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Abstract

Analysis of the Extent of Completion of Skin Assessments and Documentation of Risk for Skin Breakdown in the Trauma Patient Who Experiences Hypovolemic Shock Requiring Massive Transfusion Resuscitation and Surgical Intervention

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This retrospective random chart audit spanning the years 1985 through 1989 was conducted in a sample of 105 charts of trauma patients. Patients included in the study had to be 18 years or older who survived the event longer than 24 hours after admission to the ICU. Patients who had a pressure sore prior to admission were excluded from the study.

The purpose of the study was to determine the number of charts with documentation of skin assessment and if deemed appropriate, the nursing diagnosis actual or potential for impaired skin integrity, Ninety-seven (92.4%) patients were deemed at risk for pressure sore development according to the Braden Scale for Predicting Pressure Sore Risk. Thirty-one charts had documentation of a skin assessment. No documentation of the nursing diagnosis actual or potential for impaired skin integrity was found.

A second purpose was to determine the frequency with which cues listed on the Braden Scale for Predicting Pressure Sore Risk were documented in the nursing assessment. The most frequently documented cues for sensory perception were receiving sedatives (50.5%) and comatose (26.7%). Exposure of skin to moisture was found most frequently under the cues skin dry and intact (20.0%). Activity was documented under the cues bedrest (93.3%) and out of bed in chair (6.7%). Mobility had documentation of the cues receiving sedatives (50.5%), and comatose (26.7%) most frequently. Friction and shear was documented most frequently under the cue able to move/change position by self (53.3%). Nutrition was documented under the cues nothing by mouth (98.1%) and liquid diet (1.9%) most frequently.

A third purpose, to determine if there was any association with additional data and documentation of skin assessment, yielded significant results for length of stay in the emergency department only ($p=.02$).

This study points out gaps in nursing documentation that may or may not be reflective of practice. Further research is warranted to determine potential problems with documentation of nursing practice related to prevention of pressure injury to skin.

Analysis of the Extent of Completion of Skin Assessments and Documentation of Risk for Skin Breakdown in the Trauma Patient Who Experiences Hypovolemic Shock Requiring Massive Transfusion Resuscitation and Surgical Intervention

by

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A thesis submitted in partial fulfillment
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1991

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CHAPTER I

Problem Statement

The National Pressure Ulcer Advisory Panel (1989) found that well over one million patients in acute and chronic care facilities develop skin breakdown each year. One study of a Surgical Intensive Care Unit (SICU) reported 21 of 63 patients as arriving and leaving the SICU with skin breakdown (Robnett, 1986). Cost of decubiti care in acute care settings ranges from $2,000 to $30,000 per case (National Pressure Ulcer Advisory Panel, 1989). Treatment costs of between $715 to $43,460 per patient were reported in four case studies of patients who developed pressure ulcers while in the operating room (Vermillion, 1990). Length of stay for these patients increased by 11 to 64 days for treatment of pressure ulcers alone (Vermillion, 1990).

Skin breakdown can occur if delivery of oxygen and nutrients to the cell are interrupted (Iverson-Carpenter, 1989). Pressure on skin over boney prominences has been indicated as the primary factor which interrupts delivery of oxygen and nutrients to skin tissue. Recent studies (Bennett & Lee, 1988; Mawson, Biundo, Neville, Linares, Winchester & Lopez, 1988) report the amount of pressure required to cause injury to skin as related to the patient's systolic blood pressure combined with the forces of friction

and vertical sheer. These findings suggest that patients in shock who are immobilized could experience tissue injury when exposed to lower external skin pressures combined with friction and sheer as compared to immobilized patients with relatively normal systolic blood pressures. The trauma patient who experiences hypovolemic shock is an example of a critically ill patient who could be at high risk for skin breakdown.

The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) requires nurses to complete and document physical assessments on all patients (1990). The physical assessment, to include skin assessment, should result in documentation of nursing diagnoses and treatment plans in the patient chart to guide nursing practice and promote continuity of care.

Accreditation agencies (Pieper, Mikols, Mance & Adams, 1990) consider the incidence of pressure ulcers a reflection of the quality of patient care. Research has been done to explain what causes pressure ulcers; however, little is known about the extent to which nursing personnel are completing and documenting skin assessments and identifying patients at risk for pressure ulcers. This is particularly important as skin breakdown is a costly problem with respect to length of stay. And it is preventable through systematic

identification of risk factors and with treatment aimed at prevention.

The goals of this study are to determine if nursing personnel are documenting, within the first 24 hours of admission to the intensive care unit (ICU), skin assessments of trauma patients who experience hypovolemic shock requiring massive transfusion resuscitation and surgical intervention. And when deemed appropriate, identifying those patients that have actual skin breakdown or are at risk for potential skin breakdown.

The findings of this study could be used to identify gaps in nursing chart documentation reflective of a lack of systematic assessment of risk for skin breakdown. High cost and increased length of stay associated with skin breakdown could be avoided through early identification and preventative treatment.

The information obtained from this study could be used to develop a flow sheet which facilitates documentation of skin assessment and serves as a standard of care with which to orient nurses. A list of indicators related to skin breakdown and prevention could be developed as a tool to monitor quality of care.

CHAPTER II

Conceptual Framework

This chapter introduces the concepts of alterations in blood circulation during hypovolemic shock, cellular metabolism during shock, factors affecting skin breakdown, and prevention of skin breakdown by skin assessment.

Alterations in Blood Circulation During Hypovolemic Shock

Hypovolemic shock occurs as whole blood and its components are lost from the intravascular space through hemorrhage. Baroreceptors and chemoreceptors located throughout the body sense changes in intravascular pressure and oxygen tension of blood and chemically mediate responses aimed at maintaining homeostasis by continued circulation of nutrients and oxygen to cells and removal of waste products from cells (Berne & Levy, 1990). But as more and more circulating blood volume is lost through hemorrhage, the body is unable to maintain a homeostatic balance. The shock state ensues and blood is shifted from nonvital tissues which are the: skin and connective tissue, gastrointestinal tract, and skeletal muscle to vital tissues which are essential for survival such as: kidney, lung, liver, heart, and brain (Schumer, 1987). The nonvital tissues must convert to anaerobic metabolism as the supply of nutrients

and oxygen diminishes in hypovolemic shock states.

Cellular Metabolism During Hypovolemic Shock

Under fed conditions, ingested carbohydrates, fats, and proteins are utilized as sources of nutrients for cellular metabolism. These nutrients are broken down during digestion into smaller components which are absorbed into the blood stream and transported along with oxygen and chemical mediators of metabolism to cells. In starvation or fasting states, stored food sources are mobilized, processed, and delivered as nutrients to cells. In the presence of oxygen these nutritional components are aerobically metabolized for production of adenosine triphosphate (ATP), the body's major energy source. Metabolism can occur anaerobically for brief periods; however, it is less efficient for producing ATP (Genuth, 1990).

Adenosine triphosphate is the energy source for several essential physiologic functions. It is used for muscular work and cell movement otherwise known as mechanical work. Synthetic reactions which are necessary for tissue regeneration, storage of nutrients, and production of chemicals necessary for regulation of bodily functions require ATP. Transport of substances across cell membranes essential for electrical, chemical, and mechanical signal

generation and conduction could not occur without it. Detoxification degradation proce.ses such as urea formation, oxidation, reduction, and conjugation need ATP in order to occur. And ATP allows for heat production for maintenance of body temperature (Genuth, 1990).

Cellular Metabolism of Nonvital Tissues

Skin and connective tissue. Fourteen percent of the total body cell mass is made up of skin and connective tissue (Schumer, 1987). Skin functions as a barrier protecting the body from invasion by environmental hazards and from loss of vital fluids. If anaerobic metabolism continues and ATP generation for maintenance of cellular function diminishes, cell death will occur (Schumer, 1987). When cells die, they release digestive enzymes which instigate an inflammatory response. Connective tissue serves as the medium for inflammatory activity. The inflammatory response serves to remove dead cells and toxins, provide immunologic support against infection, and supply nutrients for tissue repair (Beisel, 1987). However, this process requires an adequate delivery of the cellular components necessary for the inflammatory process, oxygen, and nutrients. Because the blood supply to skin and connective tissue is decreased during shock, immune defenses will diminish and wound healing will be impaired, predisposing

the patient to skin breakdown and invasion by microorganisms.

Gastrointestinal tract. The gastrointestinal tract, normally responsible for nutrient intake, absorption, and solid waste exchange is limited in the ability to perform these functions due to reduced blood flow during hypovolemic shock. Adenosine triphosphate production falls resulting in insufficient energy for absorption of nutrients across the intestinal membrane. A starvation or fasting state occurs and stored nutrients are mobilized as sources of energy (Schumer, 1987).

Skeletal muscle. Skeletal muscle serves as a protein reservoir during severe shock when the body is unable to obtain nutrients via the gastrointestinal tract. Muscle tissue is broken down releasing amino acids and ketones into circulation. However, during the shock state, altered circulation and hypoxia interfere with the metabolism of these stored nutrients (Genuth, 1990).

Cell Death Related to Hypoxia

Anaerobic metabolism or glycolysis cannot be maintained for prolonged periods of time such as may occur in hypovolemic shock (Genuth, 1990). It is thought that cells die as energy levels are depleted and the sodium-potassium-calcium pumps fail. Sodium and calcium move into the cell

taking water with them. Potassium moves out of the cell. Cell swelling occurs, the membrane ruptures, and the cell dies (Schumer, 1987).

Reperfusion Injury

Hypovolemic (hemorrhagic) shock patients are treated with infusion of blood in an attempt to restore volume and circulation of oxygen to the tissues. In severe hypovolemic (hemorrhagic) shock, patients may require massive blood transfusions. Massive transfusion is defined as infusion of greater that eight units or 4,000 milliliters (ml) of blood in a four hour period (G. Jurkovich, personal communication, May 5, 1990).

Reperfusion injuries can occur as flow of oxygenated blood returns to ischemic tissues. It has been postulated that reperfused ischemic cells do not metabolize oxygen appropriately, resulting in the formation of oxygen free radicals. These highly reactive types cause further cell injury (Carden, Smith, Zimmerman, Korthuis & Granger, 1989). Consequently, the hypovolemic shock patient can sustain skin tissue injury from hypoxia related to the shock state and from reperfusion of ischemic tissue.

Factors Affecting Skin Breakdown

Pressure, Friction, and Shear

Pressure on skin over boney prominences has been

identified as the major factor contributing to tissue injury because it interrupts the supply of oxygen and nutrients to cells (Iverson-Carpenter, 1989). Several researchers referenced a study by Landis (1930) who found an amount of pressure equal to or greater than 35 millimeters of mercury (mm Hg) for a period of one to two hours (Iverson-Carpenter, 1989; Linares, Mawson, Suarez & Biundo, 1987; Patterson & Fisher, 1980) as sufficient to cause tissue injury. However, Landis (1930) derived this pressure by cannulation of an arteriole in a human fingernail bed in which the pressure was measured during the bleeding process. This finding does not take into account a reactive pressure that could occur when external pressure is applied to an intact vessel or conversely, diminished blood flow to a bleeding vessel. In fact, recent studies (Bennett & Lee, 1988; Mawson et al, 1988) indicate that pressure sufficient to cause tissue injury is a function of the patient's systolic blood pressure and exposure of skin to the forces of friction and sheer. Friction occurs when skin surface is rubbed against a rough surface. Sheer occurs when superficial skin layers remain stationary while deeper layers slide causing stretching and torsion of blood vessels which results in disruption of the flow of blood to skin cells (Braden & Bergstrom, 1989). For example, shear occurs

when a patient slides down in bed and the outer layers of skin adhere to the sheets.

Immobilization and Other Factors

Studies of the prevalence of pressure sores in the hypovolemic shock patient undergoing surgical intervention could not be found. However, studies concerning spinal cord injury patients, many of which are trauma patients who have surgical intervention, were found in the literature.

In a retrospective chart audit, Linares et al. (1987) found a significant difference related to immobilization during the immediate post injury period between spinal cord injury patients who developed pressure ulcers (ages 20-63 years, mean age 31.2 years) and those that did not (ages 17-61 years, mean age 28 years). Of 32 patients, the 16 who developed pressure sores had longer transit time to the hospital ($p=0.0031$), a longer wait to be x-rayed ($p=0.0004$), took longer actually having the x-ray done ($p=0.0029$), and had the longest delay before being admitted to the hospital unit ($p<0.00001$).

In a prospective study of 39 consecutively admitted patients with spinal cord injury, Mawson et al. (1988) found that most patients (combined age range reported of 16.5-59 years, mean age 29.5 years) who were going to develop pressure ulcers related to the immediate post injury period

did so four to five days after the injury. They found in 20 patients who developed pressure ulcers as compared to 11 who did not, significant differences reported respectively for: length of time they were immobilized prior to admission to the ward (mean hours 20 +/- 12 hours SD versus mean hours 11 +/- 8 hours SD, p=0.04), time immobilized on a spinal board (mean hours 13 +/- 5 SD hours versus mean hours 6 +/- 5 hours SD, p=0.01), and systolic blood pressure on admission to the emergency room (mean mm Hg 99 +/- 22.8 mm Hg SD versus mean mm Hg 120 +/- 23.7 mm Hg SD, p=0.03). No significant differences were associated with arterial blood gases, biochemical data and anthropometrics. Although this sample was small and included only males, the data support findings from the previously reported study.

The physiologically unstable hypovolemic shock patient requiring massive transfusion and surgical intervention is at increased risk for pressure sore development because they will probably be immobilized for several hours while in transport via the ambulance, in the emergency room, in transport for diagnostic tests, and in the operating room, which could contribute to pressure injury of skin.

Allman, Laprade, Noel, Walker, Moores, Dear & Smith, (1986) conducted a cross sectional survey of 634 patients to determine which ones either had pressure ulcers or were

deemed at risk for pressure ulcers because they were immobilized in bed or a chair for at least one week. Thirty patients mean age 67 +/- 13 years SD who had pressure ulcers were compared to 78 patients mean age 61 +/- 18 years SD who were deemed at risk. Logistical regression analysis revealed significant associations between hypoalbuminemia (p=0.01), fecal incontinence (p=0.03), and fractures (p=0.04) with development of pressure sores. Albumin levels are an indication of nutritional status. The association of pressure ulcers with fractures could be a reflection of the degree of immobility. The researchers in this study did not indicate the location of the fractures. Fecal incontinence has been described as an alkaline irritant to the acid mantle of skin (Alterescu & Alterescu, 1988). This sample size was fairly large and included a diverse group of patients which makes it more generalizable; however, the age of this population may have contributed to the findings. As people age, fibroblast activity and collagen synthesis decrease thereby slowing tissue growth necessary for replacement of injured cells (Preston, 1987).

Several other factors have been associated with skin breakdown; however, research findings to substantiate significant associations with pressure sore formation could not be found. These factors include: obesity, urinary

incontinence, excessive perspiration, medications, hydration, and chronic illness. Prospective studies with larger samples need to be conducted in more diverse populations to determine significance of these factors in relation to pressure ulcer formation. Gender and race have not been found to be associated with pressure sore formation (Gosnell, 1987), although, some authors report difficulty in assessing black skin for erythema. Most authors agree that pressure sores result from systemic causes (intrinsic) as well as extrinsic and pressure factors.

Assessment Tool for Identification of at Risk Patients

The Braden Scale for Predicting Pressure Sore Risk (Braden & Bergstrom, 1989) is a tool based upon significant research findings indicative of risk for pressure sore development (Appendix A). A conceptual schema was developed to score factors related to pressure and tissue tolerance. The concepts of sensory perception, moisture, activity, mobility, and nutrition are scored individually from one to four. Friction and shear, a sixth concept, is scored from one to three. Total scores can range from six to 23. A score of 16 or less has been shown to be a valid indicator of risk for pressure sore development (Braden & Bergstrom, 1989).

Braden (1989) operationalized measurement of pressure

by the patient's mobility status (ability to move by their own volition), activity level (degree of physical activity permitted such as bed, chair, ambulatory), and sensory perception (ability to sense pain or pressure discomfort in skin). Most people normally shift their body weight frequently in response to pain or discomfort from pressure on skin over boney prominences (Siegreen, 1987). If a patient were unable to move about on their own, get out of bed, or perceive discomfort due to altered mental status from use of analgesics, exposure to anesthesia, or paralysis, they would be at increased risk for pressure injury to skin.

Tissue tolerance includes both extrinsic and intrinsic factors. Extrinsic factors include moisture, friction and shear. Intrinsic factors include nutrition, age, arteriolar pressure, and possibly interstitial fluid flow, emotional stress, smoking and skin temperature (Braden & Bergstrom, 1989). These findings are operationalized in reference to exposure of skin to moisture (from excessive perspiration, fecal and urinary incontinence), nutritional intake (if they are allowed food or not and how much they consume), and friction and shear (the patient's ability to assist with positioning which may be altered by sedation, paralysis, or paralyzing medications). Not all intrinsic factors are

measured by the Braden Scale.

The Acute Physiologic and Chronic Health Evaluation (APACHE II) severity of disease classification system (Knaus, Draper, Wagner & Zimmerman, 1985) evaluates the criticality of patients based on 12 physiologic variables, age, and chronic health problems. Because many of the variables include measurement of oxygenation, tissue perfusion, and chronic health risk, the patient's APACHE II scores will be collected in this study as demographic data to describe this patient population. Scores range from 0-71. The higher the score, the poorer the prognosis. Physiologic variables include: body temperature, mean arterial pressure, heart rate, respiratory rate, oxygenation, arterial ph, serum sodium, serum potassium, serum creatinine, hematocrit, white blood cell count and Glascow Coma Score.

Prevention of Skin Breakdown by Skin Assessment

Nursing is the "diagnosis and treatment of human responses to actual or potential health problems" (American Nurses' Association [ANA], 1980, p.9). In order to prevent skin breakdown, a skin assessment must be completed and documented (Gosnell, 1989). A nursing diagnosis and written treatment plan provides an outline of interventions to be followed by all who care for the patient.

The nursing diagnosis "Impaired Skin Integrity" (Carroll-Johnson, 1989, p.532) is used to describe "disruption of skin surface, destruction of skin layers, or invasion of body structures". Environmental factors that contribute to this nursing diagnosis include "hyper or hypothermia, chemical substances, mechanical factors (shearing forces, pressure, restraint), radiation, physical immobilization, and humidity (Carroll-Johnson, 1989, p.532). Internal factors contributing to this nursing diagnosis include: "medication, altered nutritional state (obesity, emaciation), altered metabolic state, altered circulation, altered sensation, altered pigmentation, skeletal prominence, developmental factors such as stress level and degree to which the individual takes care of their own skin, immunologic deficit such as occurs during fever and infection, and alterations in turgor (change in elasticity)" (Carroll-Johnson, 1989, p. 532). The nursing diagnosis "Potential for Impaired Skin Integrity " describes a situation where the skin remains intact, but is predisposed to these environmental and internal factors (Carroll-Johnson, 1989, p. 532).

Pressure ulcers occur 60-90% of the time over boney prominences (Gosnell, 1987). The most common sites of pressure ulcers are the: "heel, malleolus, greater

trochanter, ischial tuberosity, and sacrum" (Iverson-Carpenter, 1989, p. 276).

Erythema is an early sign of pressure injury to skin (Gosnell, 1987). Erythema results when pressure is relieved and the area floods with a supply of blood. Documentation of a skin assessment related to pressure ulcers would include the words: "tissue swelling, induration, erythema, rashes, lesions, pressure sores, ulcerations, and disruption of skin" (Iverson-Carpenter, 1989, p. 275).

Peiper, Mikols, Mance, and Adams (1990) conducted a retrospective study of 167 records of patients who were placed in special air flow beds for treatment of pressure ulcers to determine which characteristics were used most often to describe pressure sores. Of the 167 records 11 had no documentation concerning pressure ulcers. Location was documented 74.2% of the time. The descriptors of "color, exudate, odor, size in measurement, size in descriptor words, stage, healing, and characteristics of surrounding tissue" were documented in the nurse's notes less than 40% of the time (Peiper et al, 1990, p.33). This was the only study found which examined nursing documentation concerning pressure ulcers. Because pressure sores can be prevented by skin assessment with documentation of treatment plans to guide care givers, more studies need to be conducted to

determine if nurses are completing and documenting skin assessments and identifying patients at risk for skin breakdown.

Van Ness (1989) conducted a survey of an "acute care medical center" (p.61) to determine the prevalence of hospital acquired pressure sores. Although no statistics were given, this researcher found the ICU to have the highest prevalence. Critically ill patients are at high risk for pressure ulcers due to the "disease state, physiologic and environmental variables and physical forces" to which they are exposed (Mechanic & Perkins, 1988, p.217).

Because the trauma patient who has experienced hypovolemic shock requiring massive transfusion resuscitation and surgical intervention is at risk for skin injury from hypoxia related to decreased tissue perfusion and reperfusion, pressure injury from lower external pressures due to hypotension, nutritional needs that exceed intake, stress from surgery and the trauma, decreased mobility, friction, and shear; nursing has a responsibility for completing skin assessments and determining risk for skin breakdown in these patients. Studies have been done to explain what contributes to skin breakdown; however, little research has been done to determine if nurses are assessing patients for skin breakdown and documenting actual impaired

skin integrity or potential for impaired skin integrity in patients deemed at risk. A schematic model of this study is located in Appendix B.

Purpose

The purpose of this study is to determine, within the first 24 hours of admission to the ICU, in a sample of 150 charts of trauma patients who experienced hypovolemic shock requiring massive transfusion of greater than eight units or 4,000 ml of blood in a four hour period (G. Jurkovich, personal communication, May 5, 1990) and surgical intervention: the number of charts with documentation of skin assessments and if deemed appropriate, the nursing diagnosis actual or potential for impaired skin integrity. A second purpose is to determine the frequency with which cues listed on the Braden Scale for Predicting Pressure Sore Risk are documented in the nursing assessment. A Braden Score will be calculated for each patient based on documentation within the first 24 hours of admission to the ICU. Additional data to include acuity indices, demographic data, transportation and mobility status, and physiologic factors will be collected to describe this sample and to determine if there is any association between these variables and the presence of documentation of a skin assessment.

CHAPTER III

Methodology

This chapter describes the research design, sample, measurement, methods of procedure, protection of human subjects, and methods of analysis.

Design

This retrospective chart review described the extent to which nursing personnel were (within 24 hours of the patient's admission to ICU) documenting skin assessments, diagnosing patients with impaired skin integrity or potential for impaired skin integrity when deemed appropriate as evidenced by a Braden Score of 16 or less, and the frequency with which cues from the Braden Scale for Predicting Pressure Sore Risk were used in documentation of patient assessments. Demographic data were collected and related to documentation.

The descriptive design was chosen because this study attempted to describe the prevalence (Fugate Woods, Catanzaro, 1988) with which nursing personnel were documenting skin assessments and impaired skin integrity or identifying those patients at risk for impaired skin integrity when they met predictive criteria defined as a score of 16 or less on the Braden Scale for Predicting Pressure Sore Risk. Data were also collected to determine

the frequency with which cues listed on the Braden Scale for Predicting Pressure Sore Risk were used in documentation regarding patient assessment within the first 24 hours of admission to the ICU.

Sample

Population

The study sample was drawn from charts of trauma patients who experienced hypovolemic shock requiring massive transfusion resuscitation with greater than 4,000 mls or eight units of blood acutely over a four hour period (G. Jurkovich, personal communication, May 5, 1990) and surgical intervention. A list of approximately 1,008 charts of patients who experienced traumatic injury requiring surgical intervention, and who survived the event for a period of greater than three days was used to obtain a sample of 105 medical records used for data analysis. The medical records of patients from a metropolitan trauma center were audited retrospectively from the years 1985 through 1989.

Inclusion Criteria

Patients 18 years or older who had experienced any type of traumatic injury, to include spinal cord injury, resulting in hypovolemic shock requiring massive transfusion resuscitation and surgical intervention were included in this study.

Exclusion Criteria

Patients who did not survive the trauma event longer than 24 hours after admission to ICU were excluded from the study. Patients who had pressure sores prior to the trauma event were also excluded from this study.

Selection

Charts were selected from a computer generated alphabetized list of traumatized patients who were admitted through the emergency department, transferred directly to the operating room, and survived the event for a period of greater than three days. A random sample of charts that met inclusion criteria was selected for data analysis by using a table of random numbers. Beginning with the 1989 list and working backward consecutively through the 1985 list, all even numbered charts were selected and screened to determine if they met the criteria of massive transfusion and age.

Measurement

The variables measured in this study were: documentation of skin assessment, the nursing diagnosis of actual or potential for impaired skin integrity, cues for predicting pressure sore risk as defined by the Braden Scale for Predicting Pressure Sore Risk, and additional data to include acuity indices, demographic data, transportation and mobility status, and physiologic factors.

Documentation of Skin Assessment

Consideration that a skin assessment was completed was reflected in the chart by the following terms: no evidence of skin breakdown, skin dry and intact, or mention of skin characteristics such as tissue swelling, induration, disruption of skin, lesions, rashes, erythema, pressure sore or ulceration in reference to a specific body surface prone to pressure such as the heel, malleolus, greater trochanter, ischial tuberosity, sacrum, or coccyx (Iverson-Carpenter, 1989). The specific adjectives listed on the data collection tool (Appendix C) were used to describe the skin and the location of pressure injury as outlined above. The researcher circled the adjectives found in documentation on the data collection tool. A listing for no skin assessment and no body surface area recorded were also listed on the data gathering tool. An answer which allowed for recording of other adjectives used to describe the skin or the location was also among the selections found on the data gathering tool.

Skin assessments were not limited to the wound area(s) caused by the trauma or surgery. Pressure areas resulting from lying in one position for lengthy periods of time had to be assessed and reflected in documentation in the chart within the first 24 hours of admission to the ICU. If none

of these criteria were met, the medical record received the rating that no assessment to determine possible pressure injury to skin was accomplished.

Validity and Reliability.

Face validity of these criteria is supported in the literature as referenced by Iverson-Carpenter (1989). A panel of experts also confirmed validity of these criteria. Inter-rater reliability will be discussed under the pilot study findings.

Nursing Diagnosis Actual or Potential for Impaired Skin Integrity

Potential for impaired skin integrity was determined by rating documentation of the concepts related to sensory perception, moisture, activity, mobility, nutrition, and friction and shear as identified on the Braden Scale for Predicting Pressure Sore Risk (Bergstrom & Braden, 1989). If no documentation existed to substantiate a rating for a specific concept on the Braden Scale for Predicting Pressure Sore Risk, that concept received the highest rating which signifies less risk than the lowest rating which signifies greatest risk for pressure sore development. If the patient was deemed at risk by a score of 16 or less according to the ratings on the Braden Scale for Predicting Pressure Sore Risk, documentation of the nursing diagnosis potential for

impaired skin integrity was sought. Documentation of the nursing diagnosis actual impaired skin integrity was sought if the characteristics associated with pressure injury under skin assessment were documented as present on the patient. Documentation of the nursing diagnosis actual or potential impairment of skin integrity was answered by a "yes" "no" response on the data collection tool.

Validity and Reliability

Validity of the cues on the Braden Scale for Predicting Pressure Sore Risk was established by a convenience sample of 12 nurses who worked on two rehabilitation units located within an 800 bed teaching hospital. Validity was established by Fehring's method. This method yields a correlation coefficient. A high correlation coefficient does not necessarily indicate a causal relationship. The results were: mobility 0.97, activity 0.91, and sensory perception 0.87. These ratings indicate these cues as critical risk factors with a >0.75 clinical validity rating (Copeland-Fields & Hoshiko, 1989). Moisture was rated 0.64, friction .77, and shear as 0.66. All are considered risk factors with a >0.50 clinical validity rating (Copeland-Fields & Hoshiko, 1989). Validity of findings was also determined for a population of 60 adult patients in an intensive care unit (Bergstrom, Demuth & Braden, 1987). In

this study titled A Clinical Trial of the Braden Scale for Predicting Pressure Sore Risk, the mean score predictive of pressure sore development was 13.8 +/- 3 SD versus 16.9 +/- 3 SD, significant at $p<0.001$.

Bergstrom, Braden, Laguzza, and Holman (1987) reported an interrater reliability score of $r=0.99$, $p<0.001$ for registered nurses using the Braden Scale for Predicting Pressure Sore Risk in a rehabilitation center. These authors also report an interrater reliability score ranging from $r=0.83$, $p<0.001$ to $r=0.87$, $p<0.001$ when used by licensed practical nurses (LPN's) and nurses' aides (NA's) during two different work shifts in a geriatric care facility. Bergstrom, Demuth, and Braden (1987) tested the Braden Scale for Pressure Sore Risk in a population of 60 patients in an adult intensive care unit. Interrater reliability was found to be $r=0.89$.

A clinical nurse specialist at a local trauma center (C. Goodrich, personal communication, July 24, 1991) recently completed data collection related to risk for skin breakdown utilizing the Braden Scale for Predicting Pressure Sore Risk. No test to determine inter-rater reliability of the Braden Scale for Predicting Pressure Sore Risk in the intensive care units at that facility was conducted.

This researcher acknowledges that reliability and

validity for use of the Braden Scale for Predicting Pressure Sore Risk in a retrospective study has not been established. Permission to use the Braden Scale for Predicting Pressure Sore Risk was obtained from the author (Appendix D).

Cues for Predicting Pressure Sore Risk

Data was collected to determine which cues from the Braden Scale for Predicting Pressure Sore Risk were documented when assessing the patient. The idea was to determine if these cues were evaluated and documented even though they may not have led to a nursing diagnosis of potential or actual impaired skin integrity. The cues are sensory perception, moisture, activity, mobility, nutrition, and friction and shear. The appropriate answer was circled on the data collection tool under each category.

Sensory perception. Sensory perception was determined by the ability of the patient to perceive pain associated with pressure on skin over boney prominences. The level of consciousness to include awake and alert, or coma, spinal cord injury with paralysis, use of sedatives, use of paralyzing agents, or exposure to anesthesia, was considered when evaluating this characteristic. The appropriate answers were circled on the data collection tool. If no documentation existed to evaluate this cue the answer no comment was circled.

Moisture. The cue of moisture was determined by the exposure of skin to urinary or fecal incontinence, excessive perspiration, diaphoresis, or documentation that the skin was dry and intact. If no documentation existed to evaluate this cue according to these words, the answer no comment was circled.

Activity. Activity level was determined by what level of physical activity was ordered for the patient within the first 24 hours of admission to the ICU. The choices from which to select included bedrest, up in chair, ambulate with assistance, up ad lib, or no comment.

Mobility. Mobility was determined by the patient's ability to move and change position by their own volition. Because the use of sedatives, anesthesia, paralyzing agents or actual paralysis affected this characteristic, these were some of the choices listed under this cue. In addition to these cues the choice of moving about in bed, restless, and thrashing, awake and alert, and comatose were also listed. If documentation did not exist to evaluate this cue the answer no comment was circled.

Friction and shear. Friction and shear are determined by the exposure of skin to rough surfaces on which it slides such that surface tissue is displaced from underlying tissues. If the patient was unable to move by their own

volition they were considered to be exposed to friction and sheer. The choice of answers included unable to move or change position by self, awake and alert moving about by self, or no comment.

Nutrition. The diet ordered for the patient within the first 24 hours of admission to the ICU was used to determine nutritional intake. The choices included regular diet, soft diet, liquid diet, nothing by mouth (NPO), total parenteral nutrition (TPN), or nasogastric (N/G) feeding. The appropriate answer was circled on the data collection tool.

Additional Data

Additional data to include acuity indices, demographic data, transportation and mobility status, and physiologic factors was collected to describe the sample population. These data were compared with documentation of skin assessment.

Acuity indices. An APACHE II score was calculated on each patient based on data recorded at the time of admission to the ICU. APACHE II scores were gathered and compared with evidence of documentation of skin assessment. Validation of the APACHE scores is reported in reference to prediction of mortality rates. Knaus et al (1985) report chi-square of 5.28, $p=0.02$ for death rates of 1.9% at the 0 to 4 point rating as compared to 3.9% death rate at the 5 to

9 point rating. Comparison of a 73% death rate at 30 to 34 points to 84% death rate at 35 or greater points resulted in a chi-square of 7.5, p=0.01. Inter-rater reliability of this tool in the research setting for this study was determined and will be discussed under inter-rater reliability of the data collection tool for this study.

Demographic data. (a) The admitting diagnosis was recorded on the data collection tool. (b) The choices of yes or no were used to record the presence of spinal cord injury. (c) Skin color determination was made by what race was listed on the admissions form. The choices of black or nonblack were circled on the data collection tool. (d) Age was obtained from the admission form and recorded in years. (e) During the pilot study it was discovered that height was not recorded in the medical record of any of these patients. This entry was deleted. (f) The admission weight was obtained from the chart and recorded in pounds. (g) The actual time the skin assessment was completed within the first 24 hours of admission was obtained by noting the time of entry in the medical record. This time was compared with actual admission time to the ICU as noted in the nursing notes. The time the skin assessment was completed after admission to ICU was recorded as minutes after admission to ICU on the data collection tool.

Transportation and mobility status. (a) Length of stay in the ED was reported in minutes as obtained from the emergency room record. (b) Length of stay in the OR was reported in minutes as obtained from the anesthesia record. (c) Length of time in transport to diagnostic tests was obtained from the patient chart. This time was subtracted from the total time spent in the ED if the patient was transported for diagnostic tests while still admitted to the ED. (d) Length of time immobilized on the back board was obtained from the medical record and recorded in minutes.

Physiologic factors. (a) The white blood cell count was obtained from the laboratory report and recorded as measured on admission to the ED. (b) The oxygen saturation level was not available so the partial pressure of arterial oxygen was obtained from arterial blood gas analysis as recorded on admission to the ED.

Methods of Procedure

Permission was obtained from the University of Washington Human Subjects committee before proceeding with this study. This proposal was presented to the nursing research committee at the hospital used for data collection. A letter granting permission to conduct the study was received from the director of the nursing education department at that facility (Appendix E). The people in

charge of the trauma registry were contacted and told the purpose of the study. Their help was solicited in order to identify patients meeting inclusion criteria. Data collection continued until a sample of 105 charts had been achieved.

Protection of Human Subjects

This researcher and the colleague who assisted with establishing inter-rater reliability took an oath of confidentiality prior to data collection. Thus it was not necessary to inform the patients in the study population that an audit of their medical records for data collection purposes was conducted. Medical records review continued retrospectively until a sample of 105 charts that met inclusion and exclusion criteria had been obtained. This researcher personally collected all data. Each patient was coded for identification. Results of this study are reported in group form only.

Methods of Analysis

Data were reported by descriptive statistics to include the range, mean, and standard deviation. Three exceptions were that of skin color, spinal cord injury, and Braden Score of 16 or less. Actual numbers and percentages per category of black or nonblack skin were reported. Spinal cord injury and a Braden Score of 16 or less were reported

as a percentage of the total sample by a "yes" "no" response.

Documentation of skin assessment was reported as a percentage. Analysis of data concerning identification of the patient as at risk for development of skin breakdown was reported as follows. Documentation in the medical record was categorized under the concepts found in the Braden Scale for Predicting Pressure Sore Risk. If the patient was deemed at risk for skin breakdown as evidenced by a Braden Score of 16 or less, documentation of the nursing diagnosis potential for impaired skin integrity was sought in the chart. Documentation of potential for impaired skin integrity was reported as a percentage of the total. The number of patients reported as having actual impaired skin integrity was reported as a percentage of the total. The frequency with which characteristics related to the six concepts from the Braden Scale for Predicting Sore Risk were identified in the chart were reported in a table. Chi square analysis was used by constructing a contingency table comparing skin assessment (yes, no) with documentation of the nursing diagnosis altered skin integrity (yes, no). A contingency table comparing skin assessment (yes, no) with documentation of the nursing diagnosis potential for impaired skin integrity (yes, no) was also plotted.

Additional data were compared with presence or absence of a documented skin assessment using chi square analysis to determine if there was a pattern associated with documentation of skin assessment.

Summary

The aims of this study were to determine, within the first 24 hours of admission to the ICU, the extent to which nursing personnel were documenting skin assessments as related to pressure injury, and identifying and documenting risk for skin breakdown related to the nursing diagnosis potential for or actual impaired skin integrity. Data concerning the frequency with which the cues listed on the Braden Scale for Predicting Pressure Sore Risk were documented in reference to physical assessments were also gathered. Collection of additional data to include acuity indices, demographic data, transportation and mobility status, and physiologic factors were used to describe this population. This study was designed as a descriptive retrospective random audit of the charts of 105 physiologically unstable patients who suffered hypovolemic shock necessitating massive transfusion and surgical intervention.

CHAPTER IV

Results

This chapter describes findings related to nursing documentation of skin assessment, diagnosis of patients with impaired skin integrity or potential for impaired skin integrity, and the frequency with which cues from the Braden Scale for Predicting Pressure Sore Risk are documented in the patient chart. Demographic data collected to describe the study population of 105 charts of trauma patients who experienced hypovolemic shock requiring massive transfusion with greater than 4,000 mls or eight units of blood acutely over a four hour period (G. Jurkovich, personal communication, May 5, 1990) and surgical intervention will also be reported.

Sample

Three hundred eighty-nine charts of the randomized computer generated list of 1,008 charts of traumatized patients who were admitted through the emergency department (ED), transported directly to the operating room (OR), and survived the event for a period of greater than three days were reviewed to determine if they met the inclusion criteria of age and massive transfusion resuscitation. The charts were also reviewed to determine that the patient did not have documentation of a pressure sore prior to the

trauma event. One hundred five charts spanning the years 1985 through 1989 were randomly selected for the study. All patients were admitted to intensive care units post operatively.

Pilot Study for Inter-rater Reliability of the Data Collection Tool

Inter-rater reliability was established by a pilot study in which a nurse colleague and this investigator recorded data from a sample of the same ten charts. Percentage of inter-rater agreement was calculated by dividing the number of agreements with the number of agreements and disagreements (Woods, 1988). Agreement of inter-rater reliability ranged from 40% to 100%. Even though the second rater was briefed on where to locate evidence of documentation, there were some discrepancies.

Additional Data

Demographic data. There was 100% agreement with the admitting diagnosis and a Braden Score of less than or equal to 16, or greater than or equal to 17. Evaluation of spinal cord injury had 90% agreement as did age of the patient and skin color. Evaluation of spinal cord injury was found most often in medical documentation. The discrepancy for age and skin color occurred because of a variation between the admission form and the admission nursing assessment

completed in the ED. There was 50% agreement on time of admission to the ICU. Of the five charts that differed, the longest time span of discrepancy was 16 minutes with the shortest time span being 10 minutes. This may have occurred because admission time was taken from either the timed nursing assessment note or documentation of the admission vital signs. Sometimes these two times varied by a few minutes. A standard was established whereby entry time of the admission vital signs was used as admission time to the ICU.

Physiologic factors. Levels of partial pressure of arterial oxygen and the white blood cell count had 100% agreement. These entries were clearly timed on the laboratory report.

Acuity indices. There was only 40% agreement for the APACHE II score. Even though there was such a low percentage of agreement, the scores varied by only 2 points at the most. Kruse, Thell-Baharozian, and Carlson (1988) conducted a study utilizing APACHE II scores to predict mortality of patients in a medical intensive care unit. They reported inter-rater agreement of 60% when allowed a 5% range in score among second year residents and fellows. In comparison, this study would have 100% inter-rater agreement utilizing this percentage agreement calculation.

Transportation and mobility factors. Length of time on the backboard had 90% agreement as did length of stay in the OR. Length of stay for diagnostic tests had 80% agreement. Length of stay in the ED had 60% agreement. Because length of stay for diagnostic tests was subtracted from length of time in the ED these two variables showed less agreement. Time of admission to the ED was often recorded differently on the nursing assessment and on the vital signs portion of the form. A standard was established whereby entry time of the vital signs was used as the admission time of the patient to the ED. It was easy to determine when a patient went for diagnostic testing, however, it was difficult to determine from documentation as to when the patient returned to the ED. There was no way to correct for this problem. Total time from admission to the ED until admission to the ICU had 50% agreement. Disagreement spanned seven to 16 minutes only and was probably due to disagreement between ED admission times and ICU admission times. Standardization of where these variables would be obtained in documentation increased rater reliability. Table 1 displays percentage of inter-rater agreement for documentation of additional data.

Documentation of Skin Assessment

Skin assessment was evaluated by evidence of documentation of cues related to this variable and a

Table 1

Percentage of Inter-rater Agreement for Documentation of Additional Data

Admitting Diagnosis	100%
Braden Score of $\leq$ 16 or $\geq$17	100%
Spinal Cord Injury	90%
Age	90%
Skin Color	90%
Time of Adm to ICU	50%
Pa02	100%
WBC Count	100%
APACHE II Score	40%
Length of Time on Backboard	90%
LOS in OR	90%
LOS for Diagnostic Tests	80%
LOS in ED	60%
Total Time From Adm to ED to Adm to ICU	50%

specific body surface area prone to pressure injury. The following cues had 100% agreement: tissue swelling, induration, erythema, pressure sore, lesion, rash, disruption of skin, and ulceration. The cues skin dry and intact and other had 90% agreement. No evidence of skin breakdown had 80% agreement. And no skin assessment had 60% agreement. There was disagreement between the raters concerning documentation of skin assessment in four records. More careful evaluation of the record corrected this discrepancy.

Body surface area inspected had 100% agreement for the cues heel, malleolus, greater trochanter, sacrum, and coccyx. There was 90% agreement for the cues ischial tuberosity, no area recorded, and other area prone to pressure. These discrepancies occurred because of the disagreement between documentation of skin assessment.

Actual skin breakdown had 70% agreement. This was due to the disagreement concerning documentation of a skin assessment. Time skin assessment completed after admission to the ICU had 60% agreement. Again, this was because there were four charts where the raters disagreed as to documentation of skin assessment. More careful evaluation of documentation was instituted.

Documentation of the Nursing Diagnosis Potential for or Actual Impaired Skin Integrity

There was 100% agreement that neither the nursing diagnosis potential for or actual impaired skin integrity was documented in the patient chart within the first 24 hours of admission to the ICU. Percentage of inter-rater agreement of documentation of cues related to skin assessment, body surface area inspected, actual skin breakdown, time skin assessed, and the nursing diagnosis potential for or actual impaired skin integrity are summarized in Table 2.

Documentation of Cues Related to the Braden Scale For Predicting Pressure Sore Risk

The cues listed under sensory perception had the following percentage agreement: paralysis due to spinal cord injury, comatose, and no comment 100%, receiving sedatives and under influence of anesthesia 90%, and awake/alert and receiving paralyzing agents 70%. The cues of awake and alert and receiving sedatives were confusing in the documentation. Often times the neurological exam completed upon admission to the ICU listed the patient as awake and alert and moving all extremities, yet they were receiving sedatives. Response to the sedatives was rarely recorded in nursing documentation.

Table 2

Percentage of Inter-rater Agreement for Documentation of Cues Related to Skin Assessment and Body Surface Area Inspected, Actual Skin Breakdown, Time Skin Assessed, and Nursing Diagnosis Potential for or Actual Impaired Skin Integrity

Skin Assessment	
Tissue Swelling	100%
Induration	100%
Erythema	100%
Pressure Sore	100%
Lesion	100%
Rash	100%
Disruption of Skin	100%
Ulceration	100%
Skin Dry and Intact	90%
Other	90%
No Evidence of Skin Breakdown	80%
No Skin Assessment	60%
Body Surface Inspected	
Heel	100%
Malleolus	100%
Greater Trochanter	100%
Sacrum	100%
Coccyx	100%
Ischial Tuberosity	90%
No Area Recorded	90%
Other Area Prone to Pressure	90%
Actual Skin Breakdown	70%
Time Skin Assessed After Adm to ICU	60%
Nursing Diagnosis Potential for Impaired Skin Integrity	100%
Nursing Diagnosis Actual Impaired Skin Integrity	100%

Cues related to exposure of skin to moisture had the following percentage agreement: diaphoretic, incontinent of urine and feces, and excessive perspiration 100%, no comment 60%, and skin dry 50%. The cue of skin dry was generally documented in the cardiovascular assessment. The rating of this cue also affected the rating of the cue no comment. More careful evaluation of documentation was instituted.

Activity level had 100% agreement of all the cues. The cues were bedrest, out of bed in chair, ambulate with assistance, ambulate ad lib, and no comment.

Cues related to mobility had 100% agreement for actual paralysis, no comment, and comatose. Moving about in bed, restless, and thrashing, awake and alert, receiving sedatives, receiving paralyzing agents, and under the influence of anesthesia had 90% agreement.

The cues related to friction and shear of awake and alert/moving about by self and no comment had 100% agreement. Unable to move/change position by self had 90% agreement.

All cues related to nutrition had 100% agreement. These were regular diet, liquid diet, soft diet, nothing by mouth, total parenteral nutrition, and nasogastric feeding. Findings of percentage agreement related to documentation of cues from the Braden Scale for Predicting Pressure Sore Risk

are summarized in Table 3.

Study Results

Additional Data

Demographic data. The admitting diagnoses were generally multiple trauma due to motor vehicle accident, self inflicted trauma, accidental injury, or injury related to violent acts such as gun shot wounds or stab wounds.

The study population ranged in age from 18 years to 89 years. The mean age was 36.83 years with +/- 16.79 years standard deviation (SD).

The sample population consisted of 7.6% (8) black skinned patients. Non black skinned patients, which included any race other than blacks, were 92.4% (97) of the sample population.

Twenty-three or 21.9% of the patients sustained a spinal cord injury. The other 78.1% (82) of the patients did not have spinal cord injury.

Ninety-seven or 92.4% of the sample population had a Braden Score of 16 or less. A score of 16 or less indicates that the patient is at risk for skin breakdown. Eight or 7.6% of the sample population had a Braden Score of 17 or greater.

Table 3

Percentage of Inter-rater Agreement for Documentation of Cues from The Braden Scale for Predicting Pressure Sore Risk

n = 105 More Than One Answer Could Be Selected Per Chart

Sensory Perception	
Paralysis Due to Spinal Cord Injury	100%
Comatose	100%
No Comment	100%
Receiving Sedatives	90%
Under Influence of Anesthesia	90%
Awake/alert	70%
Receiving Paralyzing Agents	70%
Exposure of Skin to Moisture	
Diaphoretic	100%
Incontinent of Urine and Feces	100%
Excessive Perspiration	100%
No Comment	60%
Skin Dry	50%
Activity Level	
Bedrest	100%
Out of Bed in Chair	100%
Ambulate with Assistance	100%
Ambulate Ad Lib	100%
No Comment	100%
Mobility	
Actual Paralysis	100%
No Comment	100%
Comatose	100%
Moving About in Bed, Restless, Thrashing	90%
Awake and Alert	90%
Receiving Sedatives	90%
Receiving Paralyzing Agents	90%
Under the Influence of Anesthesia	90%
Friction and Shear	
Awake and Alert/Moving About by Self	100%
No Comment	100%
Unable to Move/Change Position by Self	90%
Nutrition	
Regular Diet	100%
Liquid Diet	100%
Soft Diet	100%
Nothing by Mouth	100%
Total Parenteral Nutrition	100%
Nasogastric Feeding	100%

Physiologic Factors

The data of height and weight were to be collected to determine if the patient was greater than 20 pounds over recommended maximum weight or 20 pounds under recommended minimum weight. However, height was not recorded on any of the charts of the study population. If the sex of the patient had been collected as part of the demographic data, perhaps a rough estimate that the study population exceeded their maximum or minimum recommended weight standards could have been speculated. Thus, the weight of the patients is not reported because it has no significance.

Oxygen saturation levels of blood were not recorded in the charts of the study population at the time of admission to the ED. The level of partial pressure of arterial oxygen was available in 100 records and was collected as data. Levels ranged between 22 millimeters of mercury (mm Hg) to 619 mm Hg. Normal values accepted by this hospital's laboratory are between 70 mm Hg and 95 mm Hg. The mean arterial oxygen level was 267.97 mm Hg +/- 171.85 mm Hg SD. Most, but not all patients were intubated prior to admission to the ED. For the most part the sample population was well oxygenated, however this is not to say that all tissues were receiving oxygen. It is acknowledged that shifting of circulating blood volume during hypovolemic shock shunts

blood and oxygen away from the nonvital tissues of skin, connective tissue, gastrointestinal tract and skeletal muscles to vital tissues such as the brain, heart, liver, lungs, and kidneys.

The white blood cell count (WBC) on admission to the ED was available in 104 records and ranged from 3.0 to 43.0 thousand per u/L. The normal values accepted by this hospital's laboratory are 4.3 thousand per u/L to 10.0 thousand per u/L. The mean value was 14.70 thousand per u/L +/- 7.29 thousand per u/L SD.

Acuity Indices

The Acute Physiologic and Chronic Health Evaluation (APACHE) II scores calculated for each patient at the time of admission to the ICU ranged between 0 and 32. The mean score was 12.86 +/- 7.58 SD. APACHE II scores can range from 0 to 71. Scores of 0 to 4 are associated with a 1.9% death rate. Scores between 5 and 9 points are associated with a 3.9% death rate. It is at the scores of 30 to 34 that the mortality rate increases to 73%. And a death rate of 84% is associated with a score of 35 or greater.

Transportation and Mobility Factors

The time the patient was admitted to the ED, as evidenced by the time the admission vital signs were documented, was used as the time the patient was placed on

the backboard in order to standardize this measurement. A backboard is a firm support or board used to stabilize the spine in order to prevent further injury. Some charts did not contain the ambulance flow sheets while others contained the life flight log. It was also difficult to determine when the patient was removed from the backboard. At times adequate documentation was found on the anesthesia flow sheet with reference to body position or on the operating room document that described the devices used for patient positioning and transport to the unit. If documentation from either of these two forms failed to provide information regarding the use of the backboard, the initial nursing assessment completed on admission to the ICU was examined to determine if the patient arrived on a backboard. If documentation did not support that the patient was on a backboard then time of admission to the ICU was used as the time the patient was removed from the backboard. Seventy-four charts had documentation of the patient as being on the backboard. The length of time the patient remained on the backboard ranged from 10 minutes to 1153 minutes. The mean time was 190.99 minutes +/- 204.51 minutes SD.

Length of stay in the ED was determined by documentation on the emergency room flow sheet. Length of stay ranged from 5 minutes to 315 minutes. The mean time

was 76.58 minutes +/- 68.00 minutes SD. This finding does not include the length of time the patient may have spent having diagnostic tests in another department while still being admitted to the ED.

Length of stay for diagnostic tests was determined by documentation on the emergency room flow sheet or the anesthesia record. The most frequently occurring tests outside of the ED and OR were computerized axial tomography (CAT) scans, arteriograms, and xrays. The time the patient was gone from the ED or OR was noted and subtracted from the time spent in the ED or OR. Fifty-four charts had documentation of the patient being transported for diagnostic tests. Length of stay for diagnostic tests ranged from 10 minutes to 350 minutes. The mean time was 61.5 minutes +/- 62.01 minutes SD.

Length of stay in the OR was obtained from the anesthesia flow sheet. The anesthesia start and end times were used to determine length of stay in the OR. None of the patients were sent to the recovery room post operatively. All were admitted to the ICU immediately after surgery. Length of stay ranged between 30 to 850 minutes. The mean stay in the OR was 285.50 minutes +/- 176.22 minutes SD.

The length of time it took for the patient to be

admitted to the ICU was calculated by noting the time of admission to the ED until the time the admission vital signs were charted on the ICU admission assessment sheet. The time ranged from 102 minutes to 1155 minutes. The mean time was 417.68 minutes +/- 250.72 minutes SD. All additional data are reported in Table 4.

Skin Assessment

Time of admission to the ICU was determined by the time admission vital signs were documented on the critical care flow sheet. Documentation was evaluated for the 24 hour period after admission to determine when a skin assessment for pressure injury was completed. The time the skin assessment was documented was used to calculate how long after admission to the ICU a skin assessment was completed. Of 105 charts, 31 charts had evidence of documentation of skin assessment for pressure injury. The time the assessment was completed ranged from 1 minute to 1435 minutes after admission to the ICU. The mean time was 526.77 minutes +/- 374.49 minutes SD.

Of the 31 charts with documentation of skin assessment, the most frequently documented words were no evidence of skin breakdown 14.3% (15), skin dry and intact 6.7% (7), erythema 4.8% (5), tissue swelling 3.8% (4), other (stable integument) 1.9% (2), lesion 1% (1), disruption of skin 1%

Table 4

Results of Additional Data

Variable	n	Range	Mean	SD
Age (in yrs)	105	18-89	36.83	16.79
APACHE II	105	0-32	12.86	7.58
P/P Arterial O2 on Adm to ED (mm Hg)	100	22-619	267.97	171.85
WBC on Adm ED (thous per u/L)	104	3.0-43.0	14.70	7.29
Time on Board (min)	74	10-1153	190.99	204.51
LOS in ED (min)	105	5-315	76.58	68.00
LOS Diagnostic Tests (min)	54	10-350	61.50	62.01
LOS in OR (min)	105	30-850	285.50	176.22
Time From ED to ICU Adm (min)	105	102-1155	417.68	250.72

(1), and rash 1% (1). The words induration, pressure sore, and ulceration were not found in nursing documentation. The percentage for this section does not equal 100% because more than one answer could be selected for each chart.

The most frequently inspected body surface area was the sacrum 11.4% (12), coccyx 11.4% (12), heel 2.9% (3), greater trochanter 1.9% (2), ischial tuberosity 1.9% (2), and malleolus 1% (1). Of the 31 charts that had documentation of skin assessment, 5.7% (6), had inspection of another area prone to pressure injury of skin. Findings related to skin assessment can be found in Table 5.

Nursing Diagnosis Actual or Potential for Impaired Skin Integrity

The Braden Scale for Predicting Pressure Sore Risk was used to calculate a score for all 105 charts used for the study population. Ninety-seven (92.4%) received a score of 16 or less indicating potential for impaired skin integrity. However, none of the charts had documentation of the nursing diagnosis potential for impaired skin integrity. Nursing notes were written in a systems review format. Nursing diagnosis could not be found in the documentation for the initial 24 hour stay in the ICU.

Of the 31 charts with documentation of skin assessment, six patients had evidence of skin breakdown. Documentation

Table 5

Frequency of Documentation of Descriptors of Skin Assessment

N = 31 Charts With Documented Skin Assessment

More Than One Answer Could Be Selected Per Chart

No Evidence of Skin Breakdown	14.3% (15)
Skin Dry and Intact	6.7% (7)
Erythema	4.8% (5)
Tissue Swelling	3.8% (4)
Other (Stable Integument)	1.9% (2)
Lesion	1.0% (1)
Disruption of Skin	1.0% (1)
Rash	1.0% (1)
Induration	0.0%
Pressure Sore	0.0%
Ulceration	0.0%
Sacrum	11.4% (12)
Coccyx	11.4% (12)
Heel	2.9% (3)
Greater Trochanter	1.9% (2)
Ischial Tuberosity	1.9% (2)
Malleolus	1.0% (1)
Other Area Prone to Pressure	5.7% (6)

of the nursing diagnosis actual impaired skin integrity was not found in any of the patient charts. Twenty-five of the patients with documentation of skin assessment had no evidence of skin breakdown. Because no skin assessment was documented on 74 of the charts, this researcher could not determine if actual skin breakdown occurred within the first 24 hours of admission to the ICU for those patients.

Cues for Predicting Pressure Sore Risk

Because cues from the Braden Scale for Predicting Pressure Sore Risk have been found to be related to the risk of pressure sore development, documentation was evaluated to determine if this information was collected in the nursing assessment or documented on the flow sheets within the first 24 hours of admission to the ICU.

Evaluation of sensory perception was documented as listed under the following headings: receiving sedatives 50.5% (53), comatose 26.7% (28), awake and alert 11.9% (23), under the influence of anesthesia 8.6% (9), and receiving paralyzing agents 7.6% (8). Generally this evaluation was documented in the neurologic assessment completed shortly after admission to the ICU.

Exposure of skin to moisture was generally documented in the cardiovascular and gastrointestinal/renal assessment. The skin was noted as dry and intact 20% (21), excessive

perspiration 3.8% (4), and incontinent of urine and feces 1% (1) of the time.

Activity was noted in the doctors orders and in the nurses' physical assessment under musculoskeletal system in 100% (105) of the charts. Ninety-eight (93.3%) of the patients were on bedrest. Seven (6.7%) of the patients were allowed out of bed in a chair.

Mobility was documented in the nursing notes under the neurologic and musculoskeletal assessment the majority of the time. Receiving sedatives was documented fifty-three (50.5%) times. Twenty-eight (26.7%) of the patients were listed as comatose. Moving about in bed, restless, and thrashing was documented 13 (12.4%) times. Documentation of patients as being awake and alert was documented 23 (11.4%) times. Nine charts (8.7%) had documentation of the patient being under the influence of anesthesia. Eight charts (7.6%) had documentation regarding the patient as receiving paralyzing agents.

Friction and shear were more difficult to evaluate from the documentation. Documentation was evaluated as it related to the patients level of sedation or neurologic assessment. Using this outcome, fifty-six (53.3%) of the charts had documentation related to the patient being unable to move or change position by themselves. Twelve (11.9%)

charts had evidence of documentation of the patient as being awake, alert and able to move by themselves.

Assessment of nutritional status was documented in 100% (105) of the charts. One hundred three patients (98.1%) patients were receiving nothing by mouth. Two patients (1.9%) were ordered a liquid diet. See Table 6 for findings related to the frequency of documentation of the cues from the Braden Scale for Predicting Pressure Sore Risk.

Association of the Additional Data With Documentation of Skin Assessment

Chi square analysis was calculated for each variable of skin assessment "yes" "no" with an exclusive category of each additional variable. Was skin assessment documented more often in patients who had spinal cord injury? Figure 1 a depicts chi square analysis of these variables. Of the patients with spinal cord injury, seven patients or 30% of the sample had documentation of skin assessment. Of the patients with no spinal cord injury, 24 or 29% of the sample population had documentation of a skin assessment. No significant association existed, $p = .95$ (Continuity Correction method).

Were patients who had APACHE II scores of 30 - 71 more likely to have documentation of a skin assessment? Thirty or 29.1% of the patients with APACHE II scores of 0 - 29 had

Table 6

Frequency of Documentation Related to Cues From the Braden Scale for Predicting Pressure Sore Risk

n = 105 More Than One Answer Could Be Selected Per Chart

Sensory Perception	
Receiving Sedatives	50.5%
Comatose	26.7%
Awake and Alert	11.9%
Under the Influence of Anesthesia	8.6%
Receiving Paralyzing Agents	7.6%
Exposure of Skin to Moisture	
Skin Dry and Intact	20.0%
Excessive Perspiration	3.8%
Incontinent of Urine and Feces	1.0%
Activity	
Bedrest	93.3%
Out of Bed in Chair	6.7%
Mobility	
Receiving Sedatives	50.5%
Comatose	26.7%
Moving About, Restless, Thrashing	12.4%
Awake and Alert	11.4%
Under the Influence of Anesthesia	8.7%
Receiving Paralyzing Agents	7.6%
Friction and Shear	
Able to Move/ Change Position by Self	53.3%
Awake and Alert/Moving by Self	11.9%
Nutrition	
Nothing by Mouth	98.1%
Liquid Diet	1.9%

documentation of skin assessment. Only one patient or 50% of the sample population with an APACHE II score between 30 - 71 had documentation of a skin assessment. No significant association existed, p =.50 (Fischer's Exact Two Tailed Test). See figure 1 b.

Were patients ages 40 years or greater more likely to have documentation of skin assessment? Figure 1 c shows that of the patients who had documentation of skin assessment, 41.2% or 14 were 40 years of age or older. Seventeen or 23.9% of the patients ages 18 - 40 years of age had documentation of skin assessment. No significant association existed (p =.11 by Continuity Correction method).

Were patients with nonblack skin more likely to have documentation of skin assessment? Twenty-eight percent (27) of the nonblack population had documentation of skin assessment as opposed to 50% (4) of the black population. Figure 1 d depicts chi square analysis with no significant association (p =.50 by Continuity Correction method).

Were patients with a Braden Score of $\leq$ 16 more likely to have documentation of skin assessment? All 31 patients with documentation of a skin assessment had a Braden Score of $\leq$ 16 (p =.85 by Likelihood Ratio). See figure 1 e.

Would patients with a PaO2 of $\leq$ 69 mm Hg be more likely

to have documentation of skin assessment? Only one patient or 12.5% of the patients with a PaO2 of ≤ 69 mm Hg had documentation of a skin assessment. Figure 1 f depicts chi square of these variables (p =.62 by Pearson's method).

Were patients with a WBC count of ≥ 10.0 thousand per u//L more likely to have documentation of a skin assessment? Twenty or 28.6% of the population with a WBC count of 10.0 thousand per u/L had documentation of a skin assessment. Ten or 32.3% of the population with a WBC count of 4.4 - 10.0 thousand per u/l had documentation of a skin assessment. No patient with a WBC count of ≤ 4.3 thousand per u/L had documentation of a skin assessment. Figure 1 g depicts chi square with p =.50 (Pearson's method).

Were patients with a LOS in the ED of ≥ 61 minutes more likely to have documentation of a skin assessment? Fourteen or 33.3% of the sample population who remained in the ED ≥ 61 minutes had documentation of a skin assessment. Seventeen or 27% of the patients with a LOS of ≤ 60 minutes had documentation of a skin assessment. No significant association (p =.48 by Likelihood Ratio) was found. See figure 1 h.

Were patients who stayed for ≥ 31 minutes for diagnostic test more likely to have documentation of a skin assessment? Seven or 21.2% of the sample population who

stayed 31 minutes or longer for diagnostic tests had documentation of a skin assessment. Twelve or 57.1% of the patients who stayed 30 minutes or less for diagnostic tests had documentation of a skin assessment. A significant association existed at p=.02 (Continuity Correction method). No assumptions can be made regarding why patients with LOS of 30 minutes or less for diagnostic tests were more likely to have documentation of a skin assessment. See figure 1 i.

Were patients with a LOS in the OR of $\geq$ 121 minutes more likely to have documentation of a skin assessment? Twenty-five or 28.7% of the sample population with LOS in the OR of $\geq$ 121 minutes had documentation of a skin assessment. Six or 33.3% of the population with LOS in the OR of 120 minutes or less had documentation of a skin assessment. P was not significant at .92 (Continuity Correction method). See figure 1 j.

Were patients with a total time from the ED to the ICU of four hours and one minute or greater more likely to have documentation of a skin assessment? Twenty-six percent or 20 patients with a total time from the ED to the ICU of four hours and one minute or greater had documentation of a skin assessment. Eleven or 39.3% of the population with a total time from the ED to the ICU of four hours or less had documentation of a skin assessment. Figure 1 k depicts chi

square analysis. Findings were not significant (p=.28 by Continuity Correction method).

Were patients who were on the backboard 121 minutes or longer more likely to have documentation of a skin assessment? An equal number of patients (12 or 32.4%) in the categories of 120 minutes or less and 121 minutes or greater had evidence of documentation of a skin assessment. Figure 1 1 depicts chi square analysis (p =1.0 by Likelihood Ratio).

Although 31 charts had evidence of documentation of skin assessment, measures taken to prevent pressure injury to skin were also documented in approximately ten charts that had no documentation of skin assessment. For example, eggcrate mattresses were placed on beds and documentation to support that patients were being repositioned was found. Analysis of time a skin assessment was completed after admission to the ICU revealed that 15 charts had documentation of a skin assessment within the first eight hours of admission to the ICU. Sixteen charts had documentation of skin assessment at eight hours, one minute to the twenty-fourth hour.

Association of Documentation of the Nursing Diagnosis Actual or Potential Impaired Skin Integrity with Skin Assessment

Because nursing diagnosis was not found in

1 a. Spinal Cord Injury n=105

Skin Assessment	yes	no
yes	30%	29%
no	70%	71%

p = .95

1 b. APACHE II Score n=105

Skin Assessment	0 - 29	30 - 71
yes	29.1%	50%
no	70.9%	50%

p = .50

1 c. Age n=105

Skin Assessment	18-40 yr	40-+ yr
yes	23.9%	41.2%
no	76.1%	58.8%

p = .11

1 d. Skin Color n=105

Skin Assessment	Black	Nonblack
yes	50%	28%
no	50%	72%

p = .50

1 e. Braden Score n=105

Skin Assessment	≤16	17 or >
yes	32%	0%
no	68%	100%

p =.85

1 f. Pa O2 n=100

Skin Assessment	≤69	≥70
yes	12.5%	28.9%
no	87.5%	71.1%

p = .62

Figure 1

Chi Square Analysis of Additional Data With Skin Assessment

1 g. WBC Count n=104

Skin Assessment	≤4.3	4.4 - 10.0	≥10.0
yes	0%	32.3%	28.6%
no	100%	67.7%	71.4%

p = .50

1 h. LOS ED n=105

Skin Assessment	<60 min	61 min>
yes	27%	33.3%
no	73%	66.7%

p = .48

1 i. LOS Diagnostic Tests n= 54

Skin Assessment	≤30 min	≥31 min
yes	57.1%	21.2%
no	42.9%	78.1%

p = .02

1 j. LOS in OR n=105

Skin Assessment	≤120 min	≥121 min
yes	33.3%	28.7%
no	66.7%	71.3%

p = .92

1 k. Total Time From ED to ICU n=105

Skin Assessment	<4 hrs	4hr 1 min>
yes	39.3%	26%
no	60.7%	74%

p = .28

1 l. Time on Backboard n= 74

Skin Assessment	≤120 min	≥121 min
yes	32.4%	32.4%
no	67.6%	67.6%

p = 1.0

Figure 1 (continued)

2 a. Nursing Diagnosis Potential for Impaired Skin Integrity n= 105

Skin Assessment	yes	no
yes	0	31
no	0	74

unable to determine p value

2 b. Nursing Diagnosis Impaired Skin Integrity n=105

Actual Skin Breakdown	yes	no
yes	0	6
no	0	25
unable to determine	0	74

unable to determine p value

Figure 2 a. Chi Square Analysis of Skin Assessment with the Nursing Diagnosis Potential for Impaired Skin Integrity.
b. Chi Square Analysis of Actual Skin Breakdown With the Nursing Diagnosis Impaired Skin Integrity

documentation within the first 24 hours of admission to the ICU, there was no association between skin assessment and potential or actual impaired skin integrity. Actual skin breakdown occurred in six patients within the first 24 hours of admission to the ICU. Figures 2 a and b depict chi square analysis of these variables.

Summary

The sample population was a relatively young, otherwise healthy population with a mean age of 36.83 years. Ninety-seven patients had nonblack skin. Only 21.9% had spinal cord injury. The white blood cell count was slightly elevated (mean 14.7 thousand/uL) indicating an intact functioning immune system which was probably responding to the trauma. In view of the severe state of hypovolemic shock which required massive transfusion resuscitation of greater than eight units or 4,000 mls of blood acutely over a four hour period, no assumptions can be made regarding the high levels of arterial oxygen pressure. Circulating blood volume shifts away from nonvital tissues such as skin and connective tissue during shock depleting them of nutrients, oxygen, and in this case immunologic defense. The mean APACHE II score on admission to the ICU was 12.86 which is predictive of a high survival rate.

Because the sample population was admitted through the

ED then transferred directly to the OR, they were immobilized for lengthy periods of time. The mean time between admission to the ED and transfer to the ICU was 417.68 minutes or slightly under seven hours.

Although ninety-seven (92.4%) of the population were deemed at risk for skin breakdown according to the Braden Scale for Predicting Pressure Sore Risk, only 31 charts had evidence of documentation of skin assessment. The systems review format was used for documentation of the nursing physical assessment. Integument was listed as a system in the majority of the charts. However, this system was generally assessed in relation to the surgical site or wounds sustained during the trauma event. Ten charts with no documentation of skin assessment had documentation of measures to prevent skin breakdown. Fifteen patients had evidence of documentation of skin assessment at less than or equal to 480 minutes after admission to the ICU. Sixteen patients had documentation of skin assessment at greater than or equal to 481 minutes after admission to the ICU. Six patients had actual skin breakdown within the first 24 hours of admission to the ICU. The nursing diagnosis actual or impaired skin integrity were not charted within the first 24 hours of admission to the ICU.

Length of stay for diagnostic tests of 30 minutes or

less or 31 minutes or greater was the only variable that revealed a significant association with documentation of a skin assessment ($p = .02$). No assumptions can be made regarding this finding.

CHAPTER V

Discussion

Discussion of Findings

Because spinal cord injury, APACHE II scores of 30 - 71, age of 40 years or older, Braden Score of 16 or less, PaO2 of 69 mm Hg or less, and WBC of 10.0 thousand per u/L or greater are supported in the literature as increasing the patient's risk for pressure injury to skin due to physiologic alterations, these factors should have been associated with documentation of skin assessment. However, there was no significant association as determined by chi square analysis.

Length of time of immobilization is also supported in the literature as contributing to the patient's risk for skin breakdown. However, LOS in the ED, LOS in the OR, length of time on the backboard, and total time from admission to the ED to admission to the ICU did not have significant association with documentation of skin assessment. Length of stay for diagnostic tests of 30 minutes or less and 31 minutes or greater, and documentation of skin assessment was the only significant finding ($p = .02$). No explanation is offered regarding this finding.

The mean time this population was immobilized prior to admission to the ICU was 417.68 minutes or just under seven

hours +/- 250.72 minutes SD. Mawson et al (1988) found, in a population of 20 spinal cord injury patients that were immobilized for 20 hours +/- 12 hours SD, that pressure injury to skin developed within four to five days after the trauma event. Some of the patients in the study population fall within the range of hours of immobilization related to pressure injury of skin in the Mawson study. In this study data were collected for only the first 24 hours after admission to the ICU. Six patients were found to have evidence of skin breakdown within the first 24 hours of admission to the ICU.

Although 92.4% of the sample population were deemed at risk for pressure injury of skin as predicted by the Braden Scale for Predicting Pressure Sore Injury, only 31 charts had documentation of a skin assessment. Of the 105 charts of the study population, none of them had documentation of the nursing diagnosis potential for or actual impaired skin integrity.

The findings related to documentation of skin assessment and nursing diagnosis can be viewed in two distinct ways. Nurses functioning in this ICU setting may be operating at a problem solving level that Benner (1984) refers to as the expert. The expert as defined by Benner (1984) is someone who perceives the whole situation and

doesn't waste time considering options that are not relevant to the situation. The expert views the situation to determine what clinical findings are most pertinent to the problems at hand. They mentally prioritize and problem solve by interceding for the most critical situation. If the patient were hemodynamically unstable that would take priority over a skin assessment.

Findings related to the cues from the Braden Scale for Predicting Pressure Sore Injury such as sensory perception, exposure of skin to moisture, activity level, mobility, friction and shear, and nutrition were being documented in the patient chart in the systems review format. This could mean that the patient was indeed being assessed in relation to risk factors related to pressure injury to skin. Documentation may be reflective of charting by exception, even though this not a recognized standard for chart documentation in the participating hospital. Findings related to pressure injury to skin would not be documented if they did not exist. Perhaps the nurses in this setting have mentally taken into consideration the risk factors that these patients have been exposed to in relation to pressure injury to skin, but it has not manifested itself in outwardly evident characteristics such as erythema, ulceration, rash, tissue swelling, induration, pressure

sore, or disruption of the skin. One problem with charting by exception is that it may lead to oversight of potential problems for which nursing can intervene and take measures to prevent. For example, if no mention of skin assessment is made, nursing measures to prevent skin breakdown may not be instituted. This may be disturbing to the patient and costly to cure once a pressure sore has occurred. Documentation of measures to prevent pressure injury to skin were found in ten charts with no documentation of skin assessment.

Another view of this situation is that when nurses document in a systems review format which does not culminate in formulation of a nursing diagnosis; perhaps the nursing process is not being practiced. The data collected may not be analyzed in reference to a comprehensive view of the patient.

Nursing is the "diagnosis and treatment of human responses to actual or potential health problems" (American Nurses' Association [ANA], 1980, p.9). The nursing process describes a method whereby subjective and objective data are collected and an assessment is made. This assessment should lead to formulation of a nursing diagnosis weather it be an actual or a potential problem. A plan of care is formulated by defining interventions used to treat the actual or

potential problem. The plan of care should be written in order that continuity of care may be provided with periodic evaluation to determine if the interventions are effective. This process forms the basis for nursing practice. Without formulation of a nursing diagnosis, assessment of the patient may stop at the data gathering phase. As nurses rotate off shift, information regarding findings from the physical assessment may not be communicated in a manner which provides for continuity of care. The assessment phase would repeat itself with little or no contribution toward improving patient outcome in an efficient manner.

Limitations of the Study

Limitations to the study are several. Because it was a retrospective chart audit, only what was documented could be used as data. If documentation was not reflective of the care that was being rendered, the findings of this study would not be accurate. Only APACHE II scores were collected at a point in time of the patient's admission to the ICU. These scores could not be used to judge minute to minute changes in the hemodynamically unstable patient. Perhaps if these data were collected prospectively, a better picture of the patient's needs in relation to nursing time demand could have been described. For example, if a patient were physiologically unstable requiring frequent intravenous

medication or hemodynamically altering medication to maintain physiological function, perhaps these interventions would have taken priority during the first 24 hours of admission to the ICU.

No data were collected to determine if the patient did indeed develop skin breakdown related to pressure injury after the first 24 hours of admission. These data may have provided a stronger conclusion in relation to what documentation reflected and what care was actually being given to prevent pressure injury to skin.

The small size of the study and the fact that it was conducted in one setting may make it less generalizable to other settings. It should also be noted that this setting was a level one trauma center. Perhaps the patients in this setting were much more acutely ill than would be seen in other critical care settings.

Recommendations

Replication of the study in other settings might reflect similarities or differences in documentation in relation to patient outcomes. A prospective study comparing observed nursing interventions to prevent skin breakdown with written documentation could provide some insight into what care nurses actually provide at the bedside in contrast to what is documented. For instance, in a prospective

study, a comparison of documentation could be made with actual physical assessments, beyond the 24 hour period, to determine if the patient developed skin breakdown related to pressure injury. Comparison of data across settings may point out differences in practice related to patient outcome and quality of care at different facilities. This information could be shared in order to improve practice.

Inclusion of data related to patient acuity and nursing time demand may be significant in relation to nursing documentation. Perhaps this data could provide some information as to priority setting in relation to patient care within the first 24 hours of admission to the ICU. The sample could include hypovolemic shock patients who may not have required massive transfusion. These patients would be acutely ill, but perhaps less hemodynamically unstable. Systolic blood pressure could be used an indicator of shock.

Conclusions

Although this study has several limitations, it does point out gaps in nursing documentation which may or may not be reflective of practice. The study raises many questions. Nurses need to develop and practice methods of inquiry to enhance the scientific knowledge base of the profession. If nursing is the "diagnosis and treatment of human responses to actual or potential health problems" (ANA,

1980, p.9) are nurses practicing within the realm of scientific problem solving or are nurses just carrying out physician orders? Is care being individualized to patient need? What are the legal ramifications of charting by exception? Development of standards of practice with methods to facilitate documentation such as flow sheets or use of a computer to document clinical findings may improve documentation of skin assessment and development of a plan of care with nursing diagnosis.

Because of the limitations of a retrospective study, further research is warranted to determine potential problems with documentation of nursing practice related to prevention of pressure injury to skin. A prospective study might determine specific causes and identify methods to improve nursing documentation of skin assessment.

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Braden Scale

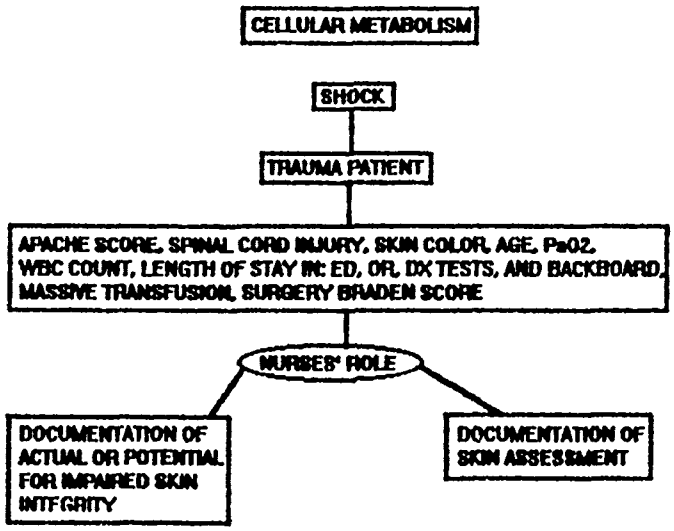
FOR PREDICTING PRESSURE SORE RISK

Patient's Name _____ Evaluator's Name _____ Date of Assessment

SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	**1. Completely limited:** Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation. OR limited ability to feel pain over most of body surface.	**2. Very Limited:** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness. OR has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body.	**3. Slightly Limited:** Responds to verbal commands, but cannot always communicate discomfort or need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. No Impairment:** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.	
MOISTURE degree to which skin is exposed to moisture	**1. Constantly Moist:** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2. Very Moist:** Skin is often, but not always moist. Linen must be changed at least once a shift.	**3. Occasionally Moist:** Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. Rarely Moist:** Skin is usually dry, linen only requires changing at routine intervals.	
ACTIVITY degree of physical activity	**1. Bedfast:** Confined to bed	**2. Chairfast:** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. Walks Occasionally:** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	**4. Walks Frequently:** walks outside the room at least twice a day and inside room at least once every 2 hours during waking hours.	
MOBILITY ability to change and control body position	**1. Completely Immobile:** Does not make even slight changes in body or extremity position without assistance.	**2. Very Limited:** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	**3. Slightly Limited:** Makes frequent though slight changes in body or extremity position independently.	**4. No Limitations:** Makes major and frequent changes in position without assistance.	
NUTRITION usual food intake pattern	**1. Very Poor:** Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement. OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	**2. Probably Inadequate:** Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding.	**3. Adequate:** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) each day. Occasionally will refuse a meal, but will usually take a supplement if offered. OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs.	**4. Excellent:** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.	
FRICTION AND SHEAR	**1. Problem:** Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.	**2. Potential Problem:** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints, or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. No Apparent Problem:** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.		
				Total Score	

Appendix B

Schematic Model



Appendix C

Data Collection Tool

1. PATIENT CODE NO_____ 2. TIME OF ADM TO ICU_____

3. ADMITTING DIAGNOSIS_____

4. SPINAL CORD INJURY? (CIRCLE APPROPRIATE ANSWER):

   A. YES B. NO

5. LENGTH OF TIME ON THE BACKBOARD (RECORDED IN MINUTES): _____

6. APACHE SCORE_____

7. SKIN COLOR (CIRCLE THE APPROPRIATE ANSWER):

   A. BLACK B. NONBLACK

8. AGE (IN YEARS)_____

9. HEIGHT IN INCHES_____

10. WEIGHT IN POUNDS_____

11. PaO2 ON ADM TO ED_____

12. WBC ON ADM TO ED _____

13. LOS IN ED (IN MINUTES) _____

14. LOS IN OR (IN MINUTES)_____

15. LOS FOR DX TESTS (IN MINUTES)_____

16. SKIN ASSESSMENT LIMITED TO THESE WORDS ONLY (CIRCLE APPROPRIATE ANSWERS).

A. TISSUE SWELLING	B. INDURATION
C. ERYTHEMA	D. PRESSURE SORE
E. LESION	F. RASH
G. DISRUPTION OF SKIN	H. ULCERATION
I. SKIN DRY AND INTACT	J. NO EVIDENCE OF SKIN BREAKDOWN
K. NO SKIN ASSESSMENT	L. OTHER

17. BODY SURFACE AREA INSPECTED (CIRCLE APPROPRIATE ANSWERS):

A. HEEL
B. MALLEOLUS
C. GREATER TROCHANTER
D. SACRUM
E. ISCHIAL TUBEROSITY
F. COCCYX
G. NONE RECORDED
H. OTHER AREA PRONE TO PRESSURE

18. TIME SKIN ASSESSMENT COMPLETED AFTER ADMISSION TO ICU RECORDED IN MINUTES _____

19. SENSORY PERCEPTION (CIRCLE APPROPRIATE ANSWERS):

A. AWAKE/ALERT
B. PARALYSIS DUE TO SPINAL CORD INJURY
C. RECEIVING SEDATIVES
D. RECEIVING PARALYZING AGENTS
E. UNDER INFLUENCE OF ANESTHESIA
F. COMATOSE
G. NO COMMENT

20. EXPOSURE OF SKIN TO MOISTURE (CIRCLE APPROPRIATE ANSWERS):

A. SKIN DRY
B. DIAPHORETIC
C. INCONTINENT OF URINE OR FECES
D. EXCESSIVE PERSPIRATION
E. NO COMMENT

21. ACTIVITY (CIRCLE APPROPRIATE ANSWER):

A. BEDREST
B. OOB IN CHAIR
C. AMB WITH ASSIST
D. AMB AD LIB
E. NO COMMENT

22. MOBILITY (CIRCLE APPROPRIATE ANSWERS):

A. MOVING ABOUT IN BED, RESTLESS, THRASHING
B. AWAKE AND ALERT
C. RECEIVING SEDATIVES
D. RECEIVING PARALYZING AGENTS
E. UNDER INFLUENCE OF ANESTHESIA
F. ACTUAL PARALYSIS
G. NO COMMENT
H. COMATOSE

23. FRICTION AND SHEAR (CIRCLE APPROPRIATE ANSWER):

A. UNABLE TO MOVE/CHANGE POSITION BY SELF
B. AWAKE AND ALERT MOVING ABOUT BY SELF
C. NO COMMENT

24. NUTRITION (CIRCLE APPROPRIATE ANSWERS):

A. REGULAR DIET
B. LIQUID DIET
C. SOFT DIET
D. NPO
E. TPN
F. N/G FEEDING

24. IS PATIENT AT RISK FOR SKIN BREAKDOWN? (BRADEN SCORE OF 16 OR LESS) (CIRCLE APPROPRIATE ANSWER)

A. YES
B. NO

25. IS NURSING DIAGNOSIS POTENTIAL FOR IMPAIRED SKIN INTEGRITY DOCUMENTED? (CIRCLE APPROPRIATE ANSWER)

A. YES
B. NO

26. DOES THE PATIENT HAVE ACTUAL SKIN BREAKDOWN WITHIN THE FIRST 24 HOURS OF ADMISSION TO THE ICU? (CIRCLE APPROPRIATE ANSWER)

A. YES
B. NO
C. UNABLE TO DETERMINE

27. IS THE NURSING DIAGNOSIS IMPAIRED SKIN INTEGRITY DOCUMENTED? (CIRCLE APPROPRIATE ANSWER)

A. YES
B. NO

Appendix D

Letter Granting Permssion to Use the Braden Scale For Predicting Pressure Sore Risk

University of Nebraska Medical Center

College of Nursing

42nd and Dewey Avenue
Omaha, NE 68105-1065

102 Fairfield Hall
Lincoln, NE 68588-0620

Scottsbluff, NE 69361

Date: April 16, 1991

To: Maryanne Kolesar

From: Barbara Braden, Ph.D., R.N. & Nancy Bergstrom, Ph.D., R.N.

Re: Permission to use the Braden Scale

As holders of the official copyright for the Braden Scale for Predicting Pressure Sore Risk, we hereby grant permission for the use of the Braden Scale in your clinical agency.

Barbara J. Braden, Ph.D., R.N.
Associate Professor
Creighton University
School of Nursing
Omaha, NE 68178

Nancy Bergstrom, Ph.D., R.N.
Professor
University of Nebraska
Medical Center
College of Nursing
Omaha, NE 68105

Appendix E

Letter Granting Permission to Utilize Medical Facility for Data Collection

TO: Maryanne Kolesar

FROM: Nursing Research Committee
Department of Nursing Service

RE: Proposed Study Titled:
~~Analysis of the Extent~~ of
Completion of Skin Assessment
~~and Documentation of~~ risk for Skin
Breakdown in the Trauma Patient
~~Experiences Hypovolemic~~ Shock
Requiring Massive Transfusion
Resuscitation and Surgical Intervention

Your proposal has been approved for conduct within the Department of Nursing. You are therefore, free to proceed with your study within the following guidelines:

1. Prior to initiating the study, you contact the Associate Director of Nursing for Nursing Education to arrange completion of appropriate mandatory orientation.

2. Inform the Associate Director of Nursing for Education re: date data collected begins; date data collection ends.

3. The results of your study must be presented to the department of nursing staff in a verbal presentation within 6 months of completion of data collection.

LETTER OF AGREEMENT

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Attachment "D"
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TO:
FROM: Nursing Research Committee
Department of Nursing Services

RE: Proposed Study Titled:
Analysis of the Extent of
Completion of Skin Assessment
and Documentation of Risk for Skin
Breakdown in the Trauma Patient

4. A copy of the study's final report, including an abstract, shall be submitted to the Department of Nursing Service within 6 months of the completion of the study.

5. will not be identified by name in the study.

If you need clarification of any of the above, or other information, your contact person within the Nursing Department is _____ (phone).

Associate Director of Nursing for
Education

6-5-91
Date

SS:jm
4/22/87
d/research
f/memo75