wounds, involving skin, subcutaneous tissue, muscle, and bone/joint, or a diameter greater than 12 centimeters, were evaluated as the most severe and thus received the highest numerical value of four. Wounds falling between these two extremes of tissue involvement and size are assigned values of two and three.

Wound Development is also assigned values on the basis of severity, with the initial stage of ulcer formation, hyperemia, viewed as the least severe and thus assigned the lowest value of one. Ulceration is viewed as the final stage in the wounding process and is assigned a value of four. Ischemia and necrosis lie between these two extremes and are assigned values of two and three respectively.

Items in the categories of Drainage and Odor were rated on whether the item was associated with normal wound healing or with infection. Items associated with normal wound healing receive lower values, while items associated with infection receive higher values. No drainage, serous drainage, catarrhal drainage, and the lack of odor in a wound are characteristics of normal healing (Luckmann and Sorensen, 1974) and therefore receive a value of one. Purulent drainage and foul odor are characteristics of infection (Luckmann and Sorensen, 1974; Schumann, 1979) and received a value of three and two respectively. Hemorrhagic drainage lies between the extremes of normal and abnormal and receive a value of two.

Items in the Phase of Healing category were rated on the basis of their distance from the healed wound. Inflammation, the initial stage in the healing process, was evaluated as farthest from the healed wound

and thus assigned the highest value of four. The Maturative phase signifies a healed wound and is assigned the lowest value of one. The Migratory and Proliferative Phases lie within these two extremes and are assigned values of three and two respectively.

Not one type of intervention has been shown to be more effective than another. Therefore, each of the interventions is assigned values of one. The intervention category was not used in the data analysis, but included in data collection as part of the tool.

Following initial development of the Wound Assessment Checklist, the instrument was used on a trial basis by staff nurses at a Hospice facility for a period of four weeks. Prior to implementation, the instrument was evaluated by the head nurse of the unit. Staff education was provided through an inservice program by the investigator. Nurses used the instrument with a total of six patients. Staff input regarding actual implementation of the instrument resulted in no major revisions in either the content or format.

Guide for the Wound Assessment Checklist

A guide accompanying the Wound Assessment Checklist was prepared by the investigator to define the terms that appear in the instrument. The Guide for the Wound Assessment Checklist was used by the investigator to train the two nurse raters prior to actual use of the instrument. The Guide appears in Appendix E.

Data Collection Protocol

Prior to data collection, the instrument was submitted to a panel of four experts on wounds and wound healing. The judgement of the panel was used to establish content validity of the instrument.

The investigator identified any patient with a decubitus ulcer with the assistance of the staff. From the medical record, either the nurses notes or the physician's progress notes, the state of the wound was determined. The state of the wound was defined as the presence or absence of wound infection. From this information, subjects were to be placed into one of two groups - those with infected decubitus ulcers, and those with noninfected decubitus ulcers.

Subjects who met the criteria were approached by the investigator to request participation in the study. The investigator explained that she was conducting a study on wound healing, and their participation would involve having two nurses look at their wound on one occassion. It was also explained that two additional visualizations at five day intervals would be performed by the investigator. Patients had their wounds visualized a total of three times; once by the two nurse raters to establish interrater reliability, and two additional times by the investigator to obtain serial measurements for construct validity.

To eliminate the possibility of bias, the investigator was eliminated from the initial scoring of the wounds for the entire sample. Bias was a possibility due to the investigator's previous identification of the wound state as infected or noninfected from the medical record. Knowledge of wound state prior to rating could influence ratings in the direction expected, rather than on the basis of observed wound

characteristics. Two other nurse raters, both trained in the use of the instrument by the investigator, completed the Wound Assessment Checklist once for each subject. Training in the use of the tool consisted of instruction with the aid of the Wound Assessment Guide. This instruction was provided to the two nurse raters by the primary investigator. A pilot study was conducted after the rater training in a simulated situation. In the simulated situation, the raters used the Wound Assessment Checklist to rate different decubitus ulcers as presented through slides. Their ratings were compared to those obtained by the primary investigator. These two nurse raters were not informed prior to their checklist completion which wounds were considered to be infected.

To obtain serial measurements, the investigator assessed each of these wounds two additional times with the Wound Assessment Checklist at five day intervals. A five day interval has been used by other researchers as sufficient to detect wound changes (Van Ort and Gerber, 1976; Gerber and Van Ort, 1979). These additional ratings followed the initial rating performed for each of the subjects by the two nurse raters. Following each additional rating for each subject, the investigator determined from the medical record the state of the wound. This information was used in determining concurrent validity.

Reliability and Validity

Measurement is defined by Carmines and Zeller as the "process of linking abstract concepts to empirical indicants" (1979, p. 10). To make accurate inferrences from empirical observations concerning the

theoretical framework, two basic properties of empirical observations that are captured in the measurement tools must be addressed. These two properties are reliability and validity (Carmines and Zeller, 1979).

Reliability of an instrument is the degree of consistency with which it measures the specified attribute (Polit and Hungler, 1978). This study addresses reliability through interrater reliability.

In interrater reliability, different observers use an instrument to measure the same phenomena at the same time (Polit and Hungler, 1978). A correlation coefficient is commonly computed to demonstrate the strength of relationship between the observer's rating (Polit and Hungler, 1978). In this study, interrater reliability was to be established through single ratings of each participant performed by two trained nurse raters.

Validity is defined by Polit and Hungler (1978) as the degree to which the tool measures what it is supposed to be measuring. In this study, content validity, concurrent validity, and construct validity were investigated.

Content validity is the sampling adequacy of the content by the instrument or its representativeness (Kerlinger, 1973). It is essentially a judgement, arrived at by a panel of experts in a content area who judge the adequacy of items in the tool in representing the content universe (Polit and Hungler, 1978). In this study, content validity was established by submitting the instrument to four experts in the area of wounds and wound healing. The panel consisted of one nurse educator and three nurses enrolled in a doctoral program in nursing. Two of the

doctoral students have previously conducted research with decubitus ulcers and wound healing. The third doctoral student provided expertise from a surgical background in relation to wound healing. The nurse educator provided expertise regarding wound healing in the geriatric population. The experts judged the adequacy of each category, as well as the adequacy of content for the entire tool.

Criterion-related validity requires the comparison of test scores with another criteria believed to measure the attribute under study (Kerlinger, 1973). In this study, it was investigated through comparison of the wound state as documented in the chart with the wound state as described by the Wound Assessment Checklist.

Construct validity attempts to validate the theory behind the test (Kerlinger, 1973). One method of establishing construct validity is the known-groups method (Kerlinger,1973; Polit and Hungler, 1978). In this method, groups of people with known characteristics are administered an instrument with the direction of differences predicted (Kerlinger, 1973). If the data perform as predicted, the construct is supported. In this study, the wound construct was considered supported if the instrument was capable of discriminating between the two groups of subjects - those with infected decubitus ulcers and those with non-infected decubitus ulcers. A correlation between the single ratings obtained with the instrument and the wound state as indicated in the medical records was to be used to determine to what extent the instrument is capable of discriminating the groups.

A method of obtaining support for the wound healing construct may be obtained through serial measurements if the instrument

accurately reflects changes in the wounds. Since wound healing is a process that occurs over time, changes in wound characteristics should reflect that process, and different measurements would be expected at different points in time. A valid instrument should reflect these changes over time by yielding different measurements. A difference between the serial measurements across time reflect the degree to which the instrument measured wound changes.

Data Analysis

Each subject was given a total score on the Wound Assessment Checklist, ranging from eight to 27. A score of eight indicated a well-healing wound, while a score of 27 indicated poor healing in a wound.

Kappa (K) is a statistic developed to measure the interobserver reliability of categorical data commonly seen with nominal scaling (Cohen, 1960). It represents two quantities: the proportion of units in which the judges agreed, and that proportion of units in which agreement is due to chance. A value of zero occurs when obtained agreement equals chance agreement. Positive values of K result with greater than chance agreement, and approaches the upper limit of +1.00 when there is perfect agreement between judges. A negative value for K occurs when the proportion of observed agreement is less than the proportion of chance agreement.

Kappa was computed for several groups of data and the criterion for each group was set at .70. To establish interrater reliability, kappa was computed for the single ratings obtained by the two nurse raters. To establish content validity, kappa was to be computed for

the judges' evaluations to determine the proportion of agreement. Kappa was computed for the ratings achieved with the instrument, and the wound state as identified in the chart to establish concurrent or criterion validity. The data from the medical record was categorized after collection, to achieve quantification, and thus facilitate computation of Kappa.

Repeated Measures Analysis of Variance (ANOVA) is a statistic used to test the significance of differences between means over time (Polit and Hungler, 1978). In this study, the repeated measures ANOVA was computed to establish construct validity for the taxonomy of wound healing. In this way, it could be determined whether there was significant variability in the serial ratings across time.

According to Polit and Hungler (1978), the t-test is the basic parametric procedure for testing differences in group means. This facilitates the comparison of two groups of subjects on a dependent variable of interest. To establish construct validity for the taxonomy of wounds, this statistic was to be used to answer the question: Does the tool discriminate between two groups that differ on the variable of infection?

Descriptive statistics were used to analyze demographic data in order to describe the study sample.

Summary

A descriptive study was used with a sample of 44 wounds to test the Wound Assessment Checklist for reliability and three forms of validity. Data was obtained through single ratings performed by trained raters, as well as serial measurements obtained by the primary investigator.

CHAPTER 4

RESULTS OF DATA ANALYSIS

This chapter presents the results of the study. Findings related to the characteristics of the sample and to the characteristics of the wounds are presented. The statistical analysis of the data is presented in the order of interrater reliability, content validity, concurrent or criterion validity, and construct validity.

Demographic Data

The characteristics of the sample and of the wounds are revealed through an examination of the demographic data obtained with the Demographic Sheet. A total of 34 subjects agreed to participate in the study. The total number of wounds assessed in the study with the tool was 44 since some of the subjects had multiple wounds. Twenty-five of the subjects had a single decubitus ulcer, eight subjects had two decubitus ulcers, and one subject had three decubitus ulcers. All 44 wounds were assessed twice with the tool. However since two subjects died during the two weeks of data collection and prior to the third serial measurement, only 38 of the wounds were assessed three times as specified in the methodology. None of the wounds was infected as documented by the medical records; therefore, the planned analysis of the construct validity for the wound construct was not done.

Characteristics of the Sample

As shown in Table 1, the 34 subjects ranged in age from 45 to 96 years, with a mean age of 85 years. Only two of the subjects were less than 74 years old. The 34 subjects ranged in weight from 66 to 154 pounds, with a mean weight of 109 pounds. The length of institutionalization for the 34 subjects ranged from less than 12 months to 132 months. As shown in Table 2, 23 subjects, or 68 percent of the sample, were female while only 11 subjects were male.

Variables that influence wound healing, such as diet, diseases, and medications, are also apparent from examination of the demographic data. As shown in Table 2, 20 subjects, or 59 percent of the sample, received a regular diet. Of the remaining subjects, four were on a diabetic diet, four subjects received a low sodium diet, and three subjects received a low caloric diet.

Regarding the underlying disease processes, Table 3 indicates that cardiovascular disease and neurologic disease account for the majority of disease present in the subjects. As shown in Table 4, 12 subjects presented with diseases of three major body systems. Not only are cardiovascular and neurologic systems most commonly affected in this sample, but 79 percent of the sample presented with diseases affecting two to three major body systems in each subject.

Regarding medications, Table 3 indicates that 11 subjects receive diuretics regularly, while 23 subjects, or 68 percent of the sample receive some form of vitamin supplimentation, that included potassium. Table 4 indicates that 86 percent of the sample received from one to four classes of drugs per subject.

TABLE 1: Age and Weight for Sample

Variable	Mean	S.D.	Min.	Max.
Age	85	10.90	45	96
Weight	109	26.75	66	154

TABLE 2: Sex and Diet for Sample

	Frequency	Percent
Sex		
Male	11	32%
Female	23	68%
Total		100%
Diet		
Regular	20	58%
Diabetic	4	12%
Low Sodium	4	12%
Low Calorie	3	9%
Missing	3	9%
Total		100%

TABLE 3: Frequencies for Specific Diagnoses and Medications

Body System / Medications	Diagnoses Absolute Frequency	Diagnoses Percent	Medication Absolute Frequency	Medication Percent
Cardiovascular Diseases	19	56%		
Antihypertensives			1	3%
Cardioactive glycosides			9	26%
Diuretics			11	32%
Vitamins			23	68%
Endocrine Disease	7	21%		
Antidiabetics			5	15%
Hormones			2	6%
Gastrointestinal Disease	4	12%		
Hematopoietic Disease	1	3%		
Musculoskeletal	7	21%		
Anti-inflammatory			3	9%
Respiratory Disease	6	18%		
Antitubercular			1	3%
Bronchodilators			2	6%
Neurologic Disease	27	79%		
Antipsychotics			5	15%
Anticonvulsants			4	12%
Antidepressants			2	6%
Antiparkinson drugs			2	6%
Peripheral Vascular Disease	5	15%		
Urinary Tract Disease	8	23%		
Antibacterials			4	12%

TABLE 4: Sum Diagnoses and Sum Medications per Subject for Sample

Number Diagnoses/Subject	Frequency	Percent
1	5	15%
2	12	35%
3	15	44%
4	0	0
5	1	3%
6	1	3%

Number of Medication Classes/Subject	Frequency	Percent
0	3	9%
1	10	29%
2	9	26%
3	5	15%
4	5	15%
5	1	3%
6	1	3%

Characteristics of the Wounds

The age of the wounds ranged from one day to 462 days, with a mean age of 69 days. The standard deviation for wound age was 96.65. The location of the wounds is illustrated in Table 5. It is interesting to note that 11 wounds were located on the buttocks, 12 of the wounds were located on the hip, and 12 of the wounds were located on the sacrum. Wounds located on the buttocks, hip and sacrum accounted for 35 of the wounds, or 79 percent of the sample.

Interrater Reliability

To determine the interrater reliability of the tool, the two raters completed the tool at the same time while visualizing each subject's wound. Prior to data collection, the two raters were trained by the primary investigator in the use of the tool.

Rater training

Training was accomplished with the aid of the Wound Assessment Guide. Training was followed by a simulation using slides of decubitus ulcers. Due to a time interval of two months between the initial training of the two raters and actual data collection, the raters were trained a second time by the primary investigator. Due to the numerous questions raised in the simulation, a revised Wound Assessment Guide was used in the second training period. The revised Wound Assessment Guide appears in Appendix E. In addition, a pilot study using two subjects was conducted after the second training due to difficulty encountered in completing some of the tool's categories, such as Location, Drainage, and

TABLE 5: Frequencies for Wound Location

	Frequency	Percent
Wound Location		
Ankle	4	10%
Back	1	2%
Buttocks	11	25%
Hip	12	27%
Ischium	3	7%
Sacrum	12	27%
Missing	1	2%
Total		100%

Odor, during the simulation with the slides. In the pilot study, the two raters each completed the tool while visualizing the wound at the same time. The criterion for successful performance of the two raters was set at agreement between the two raters for at least five of the eight categories on the tool. For the first subject in the pilot study, agreement between the two raters was reached for each of the categories except two: Wound Type and Location. For the second subject in the pilot study, agreement was reached between the two raters for each category. Since the results of the pilot study indicated that the two raters met the criterion for successful performance, the actual data collection followed the same procedure in which the two trained raters completed the tool while visualizing the wounds at the same time for each of the 34 subjects.

Reliability

Table 6 presents the Percentage Agreement and Kappa for each category of the tool. The criterion for both Percentage Agreement and Kappa was set at .70. Note that only the first three categories of the tool, Type, Location, and Tissue Involvement, met the .70 criterion for both Percentage Agreement and Kappa. The conclusion reached is that there was a large amount of agreement between the two raters for these three categories, and that this agreement was not due to chance.

As shown in Table 6, the results for the remaining five categories of the tool do not demonstrate the same degree of reliability. For the categories of Size, Wound Development, and Drainage, the Percentage

TABLE 6: Kappa and Percentage Agreement Between Rater 1 and Rater 2 By Category for Entire Tool

Category	Kappa	Percentage Agreement
I. Type	.76	.86
II. Location	.78	.84
III. Tissue Involvement	.69	.82
IV. Size	.45	.79
V. Wound Development	.57	.73
VI. Drainage	.34	.89
VII. Odor	0	.95
VIII. Phase of Healing	.07	.41

Agreements show an acceptable level of agreement between the two raters at .82, .79, and .73 respectively. The corresponding lower Kappa values of .45 for Size, .57 for Wound Development, and .34 for Drainage indicate that the true agreement between the two raters not due to chance is much lower. A Percentage Agreement of .95 and Kappa of zero for the category of Odor indicates that all of the agreement between the two raters was due to chance. For the category of Phase of Healing, the Percentage Agreement value of .41 and the Kappa value of .07 also fail to meet the .70 criterion, indicating a low level of agreement between the two raters and even lower level of true agreement.

On the basis of individual category analysis, the categories of Size, Wound Development, Drainage, Odor, and Phase of Healing must be revised before interrater reliability can be established. The revisions of the categories are discussed in Chapter 5.

Content Validity

To establish content validity, the tool was submitted to a panel of four experts on wounds and wound healing. The panel of experts consisted of three doctoral students and one nurse educator. Two of the doctoral students have previously conducted research with decubitus ulcers, while the third doctoral student has expertise in wound healing from a surgical background. The nurse educator contributes expertise on wound healing in the geriatric population. Each expert was asked to judge each category, as well as the entire tool, for the adequacy of the content. This was performed by answering the following questions: Do the items that comprise each category enable that category to adequately

portray the intended wound characteristic? Do the categories that comprise the tool enable the tool to adequately portray the construct of wounds?

Results indicate that there was total agreement between each of the judges for items comprising each category except Location. For the Location category, one judge expressed the need to further divide the item Leg into Upper and Lower Leg. This revision is discussed in Chapter 5.

There was total agreement between the four judges that the entire tool adequately tapped the universe of content pertaining to wounds. On the basis of these results, content validity for the tool was established by the panel of experts.

Criterion-Related Validity

The only criterion available in this study to compare with the tool was the medical record. The primary investigator collected any relevant data which could be compared with the tool prior to the initial wound ratings by the two trained raters, and after the second and third serial measurements made by the primary investigator. The only relevant data available from the chart were wound location, which corresponds to the category Location on the tool, and wound size, which corresponds to the category Size. As shown in Table 7, chart size compared with Rater 3 is lacking. The lack of a new size measurement on the chart during the time interval of the second and third serial measurements resulted in the lack of a criterion to compare with the second and third measurements.

TABLE 7: Kappa and Percent Agreement (in parenthesis) for Instrument Ratings and Chart Criterion

	Raters			
	1	2	3^1	3^2
Chart Location	.67	.57	.60	.66
N = 43	(.74)	(.67)	(.70)	(.73)
Chart Size	.43	.15	--	--
N = 22	(.77)	(.77)		

3^1 - second rating completed by primary investigator

3^2 - third rating completed by primary investigator

As shown in Table 7, five of the six comparisons meet the .70 criterion for Percentage Agreement, however, not one of the comparisons met this criterion for Kappa. Reasons for the lower Kappa values are discussed in Chapter 5.

Examination of Table 7 indicates that for each Chart Location and Rater, the corresponding Percentage Agreement and Kappa values are similar. In addition, the values obtained for Kappa approach the .70 criteria, except those involving Rater 2.

For the two raters and chart size, Table 7 indicates that while both comparisons meet the .70 criterion for Percentage Agreement, neither comparison approach the .70 criterion for Kappa. In addition, the very low value of .15 for Rater 2 indicates the large impact of chance upon this rater's ratings. The rater problem is discussed in Chapter 5. The results of these data indicate a need for revision of both the Location category and the Size category of the tool.

While the sample size is adequate for chart location, indicating that this information is provided for most of the subjects, the much lower sample size for chart size indicates that this information is less commonly documented in the medical record. In addition to the lack of information available regarding wound size, the lack of any other criterion, such as tissue involvement, against which to compare the instrument is a further indication for the need for a tool that facilitates observation and documentation. The lack of an adequate criterion measure is discussed in Chapter 5.

Construct Validity

Two types of construct validity were to be examined in this study: one relating to the wound construct and the other related to the construct of wound healing. During the two week data collection period, no infected wounds were available. Therefore, it was not possible to establish validity for the construct of wounds in this study.

To establish validity for the construct of wound healing, the primary investigator obtained serial measurements for as many of the wounds as possible. The primary investigator performed a second measurement on all 44 subjects five days after the initial measurement performed by the two trained raters. A third measurement was obtained by the primary investigator for 38 of the wounds five days after the second measurement.

Each item of the tool was assigned a numerical value prior to actual data collection, with the lowest value of one signifying a well-healing wound, and the highest value of four associated with non-healing or infection. The lowest sum score of eight would be indicative of a well-healing wound, while the highest sum score of 27 on the tool would indicate a non-healing and/or infected wound.

Table 8 displays the mean scores and standard deviations for the sum scores obtained by each rater. There is consistency for the mean score of 15.93 obtained by Rater 1 and the mean score of 16.02 obtained by Rater 2.

A second finding from Table 8 is the pattern of the mean scores between the trained raters and the investigator. The mean score rises

TABLE 8: Table of Mean Scores and Standard Deviations for Rater 1, Rater 2, and Rater 3

Rater	Mean	Standard Deviation
1	15.93	3.72
2	16.02	3.13
3^1	17.27	3.37
3^2	14.75	7.02

3^1 - Second rating completed by primary investigator.

3^2 - Third rating completed by primary investigator.

from 15.93 obtained by Rater 1 and 16.02 obtained by Rater 2 to 17.27 obtained by the primary investigator. However, during the third measurement by the primary investigator, the mean score drops to 14.75. Two different possibilities account for this pattern. First, the data suggests that in the healing process, healing is first inadequate (mean score from 16 to 17) and then healing improves (mean score from 17 to 14). The second possibility is a lack of reliability between the ratings of the two trained raters and the primary investigator. Since the primary investigator did not complete the tool while assessing the wounds with the two raters during the pilot study, the possibility of a lack of reliability exists. It is not known which of the two possibilities accounts for the variation in the scores between the two trained raters and primary investigator.

Table 9 presents the repeated measurements analysis of variance for the mean scores obtained by Rater 1 and the two investigator ratings. The level of significance was set at .05 prior to data collection. Results of the table indicate that the F value of 3.63 is significant at .03, allowing for rejection of the null hypothesis that there would be no change in the wounds over time.

Table 10 presents the repeated measurements analysis of variance for the mean scores obtained by Rater 2 and the two investigator ratings. The F value of 3.77 is also significant at .03, supporting the rejection of the null hypothesis that there will be no change in the wounds over time. Both analyses of variance indicate that there was change in the wounds over time and that the instrument appeared sensitive to this change.

TABLE 9: Analysis of Variance:
Change Across Time with Rater 1

Source	S.S.	D.F.	Mean Square	F	Sign.
Variation Across Time	140.20	2	70.10	3.63	.03
Error	1662.47	86	19.33		
Total	1802.67	88	20.48		

TABLE 10: Analysis of Variance:
Change Across Time
With Rater 2

Source	S.S.	D.F.	Mean Square	F	Sign.
Variation Across Time	140.01	2	70.01	3.77	.03
Error	1595.98	86	18.56		
Total	1736.00	88	19.73		

Summary

An analysis of the data establishes content validity for the tool. Criterion-related validity is established at the lower levels of adequacy, but is limited due to the limited chart criterion. Support for the wound healing construct is demonstrated through an analysis of variance which supports rejection of the null hypothesis. However, interrater reliability was not demonstrated in this study, and computation of Kappa for each category suggested a need for further tool revision for six of the eight categories of the tool. The low reliability of the tool affects the validity, for an instrument which is not reliable cannot be considered valid (Polit and Hungler, 1978).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

While the problem of decubitus ulcers has been present for many years, a renewed interest in the problem has come about with the increasing geriatric population. The geriatric group is especially susceptible to decubitus ulcers which carry a mortality rate of over 60 percent in this population (Vasile and Chaitin, 1972). In addition, this population suffers from many chronic diseases which result in a poorer surgical risk than with a younger group. For these patients, conservative medical treatment of decubitus ulcers is the treatment of choice.

Demographic Profile

The characteristics of the sample in this study corresponds well with other research. Gerson (1975) reports that institutionalized elderly seem to be over-represented in the group that develop decubitus ulcers. This was found to be characteristic of this sample with a mean age of 85 years. The average subject weight of 109 pounds in the sample supports the findings of Williams (1972) that thin people were more likely to form decubitus ulcers. Contrary to the findings of Gerson (1975) who reported an equal frequency of decubiti in males and females, and Williams (1972) who reported a greater frequency of decubiti in males, 68 percent of this sample was female. The commonality of

multiple diseases in the geriatric population is supported by the finding in this study that in 79 percent of the sample, each subject presented with diseases involving two to three body systems. Over half of the sample, 56 percent, presented with some form of cardiovascular disease, which has also been supported by the findings of other researchers (Vasile and Chaitin, 1972; Gerson, 1975).

Regarding wounds, Vasile and Chaitin (1972) report the occurrence of multiple decubiti in the geriatric population versus the occurrence of single decubiti in younger subjects. This is consistent with the findings of this study in which nine subjects, or 24 percent of the sample, had more than one decubitus ulcer.

Interrater Reliability

Observational methods are very dependent on the observer, and are thus more vulnerable to perceptual errors than any other data collection method (Polit and Hungler, 1978). Unreliable measurement is "measurement overloaded with error" (Kerlinger, 1973, p. 455). The following is a discussion of the sources of error encountered in this study.

One of the major problems encountered in this data analysis is excessive consistency in item selection by the second rater. Selection of only one response consistently by the second rater is apparent in the results of Kappa for the categories of Size, Drainage, Odor, and Phase of Healing. The pattern to select only one response is also demonstrated in the Kappa computation for comparison between the Chart Size and Rater 2. Bouchard (1976) describes this as content error due

mainly to operating characteristics of the observer. The selection of only one response consistently promotes the possibility that selection of the response is due to a halo effect in which there is a tendency to rate an object in a constant direction (Kerlinger, 1973).

Possible explanations for the halo effect encountered with Rater 2 are content errors and context errors (Bouchard,1976). Content errors are due mainly to operating characteristics of the observer (Bouchard, 1976). Abbreviation is the major content error identified in which there is a simplification and a loss of detail in an observation (Weick, 1968). For Rater 2, abbreviation is identified by the lack of observed odor or drainage in any wound assessed.

Context errors are associated with the material or events that surround or are associated with an observation or observer (Bouchard, 1976). With Rater 2, the major form of context error is the "assimilation to prior inputs" in which messages are distorted in the direction of identity with previous inputs (Weick, 1968, p.430). The product of assimilation to prior inputs is regularity and orderliness, or in this instance, toward the selection of only on consistent response. After viewing several wounds in succession in which the characteristics of drainage and odor were lacking, later wounds would also be rated as lacking in the characteristics of odor and drainage.

A methodological problem in the data collection procedure which could have contributed to the tendency toward assimilation to prior input was rater fatigue. Data collection by the two raters was completed in one evening in which the 44 wounds were viewed in succession.

While rest periods and setting changes provided some variability, rater fatigue and boredom are a possible source of error. Weick (1968) describes habituation as a major factor in the assimilation of unique events into commonplace labels.

Finally, background knowledge of wound healing for Rater 2 is also a factor that may have contributed to the tendency toward assimilation to prior inputs. Since the past wound experience of Rater 2 was primarily related to surgical wounds, a lack of familiarity with the observation of decubitus ulcers may have resulted in reliance on past observational skills as they applied to surgical wounds. According to Weick (1968), prior inputs have the greatest import when the present inputs are puzzling. The reliance on prior inputs could produce ambiguity and increase the possibility of chance error.

A problem encountered with assessment of wound size was the lack of descriptive data to facilitate "eyeballing" wounds for size. It is more difficult to conceptualize the length of four centimeters in the mind, especially in a society using inches as a standard of measurement, than to visualize an object that characterizes the size. This in turn could have affected the reliability of the Size category. Since the most important requirements of any category is that it be explicit, measurements of size may be aided by criteria objects (Weick, 1968).

For the category Wound Development, construction of the category itself could have contributed to the Kappa value of .57. The error of "chance response tendencies" stems from imprecise category definitions (Weick, 1968) or item ambiguity (Kerlinger, 1973). The first three

items, Hyperemia, Ischemia, and Necrosis, describe the colors red, white, and black respectively. Ulceration, on the other hand, refers to a condition which is the lack of tissue. Such ambiguity may account for some of the low reliability for the Wound Development category on the tool because an ambiguous item permits error variance to occur as individuals interpret an item differently. Since these interpretations are random, they increase error variance which decreases reliability (Kerlinger, 1973).

A second problem with the Wound Development category is the lack of specification for whether the central or peripheral portion of the wound is to be assessed. Since one wound may be in several stages of healing in different portions, such as a previously healed decubitus ulcer that reopens, a wound may exhibit different colors as well as different states in different portions. Unless this is specified on the tool, the error of "chance response tendencies" may stem from an inadequate understanding of the category by the observers (Weick, 1968).

The use of Op-Site (Chrisp, 1977), a non-permeable clear adhesive used on many of the wounds assessed may have affected the assessment of odor and drainage, and thus the Kappa values obtained for these categories. Twenty-eight of the 44 wounds, or 64 percent, were using Op-Site as the prescribed treatment. While it is possible to detect odor and drainage with Op-Site intact on the wound, it is more difficult to detect finer degrees of these two characteristics than if the wound were not covered.

The use of the Phases of Healing as described by Bryant (1977) with the Inflammatory Phase, Migratory Phase, Proliferative Phase, and Maturative Phase may have contributed to the low reliability for this category. Nurses have traditionally been educated to detect normal healing and the presence of wound complications such as infection. While it is not difficult to determine the Inflammatory Phase or the Maturative Phase from wound characteristics, it is difficult to differentiate between the Migratory Phase and the Proliferative Phase in the clinical setting. For nurses, the Migratory Phase and Proliferative Phase are what is viewed as actual healing of a wound, with the formation of a scab, or granulation tissue. Judgements beyond this may not be possible with the state of the art for nursing as it presently exists.

Selection of an item for this category requires a greater degree of inference than for the other categories because the observer must first identify wound characteristics and then categorize these characteristics with the appropriate phase of healing. This differs from the other categories in which a characteristic must only be identified, but not categorized. While most observation involves inferences, the degree of inference required for a category varies and affects the reliability (Weick, 1968). The more inference required by a category, the greater the possibility of error variance as individuals infer or interpret differently which decreases reliability (Kerlinger, 1973).

In summary, the major observer problems identified were related to biases in the form of abbreviations and assimilation to prior inputs

(Weick, 1968). Both rater fatigue and past wound experience were factors which could have contributed to the tendency to prior inputs. A lack of clarity was identified as a problem for the categories of Wound Development and Phase of Healing.

Criterion-Related Validity

The most important problem encountered that impacted upon criterion-related validity was the lack of an adequate criterion. This is also the major problem in the establishment of any criterion-related validity (Kerlinger, 1973). Since 43 of the 44 wounds were accompanied by Location on the medical record, this was determined to be an adequate criterion. However, this is the only criterion available which involves only one category of the tool. The other seven categories, including Size, lack an external measure. This lack of information in the medical record is in itself a strong indication of the need for a systematic method of observing and documenting wound characteristics.

A second problem which may have reduced criterion-related validity is an incomplete item system for Location. Five medical records identified Ischium as a wound location. The Wound Assessment Checklist did not include this item and wounds in this location were placed either in the Leg or Buttocks item.

While tools for research may not be handicapped by the lack of criterion-related validity, tools designed for clinical practice may be severely limited by its lack. The major limitation due to a lack of criterion for clinical tools is the lack of a major form of validation for these tools.

Construct Validity

Due to a lack of infected wounds in the sample, it was not possible to test the wound construct. Testing the wound construct would have answered the question: Does the instrument differentiate between infected and non-infected wounds?

While Rater 1 and Rater 2 participated in the pilot study under the supervision and direction of the primary investigator, the primary investigator did not participate by completing the tool with the raters. This raises the possibility that there was a lack of agreement between the two raters and the primary investigator which could account for the differences between the mean sum scores obtained on the tool by the raters and the primary investigator. From the resulst of the data, the possibility of a lack of interrater agreement between all three people participating in this study cannot be excluded.

In addition, the tool developer's familiarity with the tool adds another source of bias. Two factors may contribute to this bias. These two factors are: 1) personal interest and commitment coloring what is seen in the direction of what the observer desires to see and 2) the anticipation of what is to be observed affecting what is actually observed (Polit and Hungler, 1978).

Sources of Error

Design Errors

The non-varying responses of the second rater resulted in low Kappa values for several tool categories, with interrater reliability

as well as in comparison with the chart size for criterion-related validity. The difference in the mean sum score between the two raters and the primary investigator suggest the possibility of a lack of agreement between all three raters. The exclusion of the primary investigator from the pilot study prevents elimination of this source of error. Assessment of many of the wounds with intact Op-Site is a possible source of error for the characteristics of odor and drainage. The use of the tool by the primary investigator introduces the possibility of investigator bias.

Measurement Error

The consistent choice of only one response for several categories by one rater introduces the "halo" effect as a source of error (Kerlinger, 1973). The lack of clarity for the categories of Location, and Wound Development introduce ambiguity as a source of error (Kerlinger, 1973). The lack of adequate criteria to conceptualize size and healing phase introduces the possibility of error for the categories of Size and Phase of Healing.

Recommendations for Tool Revision

Tool revision is based upon the rule that "the fewer the categories, the more precise their definition, and the less inference required in making classifications, the greater will be the reliability of the data" (Weick, 1968, p. 403).

Based upon the results of this study, the following recommendations are made:

1. Revision of the Location and Size categories of the tool through the addition of specific items.
2. Revision of the Wound Development category through sub-division into a Wound Color category and a Wound Condition category.
3. Revision of the Phase of Healing category to consist of the Phase of Healing Classification by Bruno (1979).

The following specific revisions are suggested:

Location: Add the item Ischium to the category. Subdivide the Leg item into Upper Leg and Lower Leg.

Size: To facilitate visual inspection of wounds for accurate measurement, the items are divided into two centimeter intervals. A criterion will follow each item. The revised category is as follows:

0-2 cm. (No larger than 1 inch)
2-4 cm. (No larger than a half dollar)
4-6 cm. (No larger than a 2x2 dressing)
6-8 cm. (No larger than 3 inches)
8-10 cm.(No larger than a 4x4 pad)
10-12 cm.(No larger than a 6cc syringe)

Wound Development: Since this category refers to both wound colors and wound descriptions, this category is divided into the following two: Wound Color and Wound Condition.

Wound Color: The items for wound color are based upon the work of Verhonick (1961). The following items will

comprise the Wound Color category: Red, Blue, Purple, Yellow, Gray, and Black.

Wound Condition: The following items comprise the Wound Condition category as described by Verhonick (1961) and Williams (1972): Induration, Excoriation, Scab, Necrosis, Ulceration, and Scar.

Phase of Healing: Items for this category will be changed from the Inflammatory Phase, Migratory Phase, Proliferative Phase, and Maturative Phase (Bryant, 1977) to the Defensive Period, the Reconstructive Period, and the Maturative Period (Bruno, 1979).

Recommendations for Further Study

Based upon the results of this study, the following recommendations are made:

1. Extensive training of raters with the Wound Assessment Checklist.
2. Revision of data collection method such that only several wounds are viewed during each period to prevent rater fatigue.
3. Exclusion of the primary investigator from actual data collection.
4. Prior to actual wound assessment, ensure adequate wound visualization by removal of any dressings.
5. Retest the revised Wound Assessment Checklist using at least three trained raters.

6. Replication of the present study with the revised tool and methodological revisions.
7. Administration of the revised tool to a sample in which infected wounds are present to establish construct validity for the wound construct.
8. Administration of the revised tool to populations with different types of wounds.

Summary

The results of data analysis mandate revisions in both the research methodology as well as the Wound Assessment Checklist. The major recommendation is for replication of this study with the revised Wound Assessment Checklist following a pilot study that includes each rater.

APPENDIX A

HUMAN SUBJECTS APPROVAL

THE UNIVERSITY OF ARIZONA COLLEGE OF NURSING

MEMORANDUM

TO: Rochelle Renee Storm
6350 S. Hildreth
Tucson, Arizona 85706

FROM: Ada Sue Hinshaw, R.N., Ph.D. ASH/des
Director of Research

Jan R. Atwood, R.N., Ph.D. JRA/des
Chairman, Research Committee

DATE: November 4, 1982

RE: Human Subjects Review: Development of a Wound Assessment Checklist

Your project has been reviewed and approved as exempt from University review by the College of Nursing Ethical Review Sub-committee of the Research Committee, and the Director of Research. A consent form with subject signature is not required for projects exempt from full University review. Please use only a disclaimer format for subjects to read before giving their oral consent to the research. The Human Subjects Project Approval Form is filed in the office of the Director of Research, if you need access to it.

We wish you a valuable and stimulating experience with your research.

ASH:des
8/82

APPENDIX B

DISCLAIMER

DISCLAIMER

PROJECT TITLE: DEVELOPMENT OF A WOUND ASSESSMENT CHECKLIST

I am requesting your voluntary participation in this study. The purpose of this study is to develop a tool that will permit the assessment of wounds.

If you decide to participate, you will be asked to allow three nurses to view your wound on four different occasions. Two nurses will each view your wound on the same day, but at different times. This nurse will view your wound two additional times at one week intervals. During each viewing, each nurse will fill out the checklist, which requires about five minutes. Information will also be obtained from your chart each time your wound is viewed, such as weight, diet, current medications, and current treatment. You are free to withdraw from the study at any time without it affecting the quality of your treatment of care in any way. You are free to ask and receive answers to relevant questions at any time. There are no known risks associated with participation in the study.

All forms will be coded to protect anonymity. When the data are analyzed, the results will be submitted for publication and anonymity will be maintained at this time also. These data will be available to the principal investigator and the thesis committee of the University of Arizona College of Nursing, and will be kept in a safe place.

_____

(Name of Individual Responsible for Checklist)

APPENDIX C

DEMOGRAPHIC SHEET

DEMOGRAPHIC SHEET

1. Patient Number:
2. Chart Number:
3. Agency:
4. Sex:
5. Weight:
6. Age:
7. Diagnosis:
8. Grade and Stage:
9. Length of Hospitalization:
10. Concurrent Illnesses:
11. Current Medications:
12. Current Treatment:
13. Age of Wound:
14. Diet:

APPENDIX D

WOUND ASSESSMENT CHECKLIST

Wound Assessment Checklist

Directions: Complete the following checklist by placing a checkmark in the box corresponding to the most descriptive wound characteristic. There should be only one checkmark for each category, except possibly interventions, and each category should be completed. For a completed assessment, all the checkmarks for each category should fall under one dated vertical column. A maximum possible score of 27 signifies a non-healing wound. A minimum possible score of 8 signifies a healing wound.

Date							
Initials							
Category							
I. WOUND TYPE							
Closed (no broken skin)	1						
Open (broken skin)							
Incision (suture line)	2						
Puncture (fistula)	2						
Abrasion (decubitus)	3						
Laceration (jagged cut)	3						
II. LOCATION							
Head/Neck	1						
Chest							
Anterior	1						
Posterior	2						
Pelvis	3						
Buttocks	3						
Perineum	2						
Sacrum	3						
Arm							
Right	1						
Left	1						
Leg							
Right	2						
Left	2						
III. TISSUE INVOLVEMENT							
Skin	1						
Skin & SQ tissue	2						
Skin, SQ tissue, Muscle	3						
Skin, SQ tissue, Muscle, & Bone/Joint	4						

Date							
Initials							
IV. SIZE (2.54 cm.=1 inch)							
0-4 cm.	1						
5-8 cm.	2						
9-12 cm.	3						
Greater than 12 cm.	4						
V. WOUND DEVELOPMENT							
Hyperemia (redness)	1						
Ischemia (whiteness)	2						
Necrosis (dead tissue)	3						
Ulceration (ulcer)	4						
VI. DRAINAGE							
Serous (clear)	1						
Catarrhal (mucinous)	1						
Hemorrhagic (bloody)	2						
Purulent (pus)	3						
None	1						
VII. ODOR							
Foul	2						
None	1						
VIII. PHASE OF WOUND HEALING							
Inflammatory	4						
Migratory (granulation tissue)	3						
Proliferative (new scar)	2						
Maturative (old scar)	1						
IX. INTERVENTIONS							
Physical Measures	1						
Type:							
Type:							
Mechanical Measures	1						
Type:							
Type:							
Topical Agents	1						
Type:							
Type:							
Dressings	1						
Type:							
Type:							

APPENDIX E

WOUND ASSESSMENT GUIDE

WOUND ASSESSMENT GUIDE

I. Two major categories of wounds (Luckmann and Sorensen, 1980)

A. Closed Wounds

Have no free outward openings or edges. No broken skin.
Heal by primary intention.
Example - bruises, contusions

B. Open Wounds

Have free outward openings or edges. The skin is broken, and tissue loss may or may not be present.
Heal by primary intention (incisions) or secondary healing (abrasions).

1. Incisions

A wound that is cleanly cut with a sharp instrument so that the wound edges can be neatly and easily brought together for suturing.
Example - suture line

2. Puncture

A wound that is deeper than long, made with a pointed instrument.
Example - stepping on a nail, injection with a needle, fistula

3. Abrasion

An irregular superficial wound in which the outer skin or mucous membrane has been rubbed or scraped off.
Example - skinned knee, sheet burn

4. Laceration

An irregular wound caused by tearing and/or disruption of the tissues. May be a ragged tear, with tag ends of skin, or a torn flap of skin and flesh. Unlike an incision, it is difficult to approximate the wound edges for suturing.
Example - Falling against a rough surface,
cut with metal

II. Wound Location

A. Head/Neck

Anterior and posterior head and neck region, including the scalp and ears.

B. Chest

1. Anterior
Area enclosed by the ribs and sternum, and the abdominal region to the level of the hips. Describes the upper trunk.

2. Posterior
Area from the end of the neck to the buttocks. Describes the upper trunk posteriorly, or the area commonly refered to as the back.

C. Pelvis

Lower part of the trunk anteriorly. Describes the two hips and the area between these anteriorly.

D. Buttocks

The two fleshy masses on the posterior aspect of the lower trunk formed by the gluteal muscles.

E. Perineum

The area between the vagina and anus in the female, and between the scrotum and anus in the male.
Includes the genitals.

F. Sacrum

The bone at the base of the spine formed by five fused vertebrae wedged between the two hips. The lowest portion of the spine.
This category includes the coccyx.

G. Arm

The entire upper extremity from the shoulder to and including the hand. Specifically refers to bony prominences.

H. Leg

The entire lower extremity from the beginning of the thigh to and including the foot. Refers to bony prominences.

III. Tissue Involvement

This category refers to the depth of the wound in relation to the amount of tissue involved.

A. Skin

Tissue involvement is limited to the skin only - the epidermis and/or dermis. Subcutaneous tissue is not visible in the wound.

B. Skin and Subcutaneous Tissue

Tissue involvement involves the entire depth of the skin and the subcutaneous tissue. SQ tissue is visible.

C. Skin, Subcutaneous Tissue, and Muscle

The skin, subcutaneous tissue, and muscle are involved in this wound. Muscle should be visible in this wound.

D. Skin, Subcutaneous Tissue, Muscle, and Bone/Joint

The depth of this wound extends through all the overlying tissue so that either the bone or the joint is visible in the wound.

IV. Wound Development

These are described by Sather, Weber, and George (1977) as the stages involved in skin breakdown.

A. Hyperemia

This refers to central hyperemia (inside the wound) that is the initial response to injury.
This is identified as a reddened color in the wound resulting from vasodilation.
Example - Reddened color of a wound with inflammation.

B. Ischemia

This refers to central ischemia (inside the wound) that results from a lack of blood in the wound.
This is identified as a lack of redness in the wound or a lack of color associated with reduced blood flow.
Example - Lack of redness in the wound when peripheral hyperemia occurs later (bloodflow is at the periphery of the wound while the center of the wound has reduced bloodflow).

C. Necrosis

Necrosis refers to cell death but without the loss of tissue. It is identified by the presence of black tissue in a wound.

D. Ulceration

This is a step beyond necrosis, for it refers to sloughing of necrotic tissue.
This is identified by the presence of an ulcer which signifies tissue loss.
Example - a local defect with an indurated elevated edge and a nongranulating base.

VI. Drainage

Drainage is the exudate associated with a wound.

A. Serous

A watery, clear low protein fluid from blood plasma.
Example - fluid from a water blister

B. Catarrhal

A mucinous secretion from tissues that are mucous-producing.
Example - exudate from inflammed mucous membrane such as the nose.

C. Hemorrhagic

Drainage which contains red blood cells and appears bloody.

D. Purulent

Drainage which contains pus and appears yellow or green.

E. None

This refers to no visible exudate of any type in a wound.

VII. Odor

Refers to those wound characteristics detected with the sense of smell.

A. Foul

Detection of a distinct unpleasant odor associated with a wound.

B. None

No odor detected from a wound.

VIII. Phase of Wound Healing

A. Inflammatory Phase

The first phase of wound healing, designed to cleanse the wound of debris.
Cardinal signs of this phase are redness, swelling, heat, pain.

B. Migratory Phase

This phase is identified by the presence of granulation tissue in the wound.
Granulation tissue is a translucent red color (as the capillary network develops) and may protrude above the wound margins. It may have a mucin covering. It is fragile and bleeds easily (Bruno, 1979).

C. Proliferative Phase

This phase may be identified by the presence of one of two products:

a. Eschar - a hardened, brown-black covering formed of dried plasma, proteins, and dead cells. This forms if the wound is unable to be closed by epithelization.
b. New scar - An irregular, raised, purplish immature scar may be visible.

D. Maturation Phase

This phase is identified by the presence of an old scar. A scab which may have been present earlier sloughs, leaving a depressed epithelial scar and thinner epithelium. If no scab was present, the scar appears older - decreased in size and a diminished color (browner rather than purple).

IX. Nursing Interventions

A. Physical Agents

These are methods which result in the reduction of supra-capillary pressure (repositioning and turning) or improve circulation (whirlpool bath).

Cold
Heat
Heat Lamp
Air
Oxygen
Hyperbaric oxygen
Sunlight
Infrared
Microwave
Ultraviolet
Ultrasound
Massage
Vibration
Water
Whirlpool
Turning bed pts. q2h
Repositioning sitting pts. q30 min.

B. Mechanical Agents

Methods to support the entire body surface to effect a more even distribution of pressure, as well as to facilitate moving or turning a patient (Kerr, Stinson, and Shannon, 1981).

Special Beds

Air
Air fluidized
Alternating pressure mattress
Circ-O-lectric bed
Clinitron bed
High air loss bed
High density fluid bed (MUD)
Large cell ripple mattress
Low air loss bed
Plastic foam mattress
Sawdust mattress
Stryker frame
Water beds and mattresses

Other Aids

Doughnuts
Gel flotation pads
Reston
Sheepskin pads

C. Topical Agents

Chemotherapeutic preparations applied directly to the wound.

Acetic acid
Antacids (Maalox)
Antibiotics
  Gentamycin
  Nitrofurazone
  Penicillin
  Sulfathiazole
Antiseptics
  Phisohex
  Tincture of Benzoin
  Betadine

Topical Agents (Continued)

- Astringents
  - Alcohol
  - Witch hazel
- Dakin's Solution
- Debrisan
- Domeboro Solution
- Enzymes
  - Collagenase
  - Fibrinolysin
  - Trypsin
- Gelfoam
- Gentian violet
- Granulex
- Hormones
  - Insulin
- Karaya
- Oxidizing agents
  - Hydrogen peroxide
- Silver nitrate
- Silicone Cream
- Sugar
  - Granulated
  - Paste
- Third's Solution
- Zinc cream preparations

D. Dressings

Any covering placed on the wound.

- Dry
- Nonadhering
- Nonocclusive
  - Op-Site
- Periodically wet
- Occlusive
- Wet
- Wet-to-dry

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