

The Journal of

Legal Nurse Consulting

Volume 23 ▲ Number 1 ▲ Spring 2012

- ▲ Pressure Ulcers
- ▲ Nutrition Strategies for Wound Healing
- ▲ Avoidable & Inevitable? Skin Failure:
The Kennedy Terminal Lesion
- ▲ Pressure Sores and the Law
- ▲ Pressure Ulcers: Is it a Case of Negligence?



**AMERICAN ASSOCIATION OF
LEGAL NURSE CONSULTANTS**

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The Journal of Legal Nurse Consulting

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The purpose of The Journal is to promote legal nurse consulting within the medical-legal community; to provide both novice and experienced legal nurse consultants (LNCs) with a quality professional publication; and to teach and inform LNCs about clinical practice, current legal issues, and professional development.

Manuscript Submission

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The Journal of

LEGAL NURSE CONSULTING

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Pressure ulcers (PrUs) are not always a sign of negligence. When a person at the end-of-life, experiences renal or cardiac failure, it is accepted as part of the natural process of dying. Regrettably, a PrU at the end-of-life is often perceived as abnormal and avoidable. The skin is also susceptible to progressive diseases, a decline in physiology with age, and end-organ failure. Communication about this process is important to prevent misperceptions of care.
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Learning and Knowing Will Enhance our Practice



Dear Colleagues,

Spring is nearly upon us and the AALNC Conference is just around the corner. The conference: Legal Nurse Consulting Educational and Networking Forum 2012 will be held in San Antonio, Texas, March 30-31, 2012. The Conference Objectives are to:

- Integrate new approaches and techniques into the LNC's everyday practice.
- Recognize and discuss current trends and controversies in the medical and legal fields.
- Network with other medical and legal professionals.

Topics such as nurse advocacy, numerous practice issues that may have the potential for litigation, life care planning, disability, technology, forensics, and the importance of nutrition in our lives will be discussed. You will be able to have not only a great learning experience but also enjoy the beautiful River Walk!

This issue of the *Journal* is dedicated to wounds/pressure ulcers, wound care, strategies for wound healing, and legal implications related to practice issues. Our Guest Editor for the issue, Ann Peterson, has done a superb job of gathering expert authors to address the many factors related to wound risk, wound care, treatment and management, and liability issues about which the legal nurse consultant will want to know. Her Guest Editorial that follows outlines the importance of what you will see featured in this issue. In the Clinical Maxim, Dr. Peterson further addresses assessment, treatment, and prevention approaches as well as a wealth of resources for legal nurse consultants to use as they prepare for a case.

Also in this issue, Holly Hillman and Eileen Watson discuss a new area of concern related to social media and electronic communication that can have a significant impact on privacy and confidentiality of patient health information. It is clear that more education needs to be done in this area.

Raji Thomas, in *Questions & Answers*, gives a detailed overview of the new recommendations for neonatal resuscitation. Of course the legal nurse consultant will want to be familiar with all of these changes and how these are incorporated into practice.

Kathleen Ashton provides an excellent book review on the subject of tracheostomies. She describes important nuances that appear in the book related to safe and appropriate care when the tracheostomy procedure is required. The legal nurse consultant will find this a useful guide.

We hope you will enjoy reading this outstanding issue of the *Journal* as it will certainly add to your knowledge base in the care of pressure ulcers, and in all facets of legal nurse consulting.

Bonnie Rogers
JLNC Editor

Guest Editorial: Pressure Ulcer Prevention, Management, and Outcome



Dear Colleagues,

Pressure ulcers, a complication of reduced mobility and sensation, profoundly affect an individual's physical health and body image and can lead to staggering costs to both the individual and society. Clinical management of pressure ulcers prevention and treatment is influenced by multiple physiological and environmental factors which suggest an interdisciplinary team approach to treatment is warranted. While the effect of a team approach requires further research, the composition of the interdisciplinary team will be determined by the particular discipline's professional education and expertise. Clinical decision-making is complicated by multiple morbidities associated with pressure ulcers and the paucity of evidence-based guidelines for treatment.

Classified as "medical errors," the total annual cost of treating pressure ulcers soared to \$19.5 billion in 2010 and lawsuits involving pressure sores have substantially increased with verdicts and settlements reaching into the millions of dollars. Central to counsels' argument will be federal regulations that require a facility to ensure that an individual who enters a facility without pressure sores does not develop pressure sores unless the individual's clinical condition demonstrates that they were unavoidable and that those with pressure ulcers receive the necessary treatment to promote healing.

The plaintiff stance is often that the pressure ulcer is preventable and evidence of neglect, while the defense will point out contributing factors such as diabetes or terminal illness. To determine if the standard of care was met, the legal nurse consultant (LNC) will need to review the medical record for documentation relative to the presence of risk factors, the appropriateness of assessment and plan of care, and the appropriate delivery of care.

The prevention and treatment of pressure ulcers is best accomplished with a multidisciplinary approach. To assist the LNC to recognize and evaluate factors influencing the development and healing processes of pressure ulcers, this issue of *JLNC* offers articles that provide our readers with an overview of risk factors, clinical management, and liability issues.

Wound management from a nursing perspective is addressed by Cynthia Fleck. In *Pressure Ulcers*, she provides a comprehensive review of assessment, prevention, and treatment measures for pressure ulcers. Ms Fleck also addresses healing vs. reverse staging of wounds.

Mary Ellen Posthauer's *Nutrition and Wound Healing* defines the role of the nutritionist in assessing and managing a patient who is at nutritional risk. The need for early nutritional assessment and identification of risk factors status is discussed. In addition, pertinent laboratory findings and medications influencing nutritional status are reviewed and the management of nutritional deficits outlined.

Physical therapist Vince Lepak's article *Avoidable & Inevitable? Skin Failure: The Kennedy Terminal Lesion* provides a review of factors influencing organ (integumentary system) failure. The persisting belief that all pressure ulcers are avoidable, recognition of the classification of unavoidable pressure ulcers in the literature, and the implication for litigation are reviewed.

Pressure Sores and the Law contributed by Joshua Silverman looks at the duties imposed by federal and state regulations to prevent and treat pressure sores. This informative article provides the LNC with a guide to searching out evidence to substantiate the merit of a case.

The Clinical Maxim *Wound Care Primer: What to Consider When Reviewing a Pressure Ulcer Case* provides an overview of recommended preventative measures, assessment tools, and available treatment modalities. Resources are listed to provide the LNC with information that will assist in the analysis of a case and the development of a strategy to support a case.

The article by Ann Peterson and Bonnie Rogers, *Pressure Ulcers: Is it a Case of Negligence?*, addresses the costs arising from management and litigation associated with pressure ulcers. Readers are referred to two key documents that can serve as guides to factors that should be considered, by both the new and experienced LNCs, when reviewing a case involved in litigation.

Ann M. Peterson, EdD, MSN, RN, FNP-BC, LNCC

Pressure Ulcers

Cynthia Ann Fleck, RN, BSN, ET/WOCN, APN/CNS, CWS, DNC, DAPWCA, FACCWS

KEY WORDS

Pressure Ulcers, Decubitus, Bedsore, Pressure Sore, Shear Induced Ulcers

Pressure ulcers have long been recognized, yet the general management of pressure ulcers has only just begun to gain prominence among national and worldwide healthcare concerns. In spite of present attention and the treatment developments in health care, pressure ulcers continue to be a major source of morbidity and mortality.

Introduction

Pressure ulcers are one of the largest dilemmas facing clinicians who care for geriatric and critically ill patients. Two-thirds of pressure sores occur in patients older than 70 years of age (Revis, 2010), especially among those with impaired sensation and prolonged immobility (Abrussezze 1985). Pressure ulcer prevalence is estimated to be around 15% in acute care, up to 28% in long term care, and up to 29% in home care (Cuddigan, Berlowitz & Ayello, 2001). Patients inclined to pressure ulcers are at higher risk of morbidity and mortality with infection, osteomyelitis, and sepsis being the most common major complication.

Pressure ulcers are any lesions caused by unrelieved pressure resulting in damage of underlying tissue [National Pressure Ulcer Advisory Panel (NPUAP), 2007]. The term pressure ulcer is somewhat of a misnomer since pressure is only part of the problem. Other terms such as bedsore, pressure sore, or decubitus ulcer are often used interchangeably in the medical community. Decubitus comes from the Latin *decumbere*, meaning “to lie down.” Hence, “decubitus” does not adequately describe the breakdown or ulceration that can occur from other positions such as sitting, which can cause ischial tuberosity (sitting bones) ulcers.

It is theorized that pressure ulcers are caused by localized pressure or shear forces that lead to ischemia and cell death, thus causing skin and tissue breakdown. Pressure is equal to force, divided by area. The greater the surface area of the load, the less pressure exerted; therefore, a sitting individual is at higher risk of developing a pressure ulcer than a person who is lying supine. Kosiak (1959) proved that tissue compression and ischemia can lead to tissue destruction and pressure ulcer formation. He also showed that the amount of pressure and the duration of the pressure are inversely proportional and that low amounts of pressure over longer periods of time can be just as detrimental as high pressure for shorter time periods. Dermatologic manifestations such as incontinent perineal dermatitis, candidiasis or tinea, maceration, or denudation should not be classified as a “pressure ulcer” as these are not pressure-related assaults.

Pathophysiology

Many factors contribute to the development of pressure ulcers, but pressure leading to ischemia and necrosis is the final shared path. Pressure is exerted on the skin, soft tissue, muscle, underlying tissue, and bone by the weight of an individual against the contacting surface. These pressures often are in excess of capillary filling pressure, thought to be approximately 32 mm Hg (Landis, 1930) although this number is random given that these early studies were performed on young college-aged men with a wide variation of weight, age, and other factors.. Tissues are capable of withstanding enormous pressures of brief duration, but prolonged exposure to pressure just slightly above capillary filling pressure initiates a series of events leading to tissue necrosis and ulceration. The provocative event is compression or deformation of the tissues (due to shear forces) against an external object such as a mattress, device, wheelchair, bed rail, or other surface.

Shear forces and friction aggravate the effects of pressure and are important components of the mechanism of injury. Many sores termed “pressure ulcers” are actually shear induced ulcers. In addition, maceration may occur in the incontinent patient, predisposing the skin to injury by decreasing its tensile strength. Pressure, shear, and friction cause microcirculatory occlusion resulting in ischemia, which leads to inflammation and tissue anoxia. Tissue anoxia can then lead to cell death, necrosis, and ulceration. Irreversible changes may occur during as little as two hours of uninterrupted pressure depending on the individual’s risk and co-morbidities (Fleck, 2000). Reswick and Rogers (1976) suggested routine turning of patients every two hours continues to be the foundation of preventing pressure ulcers.

Healthy individuals with normal sensation, mobility, and mental faculty usually do not succumb to pressure ulcers. Feedback, both conscious and unconscious, from the areas of compression leads individuals to change position. People constantly make micro-movements to compensate. This shifts the pressure from one area to another prior to any irreversible ischemic damage to the tissues. Weight shifting for insensate or those individuals with poor mobility should

take place every 15 minutes in the seated person and at least every 2 hours in the recumbent individual (Fleck, 2002).

Individuals with decreased mobility or, sensation or those who are unable to avoid long periods of uninterrupted pressure are at increased risk for developing necrosis and ulceration. This group of patients typically includes the elderly, the neurologically impaired, the chronically ill, those with altered mental status, those with decreased sensation and/or paralysis, and patients hospitalized or institutionalized with acute or chronic illness.

Causes

Although prolonged, uninterrupted pressure is the main cause of pressure ulcers, impaired mobility is probably the most common reason patients are exposed to unrelieved pressure. This is common in those who are neurologically impaired, heavily sedated or anesthetized, restrained, demented, and

those suffering traumatic injury such as a pelvic or femur fracture or head, neck, and/or spinal cord injury. These patients are incapable of assuming the responsibility of altering their position to relieve pressure. Moreover, this immobility, if prolonged, leads to muscle and soft tissue atrophy, decreasing the bulk over which bony prominences are supported, further increasing the risk of developing a pressure ulcer.

Patient History

When initially evaluating a patient with pressure ulceration, it is important to note the following information from the history:

- Overall physical and mental health
 - Concurrent diseases and/or disabilities
- Prior hospitalizations, operations, or wounds
- Diet
 - recent weight changes
 - food avoidances

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.	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 ½ of body.	3. Slightly Limited Responds to verbal commands, but cannot always communicate discomfort or the 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 room at least twice a day and inside room at least once every two 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 Limitation 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 ½ 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 IVs for more than 5 days.	2. Probably Inadequate Rarely eats a complete meal and generally eats only about ½ 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) per day. Occasionally will refuse a meal, but will usually take a supplement when 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 & 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.					
Total Score								

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Figure 1: Braden Scale for Predicting Pressure Sore Risk
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- Bowel and bladder habits
 - continence status
- Medications and allergies
- Tobacco, alcohol, and recreational drug use
- Place of residence
- Level of independence, mobility, and ability to comprehend and cooperate with care
- Underlying social and financial support structure
- Presence of specific cultural, religious, or ethnic issues
- Presence of advanced directives, power of attorney, or specific preferences regarding care
- Any paralysis or breeches in sensation
- Presence of spasticity or flexion contractures
- Support surface used in bed or while sitting
- Presence of signs or symptoms related to the current ulceration
 - Pain
 - Fever
 - Exudate
 - Odor
- History of the present ulcer
 - Length of time the ulcer has been present
 - Treatments attempted in the past, noting successes and failures

Where do Pressure Ulcers Occur?

Generally, pressure ulcers occur over bony prominences like the heels, sacrum, ischial tuberosities (sitting bones) or the greater trochanters (hip bones). In adults, many are concentrated in and around the pelvis due to its bony structure and posture issues both sitting and reclining. Heels present a big challenge since pressure, coupled with other comorbid states such as arterial disease and/or diabetes mellitus, can further complicate treatment and increase risk. The frail elderly and the very young are at greater risk for development of pressure ulcers (Quigley & Curley, 1996; Thomson & Brooks, 1999).

Risk Assessment

A risk assessment tool is helpful to identify risk factors and alert the clinical team of increased pressure ulcer risk. The Braden Scale for Predicting Pressure Ulcer Risk and the Norton Plus Scale are two of the most common risk assessment tools (Bergstrom, Braden, Laguzza, & Holman, 1987). Using the Braden Scale (Figure 1), health care professionals can assess six broad categories, including sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Total scores range from 6 -23 with lower scores indicating a lower level of functioning and inversely a higher risk of developing a pressure ulcer. A score of 18 or below indicates a risk for developing a pressure ulcer. As an alternative, the Norton Plus Scale, assesses physical condition, mental state, activity, mobility and incontinence (Norton, McLaren, & Exton-Smith, 1962.). Total scores can range from 5-25 with lower scores associated with higher risk. A score of 10 or

below indicates risk for ulceration. Both tools are valid and reliable. Use of the Braden Scale should also include a plan of action based on the patient's risk assessment score. Braden's suggested protocol is found in Figure 2.

A scale specifically for the pediatric population known as the Braden Q was developed and validated in 2003. The performance of this modified version of the Braden Scale is similar to that consistently reported for the Braden Scale in adult patients (Curley, Razmus, Roberts, & Wypij, 2003).

The surgical patient presents with a different set of risk factors specific to the operating room environment. Risk assessment tools for this setting include the American Society of Anesthesiologist (ASA) Physical Status Score, the Munro Pressure Ulcer Risk Assessment, and the Scott Triggers (Fleck, 2011.)

It is generally accepted that risk for pressure ulcer formation is both intrinsic and extrinsic. The intrinsic factors include age, nutrition, disease process, drug therapy, lack of sensation, immobility, bed rest, smoking, radiation, obesity, infection, low blood pressure, incontinence, dehydration, and edema. Extrinsic risk factors include pressure, shear, friction, moisture, and heat.

<p>AT RISK (15-18)*</p> <p>FREQUENT TURNING MAXIMAL REMOBILIZATION PROTECT HEELS MANAGE MOISTURE, NUTRITION AND FRICTION AND SHEAR PRESSURE-REDUCTION SUPPORT SURFACE IF BED- OR CHAIR-BOUND</p> <p><i>* If other major risk factors are present (advanced age, fever, poor dietary intake of protein, diastolic pressure below 60, hemodynamic instability) advance to next level of risk</i></p>	<p>MANAGE MOISTURE</p> <p>USE COMMERCIAL MOISTURE BARRIER USE ABSORBANT PADS OR DIAPERS THAT WICK & HOLD MOISTURE ADDRESS CAUSE IF POSSIBLE OFFER BEDPAN/URINAL AND GLASS OF WATER IN CONJUNCTION WITH TURNING SCHEDULES</p>
<p>MODERATE RISK (13-14)*</p> <p>TURNING SCHEDULE USE FOAM WEDGES FOR 30E LATERAL POSITIONING PRESSURE-REDUCTION SUPPORT SURFACE MAXIMAL REMOBILIZATION PROTECT HEELS MANAGE MOISTURE, NUTRITION AND FRICTION AND SHEAR</p> <p><i>* If other major risk factors present, advance to next level of risk</i></p>	<p>MANAGE NUTRITION</p> <p>INCREASE PROTEIN INTAKE INCREASE CALORIE INTAKE TO SPARE PROTEINS. SUPPLEMENT WITH MULTI-VITAMIN (SHOULD HAVE VIT A, C & E) ACT QUICKLY TO ALLEVIATE DEFICITS CONSULT DIETITIAN</p>
<p>HIGH RISK (10-12)</p> <p>INCREASE FREQUENCY OF TURNING SUPPLEMENT WITH SMALL SHIFTS PRESSURE REDUCTION SUPPORT SURFACE USE FOAM WEDGES FOR 30E LATERAL POSITIONING MAXIMAL REMOBILIZATION PROTECT HEELS MANAGE MOISTURE, NUTRITION AND FRICTION AND SHEAR</p>	<p>MANAGE FRICTION & SHEAR</p> <p>ELEVATE HOB NO MORE THAN 30E USE TRAPEZE WHEN INDICATED USE LIFT SHEET TO MOVE PATIENT PROTECT ELBOWS & HEELS IF BEING EXPOSED TO FRICTION</p>
<p>VERY HIGH RISK (9 or below)</p> <p>ALL OF THE ABOVE + USE PRESSURE-RELIEVING SURFACE IF PATIENT HAS INTRACTABLE PAIN OR SEVERE PAIN EXACERBATED BY TURNING OR ADDITIONAL RISK FACTORS <i>*low air loss beds do not substitute for turning schedules</i></p>	<p>OTHER GENERAL CARE ISSUES</p> <p>NO MASSAGE OF REDDENED BONY PROMINENCES NO DO-NUT TYPE DEVICES MAINTAIN GOOD HYDRATION AVOID DRYING THE SKIN</p>

Figure 2: The Braden Scale: Protocols by Level of Risk.
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Staging

When evaluating the pressure ulcers, it is important to determine the greatest or lowest level of tissue destruction or the ulcer's stage. A number of systems have been developed over the years for classification or "staging" of wounds involving the skin and underlying structures. The staging system currently recommended by the Agency for Healthcare Research and Quality (AHRQ) and the Wound Ostomy and Continence Nursing Society (WOCN) [and accepted by Medicare/Centers for Medicare & Medicaid Services (CMS)] is a four-stage system based on the tissue layers involved (Figure 3). This system was derived from previous staging systems proposed by Shea (1975), the International Association for Enterostomal Therapy (1988), the NPUAP, Consensus Conference (1989), and WOCN position statements on staging pressure ulcers (1996; 2011).

Pressure Ulcer Definition

The National Pressure Ulcer Advisory Panel has redefined the definition of a pressure ulcer and the stages of pressure ulcers, including the original 4 stages and adding 2 stages on deep tissue injury and unstageable pressure ulcers (Table). This work is the culmination of over five years of work

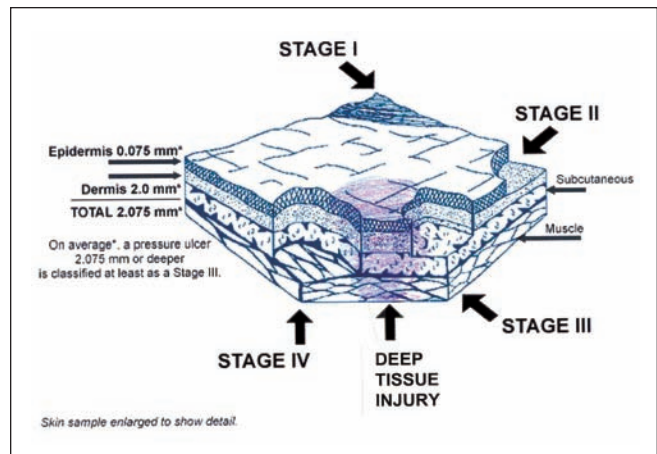


Figure 3: Skin strata and comparison of various pressure ulcer.
Cynthia Fleck

beginning in 2001 with the identification of deep tissue injury (NPUAP, 2007).

Deep tissue injuries are unique forms of "dangerous" pressure ulcers that should be differentiated from superficial stage I damage since they can deteriorate very quickly. They should not be confused with a bruise, contusion, hematoma, or gangrene (Black, 2005).

Table: NPUAP Pressure Ulcer Staging System

Stage I	Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area. Further description: The area may be painful, firm, soft, warmer, or cooler as compared to adjacent tissue. Stage I may be difficult to detect in individuals with dark skin tones. May indicate "at risk" persons (a heralding sign of risk)
Stage II	Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister. Further description: Presents as a shiny or dry shallow ulcer without slough or bruising.* This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration, or excoriation. <i>*Bruising indicates suspected deep tissue injury</i>
Stage III	Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon, or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling. Further description: The depth of a stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have subcutaneous tissue and stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep stage III pressure ulcers. Bone/tendon is not visible or directly palpable.
Stage IV	Full thickness tissue loss with exposed bone, tendon, or muscle. Slough or eschar may be present on some parts of the wound bed. Often includes undermining and tunneling. Further description: The depth of a stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput, and malleolus do not have subcutaneous tissue and these ulcers can be shallow. Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis possible. Exposed bone/tendon is visible or directly palpable.
Unstageable	Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. Further description: Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as "the body's natural (biological) cover" and should not be removed.
Suspected Deep Tissue Injury	Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer, or cooler as compared to adjacent tissue. Further description: Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.



Figure 4: Example of Stage I pressure ulcer.
Photo by Cynthia Fleck



Figure 6: Example of suspected deep tissue injury that eventually opened up to full-thickness tissue loss.
Photo by Cynthia Fleck



Figure 5: Example of Stage I pressure ulcer.
Photo by Cynthia Fleck



Figure 7: Example of Stage II pressure ulcer.
Photo by Cynthia Fleck

These areas are usually indicative of deeper, full-thickness damage to muscle underlying tissue and not superficial damage of a stage I. The proposed theory is that suspected “deep tissue injury” (DTI) occurs near the bone or from the “outside, in” from a myosubcutaneous infarct (Salcido, 2007). Later, damage is seen superficially when tissue dies or necrosis occurs and reaches the outer layers of skin when the skin opens (Maklebust & Sieggreen, 2001). (Figures 4 through 12 picture stages I through IV and unstageable wounds).

Deep tissue injury (Figure 6) due to pressure exists as a form of pressure ulcer and is not well captured by the current staging system. Several pressure ulcer staging systems are frequently cited but none define pressure-related injury under intact skin (Ankrom, et al., 2005). Following a Consensus Meeting, the NPUAP (2007) recommended using the terms “pressure-related deep tissue injury under intact skin” or “deep tissue injury under intact skin” for describing these lesions

and issued a press release updating a definition that aims for accuracy, clarity, succinctness, utility, and discrimination

Heel Pressure Ulcers

Pressure ulcers rarely occur below the knee. These types of ulcers often transpire as the etiology of other disease states such as lower extremity arterial disease (LEAD), venous insufficiency or venous hypertension and/or diabetes, and neuropathic disease states. If areas of pressure cause a wound below the knee, the underlying disease state should first and foremost be the first etiology. Pressure may have played a part in the wound’s development but is most probably not a pressure ulcer. One should always look to the underlying etiology as the definitive diagnosis before labeling a wound a “pressure ulcer”.

The heel presents a problematic source of pressure due to its bony prominence, especially in the recumbent individual. Care should be taken to mobilize the immobile, providing



Figure 8: Example of Stage II pressure ulcer.
Photo by Cynthia Fleck



Figure 10: Example of a Stage III ulcer.
Photo by Cynthia Fleck



Figure 9: Example of a Stage III ulcer.
Photo by Cynthia Fleck



Figure 11: Example of Stage IV ulcer.
Photo by Cynthia Fleck

good skin care and off-loading with pressure relief equipment to the vulnerable heel area. Unlike pressure ulcers on other areas of the body, if the heel ulcer is dry, black and intact, if there is a chance of compromised blood flow, and if the heel eschar is “stable”, that is there is no edema, redness or drainage, it is considered best practice to leave the wound alone and not debride it (Bergstrom, Bennett, & Carlson, 1994) (Figure 13).

Assessment

Skin conditions should be described objectively. Assessment of all wounds, no matter their etiology, should include the location, size (length, width and depth), the wound bed (color and type of tissue), any devitalized material, the peri wound or surrounding skin, the exudates or drainage type, amount, color, consistency and odor, the wound margins and any turning under of the wound’s edge (undermining), and tunneling as well as assessment of pain and possible cause.



Figure 12: Example of an unstageable (covered with necrotic tissue) pressure ulcer.
Photo by Cynthia Fleck



Figure 13: Example of a stable heel ulcer.
Photo by Cynthia Fleck

The comprehensive assessment should then be documented in the medical record and be re-evaluated periodically. As the wound changes, so too should the plan of care.

Pressure ulcers can also be painful, regardless of the stage. Dallam et al. (1995) reported that 59% of individuals with pressure ulcers experienced pain and only 2% of these patients that reported their pain received pharmacological treatments. Furthermore the American Geriatric Society Panel of Persistent Pain in Older Persons (2002) found that up to 80% of nursing home residents with pressure ulcer have significant pain that is undertreated.

Caveats

Keep in mind that only a full thickness wound (stage III and IV pressure ulcers) can develop devitalized material such as slough and/or eschar. These wounds heal by granulation, contraction, and finally, epithelialization. Since the various strata are not replaced, (i.e. muscle, fascia, subcutaneous), a wound does not “reverse” stage as it heals or closes (NPUAP, 1995.) For example, a stage III pressure ulcer is always a stage III pressure ulcer, even as it granulates, contracts, and epithelializes to closure; a stage III does not become a stage II or a stage I. An ulcer could be described in terms of percentage of healing as the wound size decreases. A helpful way to quantify healing is demonstrated by NPUAP’s P.U.S.H. Tool (1998). This tool provides directions on measuring the length and width of a pressure ulcer, estimating the amount of exudate, and determining the tissue type (eschar, slough, granulation, epithelial tissue and closed/resurfaced). It also includes a flow sheet and graph to record measurements and provides a visual record of the healing process.

Even after a wound has granulated and epithelialized to closure, the tissue continues to “remodel” and gain strength for up to two years. The healed tissue will never regain its full tensile strength; at best it will regain 70% to 80% its original strength (Bryant, 2000).

Healing

Partial thickness pressure ulcers heal fully by regenerating. If hair follicles are present, ulcers have the capacity to epithelialize completely and truly “heal” scar free. Full thickness pressure ulcers do not heal by regeneration, rather granulation tissue fills in the tissue void, the wound surface contracts, and the wound seals off by epithelialization. Muscle, fascia, subcutaneous, and underlying tissue such as bone that is destroyed will be replaced by scar tissue. The individual is therefore at higher risk for developing another pressure ulcer in the same area. Prevention measures should commence immediately after healing takes place to reduce the chance of reoccurrence. Simple strategies such as continuing the use of a prevention support surface and/or pressure relieving cushion or device, providing good skin care, off-loading problem areas, mobilizing the immobile, and utilizing preventative dressings can avert future pressure ulcers.

Treatment Strategies

Treatment of pressure ulcers includes supporting the host medically, surgically, and nutritionally if necessary, mobilizing, relieving pressure with recumbent and seated support surfaces, and preparing the wound bed, consisting of cleaning, debriding, management of any bioburden, providing moist wound dressings, and protecting the peri-wound skin as well as possible adjunctive therapies.

Prevention Basics

Pressure ulcer prevention encompasses alleviating the possible causative factors. Considering that lack of viable blood flow to the tissue is the main cause of pressure ulcers, preventive measures should address pressure, shear, friction, moisture, and redistribution of pressure.

Pressure

- Pressure can be lessened by establishing a patient turning schedule that is documented. The standard of care for turning and repositioning is every 2 hours in the recumbent individual and every 15 minutes in the seated person.
- Use the 30 degree lateral position in a supine patient instead of placing a patient side lying at 90 degrees. This may decrease the peak pressure caused by the greater trochanter.
- Implement an appropriate pressure-redistribution support surface to both the seated and recumbent surfaces that the patient’s body contacts at the first sign of risk.
- Avoid the use of invalid rings, “donuts,” rubber rings or any technology that has a cut-out for cushioning a seated client since these can actually increase pressures, especially over bony prominences.
- Limit the time that the patient spends on the commode or bedpan.
- Off-load the heels with a pillow, heel protection device, or wedge.

Shear

- Limit the elevation of the head of the bed to 30 degrees or less.
- Use draw sheets to turn and reposition patients.
- Use the bed's side rails and consider adding a trapeze to the bed frame to optimize mobility and decrease shear forces.
- Do not perform massage over bony prominences that have been compressed. Although there is conflicting information in the literature, it is thought that this can cause tissue damage (Duimel-Peeters I, Halfens, Berer, & Snoeckx, 2005.)

Friction

- Lift rather than drag the patient when moving or repositioning.
- Use transfer devices.
- Roll the patient onto the bedpan rather than pushing or pulling the bedpan.
- Use pads between surfaces that rub together and to relieve friction on heels and elbows.
- Use a skin prepping solution or sealant before using tape on a patient's skin.
- Teach the patient and caregivers to visually inspect the skin daily for early detection of damage.
- Encourage proper hydration and nutrition.
- Institute an active or passive range-of-motion routine.
- Apply transparent dressings or skin sealants to protect the epidermis.

Moisture

- Apply high-quality moisturizers to the skin to increase the water content and thus pliability and strength. Apply moisturizers anytime water comes in contact with the skin, especially after the bath or shower within the recommended three minute window of opportunity. Look for products that allow the skin to breath while decreasing excessive transepidermal water loss (e-TEWL).
- Protect the skin from body fluids and drainage by absorption.
- Decrease baths and address a patient's need for skin cleansing individually and by body region.
- Use moisturizing, soap-free cleansers with a neutral or slightly acidic pH.
- Apply barrier creams that remain in contact with the skin despite cleaning to offer protection from incontinence episodes. Good examples of ingredients include zinc oxide (especially for denuded, open, oozing or partial thickness skin loss), dimethicone, and other high quality silicones. (These choices work well on intact skin to seal out moisture and protect.)
 - Products containing petrolatum-based protectants should be avoided since they protect for a very short time and do not remain in contact with the skin.

- Institute a bowel and bladder program that is customized to each patient and can be documented.
- Consider the use of some of the newer high-tech polymer based incontinent products (briefs and pad) and customize to each patient's needs.

Redistribution of Pressure

- Avoid uninterrupted sitting.
- Teach the patient to perform a weight shift (stand up with assist, push-up, bend at the waist, or shift from side to side) every 15 minutes.
- If the patient is not able to perform an independent weight shift, they should be repositioned or put back to bed once per hour.
- Utilize a high-quality pressure re-distribution cushion (high-density foam, air or viscous gel) for all seated dependent individuals (AHCPR, 1992; Ratliff & Bryant, 2003; WOCN, 2003.)

Are All Pressure Ulcers Avoidable?

In the last decade or more, the question whether pressure ulcers are or are not unavoidable has been debated. Many believed that they were secondary only to poor care and were considered a quality indicator. However, there is now evidence to support that some ulcers are simply inescapable. According to the CMS Guidance to Surveyors (Lyder, 2006), an *avoidable pressure ulcer* is one that the resident developed while under a facility's care and the facility did not do one of the following elements:

- Evaluated the resident's clinical condition and pressure ulcer risk assessment
- Defined and implemented interventions that are consistent with resident needs, resident goals and recognized standards of practice
- Monitored and evaluated the impact of the interventions or revised them as appropriate.

Unavoidable pressure ulcers are: those that the resident develops even though the facility did perform the above elements, evaluated the resident's clinical condition and pressure ulcer risk factors.

The NPUAP (2010) additionally provided a unanimous consensus among conference delegates that not all pressure ulcers are avoidable. There are key situations that render pressure ulcer development unavoidable. These include hemodynamic instability that is worsened with impaired physical movement and inability to maintain nutrition and hydration status and presence of an advanced directive prohibiting artificial nutrition/hydration. The NPUAP consensus also found that even if enough pressure is removed or offloaded from the body, the skin may still not be able to survive (Black, et al., 2010). Organ dysfunction, a familiar concept in the health sciences, can occur at any time but most often during an acute critical illness (Sibbald, Krasner, & Lutz, 2010).



Figure 14: Example of a skin tear on the posterior arm.
Photo by Cynthia Fleck

Skin Tears

Although skin tears (Figure 14) are not considered “pressure ulcers”, it is important to mention these traumatic sores as they tend to occur to some of the same individuals as pressure ulcers. As the skin ages, the basement membrane (junction between the epidermis and the dermis) flattens, making it “loose”, and thus more prone to traumatic injury and unintentional separation, in essence, a skin tear. The anatomy of aging skin makes skin tears nearly inevitable in the elderly. In addition, harsh soaps and surfactant cleansers as well as non-nutritional moisturizers and protectants containing hydrocarbons such as petroleum and mineral oil, do not contribute to lipid replacement, and further add to the skin’s vulnerability. Choosing a skin care regime that replaces soap and harsh surfactant cleansers (detergent type) with pH balanced mild cleansers and phospholipids cleansers can decrease the incidence of skin tears, additionally providing overall cost savings and comfort (Groom, Shannon, Chakravarthy, & Fleck, 2010).

Skin Failure

The National Pressure Ulcer Advisory Panel has recognized that there is evidence to support that pressure ulcers occurring in the frail and terminally ill are not preventable despite heroic efforts (Black et al., 2010). The term “skin failure” refers to when the skin, the largest organ of the human body, fails along with other organs at life’s end or when the body succumbs to multiple co-morbidities. Skin failure is due to hypoperfusion of skin and is seen with concomitant severe dysfunction or failure of vital organs (Langemo, Black, & NPUAP, 2010). From a physiologic perspective, body systems begin to shut down over a period of 10-14 days and again within 24 hours of death. Langemo and Brown (2006) define two types of skin failure, chronic and acute.

Chronic skin failure occurs when underlying tissue dies due to hypoperfusion with concurrent chronic diseases. People with chronic skin failure are generally older, have

multiple comorbidities, and are at high risk for pressure ulcer development. Internal organs begin to diminish functioning along with a decline in mental acuity, thus culminating in functional loss and an overall decrease in muscle and fat. This decline is often seen without the assistance of any diagnostics via simple observation of the skin. The skin will fail, often in the form of a pressure ulcer, when it is no longer supported by failing organs.

Contrastingly, *acute skin failure* is an event in which the skin and underlying tissue die due to hypoperfusion concurrent with critical illness or trauma. In this case, a person with very few risk factors can suffer an illness or event that puts them in an extraordinary medical and/or surgical situation for an extended period of time. Some of these situations include a stroke, myocardial infarction, surgical complication, accident, trauma, or sepsis.

Additional risk factors for those who fall into the above categories include immobilization, anemia, low blood pressure/volume, renal failure, malnutrition, and sensory deprivation. Immobilization frequently arises during a critical or extended illness due to intubation, sedation, restraints, and other disease consequences.

Kennedy observed and described pressure ulcers that some people get as a result of the dying process (Kennedy, 1998). Kennedy Terminal Ulcers (KTU) are considered a predictor of imminent death within 14–21 days. They are often shaped like a pear, usually appear on the sacrum, are often dark yellow but can also be black or red, have irregular borders, suddenly appear, and can start as a blister or stage II pressure ulcer and quickly progress to a stage III or IV. (See Lepak’s *Avoidable & Unavoidable? Skin failure: The Kennedy Terminal Ulcer* that appears in this issue of the journal.)

Documentation

As with all wounds, it is imperative to document any and all non-modifiable risk factors (e.g. refusal or inability to eat in addition to the refusal of a feeding tube) that a patient or resident may have and why these may lead to the development of a pressure ulcer. The patient’s chart however is intended to be used contemporaneously with two other equally important sources of information: the patient and the clinical team.

Pressure ulcers will continue to be a big area for debate and litigation until healthcare providers recognize that all pressure ulcers are not avoidable and the body’s largest organ, the skin, can and will fail, just as any other major organ. However, it is always important to provide best practice in skin assessment and management, so that skin breakdown is avoided whenever possible.

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- Advancing the Practice www.advancingthepactice.org
- Association for the Advancement of Wound Care (AAWC) www.aawc.org
- American Academy of Wound Management (AAWM) www.aawm.org
- The American College of Certified Wound Specialists (ACCWS) www.accws.org

Appendix

Helpful Websites

- American Medical Directors Association (AMDA) www.ama.com
- Wound, Ostomy and Continence Nurses Society (WOCN) www.wocn.org
- National Pressure Ulcer Advisory Panel (NPUAP) www.npuap.org
- Braden Scale www.bradenscale.com
- Norton Scale www.coa.kumc.edu
- Guideline clearing house www.guidelines.gov
- Paralyzed Veterans of America (PVA) www.pva.org
- Agency for Healthcare Policy and Research (now the Agency for Healthcare Research and Quality) AHCPR Guidelines

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Nutrition Strategies for Wound Healing

Mary Ellen Posthauer, RD, LD, CD

KEY WORDS

Nutrition, Assessment, Protein, Calories, Fluid, and Guidelines

Defining the link between nutrition and the prevention and treatment of wounds is challenging. Inadequate dietary intake and poor nutritional status correlate with the prevention and healing of wounds. This article will focus on the role of nutrition including specific nutrients for wound healing and the application of guidelines for individuals with pressure ulcers (PrUs).

Introduction

With the spotlight on high-tech support surfaces, surgeries, specialized wound care treatments and products, it is easy to lose sight of the basic concept of nutrition. More than just food, nutrition encompasses the nutrients, calories, fluids, vitamins, and minerals taken into the body, which are vital to healing wounds. Early identification of nutrition risk by the interdisciplinary team and referral to the registered dietitian (RD) for assessment and nutrition recommendations is important in the prevention and treatment of pressure ulcers (PrUs). Complications such as pain, infection, and surgery increase the length of hospitalization and rehabilitation, decrease the individual's quality of life and contribute to the increased cost of care (Allman, Goode, Burst, Bartolucci, & Thomas, 1999; Graves, Birrell & Whitby, 2005). The cost of litigation adds to the burden of healthcare costs especially in long term care, where 87% of settlements against facilities are awarded to the plaintiffs (Voss et al., 2005). Early nutrition intervention, as part of the treatment plan, promotes healing, improves overall quality of life, and contributes to reduced length of institutional stay.

Several cross-sectional and prospective studies indicate a correlation between malnutrition and the development of PrUs (Berlowitz & Wilking, 1989; Green et al., 1999; Pinchcofsky-Devin & Kaminski, 1986; Thomas, 1997). Malnutrition is a status of nutrition in which a deficiency (also called undernutrition) or excess, or imbalance of energy, protein and other nutrients causes measurable adverse effects on tissue, body structure, body function and clinical outcome. Protein energy malnutrition has been defined as a wasting and excessive loss of lean body mass resulting from "too little energy being supplied to the body tissue that can be reversed solely by the administration of nutrients" (American Society for Parenteral and Enteral Nutrition (ASPEN), 2002).

Nutrition Screening and Assessment

With an increased focus on achieving positive clinical outcomes and controlling cost (Table 1) health care organizations should review their policies related to nutritional care. When an individual enters a health care setting, nutrition should be

Table 1: Steps for the Interdisciplinary Team to Achieve Positive Nutrition Outcomes

• Define role of each member of the interdisciplinary team
• Screen all individuals for nutrition risk
• Refer individuals at nutrition risk to registered dietitian for assessment
• Define time frame to complete nutrition assessment
• Apply clinical judgment and recommend nutrition interventions based on current guidelines
• Discuss nutritional interventions with individual prior to implementation
• Communicate nutritional recommendations to the interdisciplinary team
• Provide enhanced food or oral nutritional supplements between meals, if appropriate
• Determine policy for documentation of food /fluid intake
• Determine a procedure for documenting acceptance or refusal of oral nutritional supplement
• Encourage adequate hydration and monitor for signs/symptoms of dehydration
• Revise or liberalize diet restrictions when limitation result in food/ fluid decline
• Document acceptance or refusal of nutritional interventions
• Review and revise plan of care when progress toward pressure ulcer closure is not achieved
• Consider nutritional support (enteral or parental) when oral intake is inadequate
• Discuss the risks and benefits of nutritional support with individual/ caregiver
• Provide nutrition for individuals receiving palliative /hospice care compatible with their condition and goals

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included on the initial screening form. The screening tool can identify an individual at nutritional risk who requires referral to the appropriate professional, usually an RD, for further assessment. Recent unplanned weight loss, poor appetite or the inability to consume adequate food or fluid, dysphagia, PrUs or other wounds are all trigger conditions requiring immediate assessment and intervention. Each health care organization should have a policy that defines the frequency of screening and assessment for nutrition. For example, if the screen

triggers an assessment by the RD, what is the appropriate time for the assessment to be completed and interventions started? Is it 48 hours in acute care or 7 days in long-term care or home care? A change in condition, such as new PrUs, slow wound healing, insidious weight loss, surgery, or nothing by mouth (NPO) status should trigger a reassessment. The Braden Risk Assessment Scale includes a nutrition sub-scale, which generates data that can be used in the screening and assessment process (Bergstrom & Braden, 1992). Clinicians should strive to accurately complete the nutrition sub-scale and communicate the results to the nutrition department.

Nutritional assessment is a systematic and continual process of obtaining, verifying, and interpreting data upon which the decisions about the impact and cause of nutrition-related problems are made. The American Dietetic Association (ADA) Nutrition Care Process includes four steps: nutrition assessment, nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation (ADA, 2011). The process includes review and analysis of medical status (diagnosis); obtaining anthropometric measurements, laboratory data, food-medication interactions; and reviewing physical examination results (assessment of visual signs of poor nutrition, oral status, chewing/swallowing ability, and/or diminished ability to eat independently, etc.).

Anthropometry

Anthropometry is the science dealing with the measurement of the size, weight, and proportions of the human body. Obtaining an accurate height and weight is important since these values are the basis for calculating body mass index (BMI) and caloric requirements. Weight and body composition change with age. The proportion of body weight that is fat increases averaging 1 lb of fat gain yearly from age 30-60 and concomitantly ½ lb of muscle mass lost (Baumgartner, Stauber, McHugh, Koehler, & Garry, 1995). Loss of muscle mass increases the risk of falls which leads to immobility thus setting the stage for declining intake and PrUs.

Individuals should be weighed on a calibrated scale, at the same time of the day, and wearing the same amount of clothing. Specialty beds often are equipped with a device to weigh an individual confined to bed. The RD evaluates the severity of the weight loss in light of the effect of recent surgery, diuretic therapy, and other traumatic events.

A study by Shahin, et al., (2010) focusing on the relationship between malnutrition parameters and PrUs in German hospitals and nursing homes, established a significant relationship between the presences of PrUs and undesired weight loss of 5-10%. Inadequate nutritional intake was strongly related to the existence of PrUs in both health care settings. The National Pressure Ulcer Long Term Care Study (NPULS) of residents in nursing homes, who were at risk for developing a PrU, reported that more than 50% had a 5% weight loss during a 12 week study, and 45.6 % were considered underweight (defined by a BMI of 22 or less). Residents with the highest percentage of weight loss had a recent PrU (Horn et al., 2002). Unintended weight loss of 5% in 30 days and 10 % in 180 days places an individual at increased nutritional risk and has a negative effect on wound healing (Horn, et al., 2002; Bergstrom, et al., 2005; Murden & Ainslie, 1994; Ryan, Bryant, Eleazer, Rhodes, & Guest, 1995; Sullivan, Johnson, Bopp, & Roberson, 2004). An Australian study noted that factors such as weight loss, poor food intake, and a decline in eating independently was associated with 1.5 to 2 times the risk for PrU development (Banks, Bauer, Graves, & Ash, 2010). Individuals whose caloric intake is less than 1500 Kcalories/day frequently have an inadequate intake of vitamins and minerals, which increases the risk for undernutrition especially in acute or chronically ill individuals (Van Staveren & de Groot, 1998). Individuals experiencing unintended weight loss with PrUs should be weighed frequently, perhaps weekly, until their condition improves. During the interview with the individual or their caregiver, the RD inquires about the individual's usual body weight (UBW) over the past few months. UBW is used to calculate the percentage of weight lost or gained over time thus determining the significance of a weight change. (The formula for calculating percentage of UBW is current weight / usual x 100). An individual weighing 150 lbs. on admission who weighs 142 lb. after 7 days has lost 5.3%, which is significant and warrants nutrition intervention.



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BMI, an index of an individual's weight in relationship to their height, is calculated as weight (Kg)/height (m²), or weight (lbs)/height (in²) x 705. BMI is highly correlated with body fat, but increased lean body mass or a large body frame can also increase BMI. It is generally agreed that a normally hydrated individual with a BMI of 30 or greater indicates obesity and an individual with a BMI of less than 19 may indicate risk for under-nutrition, increased morbidity/mortality, and PrU development (Landi, et al., 2000; Murden & Ainslie, 1994).

Biochemical Data

Analysis of current laboratory values is one component of the nutrition assessment. There is not one specific laboratory test that can determine an individual's nutritional status. Biochemical data must be used with caution because it can be altered by hydration, medication, and changes in metabolism. Observing dietary intake, hydration, and trending weight changes maybe more reliable for judging nutritional status than biochemical measures.

Serum albumin has a long half life (12-21 days) resulting in slow changes affected by multiple factors such as infection, congestive heart failure, acute stress, hydration, and cortisone excess making it a poor indicator of visceral protein status (Ferguson, et al.,1993). Depressed albumin levels may exhibit the presence of inflammatory cytokine production or other comorbidities rather than poor nutritional status. Albumin does not evaporate but moves from the extravascular space to the plasma. Dehydration also falsely elevates albumin levels.

Since prealbumin (transthyretin) has a short half life (2-3 days), clinicians assume it is a predictor of nutritional repletion. Albumin and prealbumin are negative acute – phase reactants which decline in the presence of acute or chronic inflammation and improve as the acute inflammatory response improves. They may not be indicators of nutritional status, but metabolic stress and inflammation (Friedman, Campbell, & Caradoc-Davies, 1985; Fuhman, Charney, & Mueller, 2004; Lim, et al., 2005; Myron Johnson, Merlini, Sheldon, & Ichihara, 2007; Robinson, et al., 2004; Shenkin, 2006). Serum hepatic proteins including albumin, prealbumin (transthyretin) and transferrin are not the gold standard for determining nutritional status, since they may not correlate with the clinical observation of the individual's intake (Bachrach-Lindstrom, Unossom, Ek, & Arnqvist, 2001; Convisky, Covinsky, Palmer, & Sehgal, 2002).

Nutrition-focused Clinical Examination/ Food Intake

Individuals may exhibit physical signs of undernutrition and protein depletion as evidenced by their thin frail appearance, muscle wasting, weakness, flaky skin, thin dry hair, brittle nails, or cracked lips. An examination of the oral cavity is important to determine if infection or inflammation of the gums is hindering food intake. Missing or decayed teeth or ill fitting dentures often lead to reduced intake of difficult

to chew protein foods, thus restricting caloric intake and increasing the chance for weight loss. Loss of dexterity and/or the ability to self-feed is a risk factor often resulting in unintended weight loss and subsequent development of PrUs (Gilmore, Robinson, Posthauer, & Raymond, 1995).

The interview process should include questions about the individual's food preferences, including any culture or religious beliefs that may influence meal intake (Collins, Friedrich, & Posthauer, 2009). Observation during meals gives the interdisciplinary team the opportunity to determine if the individual has chewing or swallowing problems that require the services of either speech or occupational therapists. If untreated, individuals with swallowing problems or dysphagia become dehydrated, lose weight, and may develop PrUs. The speech therapist defines the diet texture and assesses the individual's need for special feeding techniques (U.S. Department of Labor, 2010). For example, an individual may require thickened liquids to prevent aspiration pneumonia. The occupational therapist determines the appropriate self-help feeding devices to foster eating independence. If not corrected, these conditions are roadblocks to recovery.

Medications

All medications, herbs and supplements, both prescribed and over the counter, should be checked for possible side effects on nutritional intake, as well as the effect on the mental and physical status of the individual. Medications can influence nutritional status and have been identified as a cause of weight loss (Thomas, 2009). Drugs may either inhibit or induce metabolism of a nutrient or increase the excretion of a nutrient. Medicine designed to calm and reduce agitation may in turn reduce mobility and activity placing individuals at risk for PrUs. Medications can increase or decrease appetite, alter sense of taste or smell, cause gastric disturbances, or impair saliva flow. Antibiotics ordered to combat infections can destroy intestinal flora causing nausea and gastric disturbances that may restrict an individual's food and fluid intake. Laxative abuse can induce a state of malabsorption and chronic diarrhea can lead to dehydration and weight loss. The list of medications that may influence nutrient intake or interfere with nutrition is lengthy (Thomas, 2007). Communication between the RD, pharmacist, physician, and other members of the health care team is valuable when determining the role of medications on nutritional status.

Nutritional Recommendations for Pressure Ulcer Treatment and Healing

Several organizations have published PrU prevention and treatment guidelines. Guidelines are systematically developed written statements that follow rigorous methodology and evidence to assist practitioners to make decision concerning healthcare for specific conditions. Evidence-based guidelines are not medical advice and the decision to adopt a recommendation should be based on the health care professional's clinical judgement taking into consideration

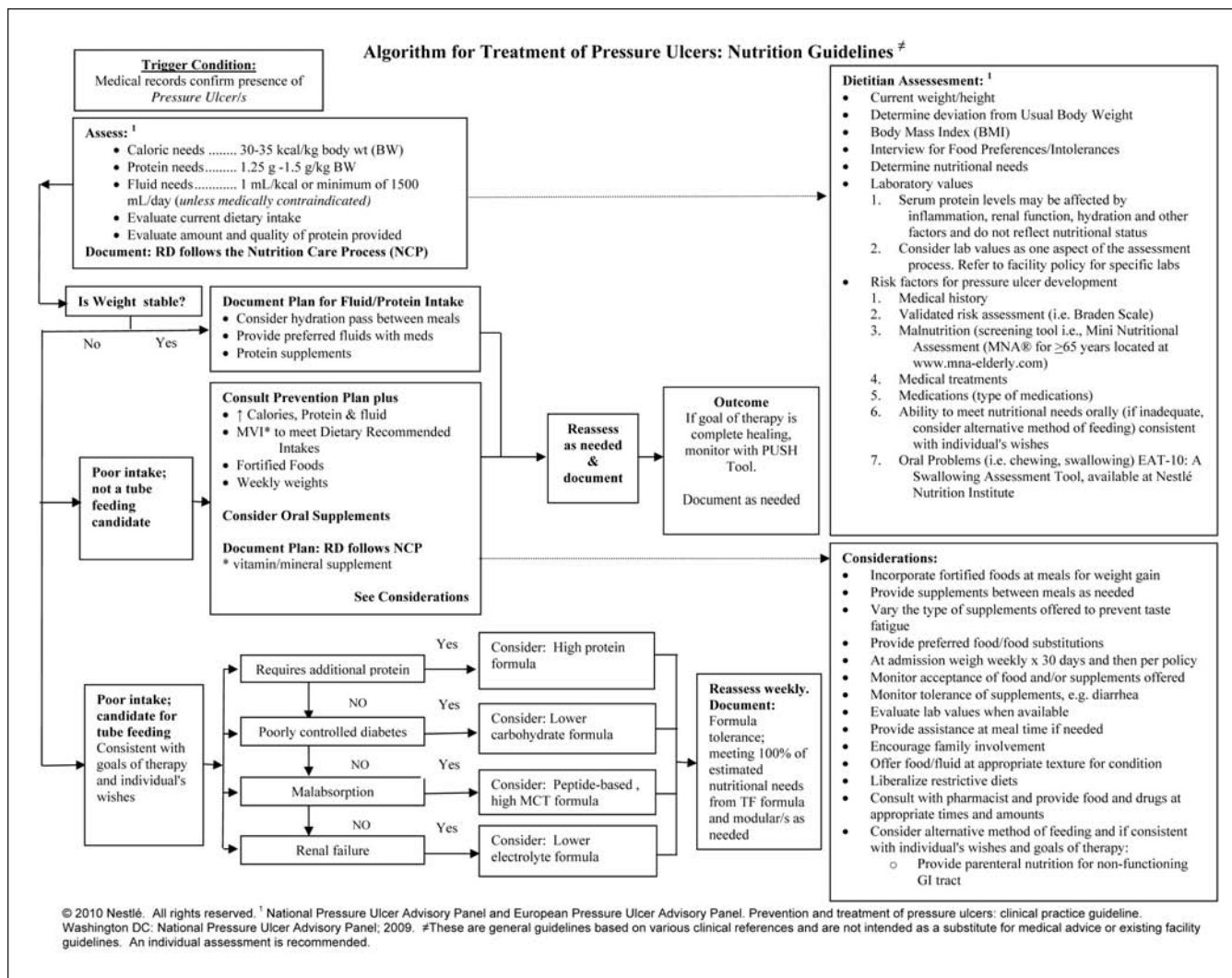


Figure: Algorithm for Treatment of Pressure Ulcers: Nutritional Guidelines by Nestlé (2010). *National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Prevention and treatment of pressure ulcers: Clinical practice guideline.* Washington DC: National Pressure Ulcer Advisory Panel. Reprinted with permission.

the assessment of the patient and resources available. Many of the following recommendations are from the National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (EPUAP) (2009) Prevention and Treatment Clinical Practice Guideline. This guideline was developed following a systematic, comprehensive review of peer-reviewed, published research on pressure ulcers from 1998-January 2008. The Sackett Level of Evidence Rating System for Individual Studies was applied to each published research evaluated and the strength of evidence supporting each recommendation was rated (Sackett, 1996). Many of the recommendations are incorporated in the Figure.

Nestlé 2010, The Algorithm for Treatment of Pressure Ulcers: Nutrition Guidelines was designed to provide the health care team with a system for addressing the nutritional aspect of wound care treatment. The algorithm guides the RD and members of the team through a series of steps to achieve healing. Clearly defined assessment and treatment

considerations are incorporated. The RD is encouraged to implement the ADA's nutrition care process, establish goals consistent with therapy objectives and the individual's wishes, and document the plan in the medical record. Suggestions are offered for specific problems such as poorly controlled diabetes, malabsorption, or renal failure. The recommendations are based on various clinical references and are not a substitute for the advice of the physician.

Macronutrients

The body's first priority is for adequate energy (kilocalories) provided from the macronutrients, carbohydrate, protein, and fat. Table 2 outlines the function and source of nutrients. Carbohydrate and fat is the preferred energy source thus sparing protein for cell structure and maintenance. Wounds such as PrUs may increase the body's metabolic demands and nutritional requirements. Severe illness, trauma, sepsis, wounds, or major surgery triggers hyper-metabolism or

Table 2: Nutrients and Therapeutic Properties

NUTRIENT	FUNCTION	SOURCE
Calories	Supply adequate energy, prevent weight loss, preserve lean body mass	Carbohydrate, protein, and fat with carbohydrate and fat the preferred source
Carbohydrates	Delivers energy, spares protein	Grains, fruits and vegetable with complex carbohydrate the preferred source
Protein	Contains nitrogen which is essential for wound healing. A component of the immune system, supplies the binding material of skin, cartilage and muscle	Meats, fish, poultry, eggs, legumes, milk and dairy products, choose lean meat and reduced or low fat dairy products.
Fat	Most concentrated energy source caring the fat soluble vitamins, provides insulation under the skin and padding to bony prominences	Meats, eggs, dairy products, and vegetable oils
Fluids	Solvent for minerals and vitamins, amino acids and glucose, helps maintain body temperature, transports materials to cells and waste products from cells, maintains skin integrity	Water, juices, beverages, fruits and vegetable contain approximately 95% water. Most supplements are 75% water
Vitamin C	Water soluble, non-caloric organic nutrient essential for collagen formation and absorption of iron	Citrus fruits and Juices, tomatoes, potatoes, tomatoes, broccoli.
Minerals: Zinc	Inorganic, non caloric nutrients. Zinc: Co-factor for collagen formation & metabolizes protein, assists in immune function	Meats, liver, eggs and seafood

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hyper-catabolism, an increase in metabolic rate. During hypermetabolism, the body burns calories quickly by converting glycogen stored in the liver to glucose to keep the body's major organs functioning. This catabolic reaction releases energy when glycogen is broken down to glucose, triglyceride to fatty acids, and glycerol and protein to amino acids. All carbohydrates, the glycerol from fat and some amino acids, when stripped of their nitrogen, can be converted to pyruvate and then to glucose. The body uses this released energy as fuel for anabolism. During the catabolic process, cytokines, the proteins liberated in tissue injury, which mediate the body's immune and inflammatory response, contribute to metabolic and gastrointestinal changes, such as anorexia and malaise. Increased Interleukin 1-6 (pro-inflammatory cytokines) and cytokines result in anorexia, muscle wasting, decreased nitrogen retention and impaired albumin synthesis (MacIntosh, Morley, & Chapman, 2000). The duration of catabolism depends on the severity of the injury and the protein and caloric intake.

The RD calculates the recommended protein, caloric, and fluid requirements and documents them in the medical record. Indirect calorimetry (IC) is the gold standard for measuring energy expenditure estimation and quantifies stress due to illness, injury and other medical conditions (Compher, Frankenfield, Keim, & Roth-Yousey, 2006; Schoeller, 2007). However, IC is not widely used outside of acute care. The NPUAP & EPUAP (2009) guideline recommends 30-35 kcalories/kg/body weight for individuals under stress with a pressure ulcer. The formula should be adjusted based on weight loss, weight gain, or level of obesity. Individuals with unintended weight loss or those who expend energy in physical therapy sessions may need additional calories.

Achieving high caloric requirements frequently requires the introduction of oral nutritional supplements (ONS) or fortified foods (Bourdel-Marchasson, et al., 2000; Desneves, Todorovic, Casser, & Crowe, 2005; Horn, et al., 2004). Supplements given between meals to increase the intake of meals and improves absorption of nutrients (Wilson, Purushothaman, & Morley, 2002).

When meals are refused or intake declines, the therapeutic diet should be evaluated by the RD and with the physician's approval individualized to the least restrictive diet. The ADA's 2010 Position statement supports the concept that the quality of life and nutritional status of older adults can be enhanced by individualization to less-restrictive diets, noting "the individual with diabetes and wounds who refuses to adhere to a restricted regime would benefit from a liberalized plan." A consistent carbohydrate diet, which provides flexible carbohydrate choices based on the individual's preferences, may be the key to compliance.

Protein

Protein is the only nutrient containing nitrogen and is comprised of amino acids which are the building blocks of protein. Protein is essential to promote positive nitrogen balance and increased levels can improve healing rates (Clark et al., 2004; Hartgrink, Wille, Konig, Hermans, & Breslau, 1998; Lee, Posthauer, Dorner, Redovian & Maloney, 2006). The current recommendation is 1.25 to 1.5 grams protein/kg body weight for an individual with PrUs when it is compatible with goals of care (NPUAP & EPUAP, 2009). Clinical judgment should be used to determine individual protein requirements, considering the number and severity of wounds, renal function, co morbidities, as well as the tolerance to interventions. High protein levels may not be appropriate

for individuals with chronic kidney disease (National Kidney Foundation, 2002).

Arginine and glutamine become conditionally essential amino acids during periods of severe trauma such as thermal injury, sepsis, and pressure ulcers. L-Arginine is 32% nitrogen, stimulates insulin secretion and promotes nitric oxide synthesis increasing circulation to the wound bed. Glutamine assists in the preservation of lean body mass and is a fuel source for fibroblast and epithelial cells. There are ONS containing protein plus arginine and glutamine but additional research is needed to determine the impact of both amino acids on pressure ulcer healing (Langer, Schloemer, Knerr, Kuss, & Behrens, 2007; McCauly, Platell, Hall, & McColloch, 1991).

Fluid

Fluid is important for maintaining tissue structure, serves as a transport medium for nutrients and waste products, and is the solvent for vitamins, minerals, glucose, and other nutrients. Individuals with fever, elevated temperature, vomiting, profuse sweating, diarrhea, or heavily draining wounds require additional fluid. Several formulas are used to

calculate an individual's fluid requirements and one general one is 1ml/calorie consumed (Clark et. al., 2004). Hydration status should be monitored frequently noting changes in weight, urine output, skin turgor, or elevated serum sodium levels (Thomas et.al., 2008), Schols and investigators noted the challenges of identifying and treating dehydration in the elderly due to their decrease in sense of thirst, total water stored and the ability of the kidneys to retain water (Schols, De Groot, van der Cammen, & Olde Rikkert, 2009).

Micronutrients

Ascorbic acid, zinc, and copper have been the most widely debated micronutrients for wound treatment. Current research recommends the consumption of a balanced diet and offering a vitamin or mineral supplement when dietary intake is poor or deficiencies are confirmed or suspected (NPUAP & EPUAP 2009).

Ascorbic acid is a water-soluble vitamin present in most fruits and vegetables. It is essential for collagen synthesis hence a deficiency of vitamin C prolongs the healing time and contributes to reduced resistance to infection (Ronchetti,

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Quaglino, & Bergaminni, 1996; Vilter, 1980). Mega doses of ascorbic acid have not resulted in accelerated PrU healing. (ter Riet, Kessels, & Knipschild, 1995).

Zinc, a cofactor for collagen formation, also metabolizes protein, liberates vitamin A from storage in the liver, and assists in immune function (Cataldo, DeBruyne, & Whitney, 2003). Wounds with increased drainage, excessive gastrointestinal losses, or inadequate dietary intake for long periods of time may trigger a zinc deficiency.

Copper is responsible for collagen cross-linking and erythropoiesis. High serum zinc levels can interfere with copper metabolism thus inducing a copper deficiency (Thomas, 2007). High dose zinc supplementation, above the upper limit of 40 mg/day, is not recommended for individuals with PrUs, unless a deficiency is confirmed (Otten, Hellwig & Meyers, 2006). Clinicians should check the nutrient analysis on ONS or enteral formulas administered to individuals with wounds since they usually contain additional micronutrients.

Nutritional Support: Enteral/Parenteral

When oral intake is inadequate to promote healing, enteral or parenteral nutrition is considered, if it is consistent with the individuals' goal and Advance Directives. The interdisciplinary team should evaluate the individual's medical condition and determine if this is a long or short-term solution. The risks and benefits of nutrition support must be discussed with the individual and/or representative (family, Healthcare Power of Attorney or legal guardian). When the gastrointestinal tract is functioning, enteral feeding is the preferred route. After enteral feeding is initiated, the RD should frequently evaluate and document in the medical record the estimated caloric, protein, and fluid requirement and how they are met. The medical record should verify if the product was administered as ordered (correct formula, strength including flushes). If the individual is not tolerating the formula or if the wounds continue to deteriorate, the RD may recommend an increase in the rate or a product change. Provision of an adequate nutrient supply can lower the incidence of metabolic abnormalities, reduce septic morbidity, and improve survival rates. However, studies reviewing enteral nutrition for improved outcomes for PrU healing have been discouraging (Henderson, Trumbore, Mobarhan, Benya, & Miles, 1992; Mitchell, Kiely, & Lipsitz, 1997).

End of Life Care

The skin is the body's largest organ and at some point in the care of individuals with difficult, non-healing wounds, who also have multiple comorbidities, the interdisciplinary health care team may determine the individual's condition is terminal. Wound healing may not be a realistic goal for the individual on palliative or hospice care rather the focus is comfort and limiting the extent of the impact of the wound, without the intent of healing (Bates-Jensen, Early, & Seeman, 2004). Maintaining adequate nutrition and hydration must be compatible with the individual's wishes.

Adequate nutrition support is often not attainable based on the disease state or when an individual is unable or refuses to eat. The nutrition care plan should be realistic, complement the wound care plan, and reflect the individual's goal to ingest fluids and foods as desired (Alvarez et al., 2002). Nutrition goals established with the expectation that an individual on palliative or hospice care will ingest a calculated caloric or protein level are not realistic.

The RD's role, as a member of the interdisciplinary team, is explaining to the individual and/or representative that withholding nutrition and hydration is not painful and may enhance and comfort the dying process. Dehydration results in azotemia, hypernatremia, and hypercalcemia, which are believed to produce a sedative effect on the brain prior to death. Decreasing feeding and hydration may diminish oral and bronchial secretions, reduce the need to urinate, and lessen coughing from pulmonary congestion (ADA, 2008).

Summary

Nutrition is a key player in wound treatment for individuals with PrUs or chronic wounds. Early identification of undernutrition and the correction of nutritional deficits promotes healing and improves the individual's quality of life. Timely assessments and all interventions should be documented in the medical record. The focus of care should be on achieving optimal nutrition for each individual. The RD should be an active participant on the wound care team. Nutrition goals should be evaluated frequently, reflect the desired outcomes of the wound care team and the individual, and revised with each condition change or when progress toward healing is not occurring. The amount and type of nutritional support should be consistent with medical goals and the individual's wishes.

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Avoidable & Inevitable? Skin Failure: The Kennedy Terminal Lesion

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KEY WORDS

Skin failure, Terminal Pressure Ulcer, Kennedy Terminal Lesion, End-of-Life

Pressure ulcers (PrUs) are not always a sign of negligence. As we die, organs, body systems, and structures begin to fail. As the largest organ of the human body, the skin is susceptible to hypoperfusion and end-organ failure. When a person at the end-of-life experiences renal or cardiac failure, it is accepted as part of the natural process of dying. Regrettably, a PrU at the end-of-life is often perceived as abnormal and avoidable. Just like any other organ of the human body, the skin is susceptible to progressive diseases and a decline in physiology with age. Communication with the patient, family, and caregivers regarding this process is important to prevent misperceptions of care. Some PrUs may be unavoidable, even with appropriate care.

Introduction

“Not all pressure ulcers (PrUs) are avoidable” (Sibbald, Krasner, & Lutz, 2010, p.226) nor are they necessarily inevitable. Some may still believe that all PrUs are avoidable; however, the position of Wound, Ostomy and Continence Nurses Society, the 1994 Agency for Health Care Policy and Research clinical practice guidelines for the “Treatment of Pressure Ulcers”, and multiple other sources including the Centers for Medicare and Medicaid Services recognize that not all PrUs are avoidable even with adherence to appropriate pressure management (Wound, Ostomy & Continence Nurses Society, 2009). The process of aging and dying involves complex physiological changes. As our population continues to age, end-stage skin failure may become more prevalent (Langemo & Brown, 2006) and manifest itself in what some have described as a Kennedy Terminal Lesion (KTL)(Kennedy, 1989) or a terminal PrU (Sibbald, et al., 2010).

Kennedy’s five year (1983-1988) retrospective study of a 500-bed intermediate care facility revealed a yearly prevalence of PrUs ranging from 1.95% to 3.36% with the lowest monthly prevalence at 0.9% and 5.34% at its peak (Kennedy, 1989). During this five year period, 469 people died (causes not listed) and 10.8% of those individuals had one or more PrUs (n=95 total PrUs) that developed within 2 weeks to several months preceding death. Almost 56% of those individuals died within 6 weeks after the onset of a PrU. If it occurred on the sacrum or coccyx, was pear shaped, had a sudden onset, and the color varied from red to yellow to black, it was recognized as a KTL. It is important to note that only 23.4% of the PrUs from this group occurred at the coccyx, which from the description most likely included sacral ulcers too (Kennedy). This original description appears to represent Stage III, Stage IV, and/or Suspected Deep Tissue Injuries (sDTI) according to current nomenclature as defined by the National Pressure Ulcer Advisory Panel (NPUAP) (NPUAP, 2007).

In 2009, a panel of 18 internationally recognized leaders used a modified Delphi method and came to a consensus on

Table 1. Excerpts from the 10 Consensus Statements and Explanations Regarding Skin Changes at Life’s End (SCALE)

• Objective changes to the skin and pain may occur despite excellent care
• Documentation should reflect the plan of care and the patient’s response
• Comprehensive patient-centered care is important
• Optimal care may not prevent skin compromise and this is not limited to the end-of-life
• Communication with the patient and the family regarding dying process should include information concerning the physiological process
• Diminished tissue perfusion is the most critical of the known risk factors
• Regular whole body skin assessments and documentation using appropriate dermatological terms are important
• Qualified healthcare professionals may need to intervene to provide appropriate diagnosis, treatment, and sensible outcomes based on the patient’s condition and desires and family expectations
• Care for the patient should involve the 5 P’s (prevention, prescription, preservation, palliation, and preference)
• Education concerning SCALE is vital not only for the patient but for his/her support group, healthcare workers involved with the care, stakeholders involved with administration, policy makers, payers, and others as allowed by law

Adapted from: Sibbald, R. G., Krasner, D. L., & Lutz, J. (2010). SCALE: Skin Changes at Life’s End: Final Consensus Statement: October 1, 2009. *Advances in Skin & Wound Care*, 23, 225-236; quiz 237-228. doi: 10.1097/01.ASW.0000363537.75328.36

10 statements (Table 1) characterizing Skin Changes At Life’s End (SCALE) from 69 internationally recognized experts in wound care. This document reinforces that skin failure can occur at the end-of-life and not all PrUs are avoidable (Sibbald, et al., 2010). Although Kennedy described this phenomenon of skin failure at the end-of-life in 1989 as a sign of imminent death (Kennedy, 1989), Jean Martin-Charcot also described this same phenomenon in the 1800s when he coined the term decubitus ominosus (Levine, 2005). As our understanding and care of skin failure has evolved, it is important to recognize that we may not be able to prevent, predict, or fully understand all the contributing factors to terminal PrUs in those at high-risk. Further, PrUs at the end-of-life or KTLs do not necessarily reflect inadequate care (Thomas, 2003).

Anatomy, Physiology, and Pathophysiology

The skin is the largest organ of the human body, covers over 20 square feet of surface area, and is approximately 15% of the body weight. One-third of the blood supply goes to the skin, which ranges in thickness from 0.5 mm to 6.0 mm. The integument contains both exocrine and endocrine glands, and excretes approximately 10 liters of perspiration a day. Humans shed the entire skin surface every month (Baranoski, 2010). Although the hypodermis and muscles are not part of the integumentary organ, these tissue layers are essential to each other and the normal physiology and function of the body. The skin specifically assists other systems of the body through protection (physical barrier, ultraviolet protection, normal skin flora, and an acidic pH); thermal homeostasis (primarily regulated by the hypothalamus); sites of attachment for muscles (frontalis, arrector pili, and indirectly through fascial attachments); sensation (touch and pain receptors); metabolism (vitamin D production, excretion of metabolic waste, and regulating fluid loss); and non-verbal perception and expression (color, facial expression, and vascular reflexes) (Baranoski, 2010; Sloane, 1994). With age, the integument layers become thinner, collagen alignment and production are disrupted, vascularity and oxygen-carbon dioxide exchange diminishes, and cellular metabolism and responses to infection slow. Changes of the integumentary system associated with aging are shown in Table 2 (Dealey, 2009; Langemo & Brown, 2006).

Disproportionately high pressure exerted according to what the body can tolerate is the primary cause of deep PrUs and the ability to withstand these pressures varies between individuals and their circumstances. If pressure is the primary cause, then deeper tissue injuries should be suspected. The principal cause of superficial PrUs (Stage I and II) is more debatable as superficial tissues may be more susceptible

Table 2. Decline in the Integumentary System Associated with Aging

• Volume of capillaries
• Tissue perfusion
• Thickness of the epidermis
• Cellular metabolism
• Vitamin D production
• Collagen and elastin production
• Collagen and elastin alignment
• Oxygen-carbon dioxide exchange
• Inflammatory response
• Ability to regulate temperature
• Autonomic response
• Sebaceous gland response
• Sensation to pressure, light touch, and pain

Adapted from: 1) Dealey, C. (2009). Skin care and pressure ulcers. *Advances in Skin & Wound Care*, 22, 421-428; quiz 429-430. doi: 10.1097/01.ASW.0000360255.92357.ad 2) Langemo, D. K., & Brown, G. (2006). Skin fails too: Acute, chronic, and end-stage skin failure. *Advances in Skin & Wound Care*, 19, 206-211.

to failure from other factors (e.g., friction and shear) than pressure (Berlowitz & Brienza, 2007). Our understanding concerning the etiology of PrUs continues to evolve (Table 3) (Berlowitz & Brienza, 2007; Stekelenburg, Gawlitta, Bader, & Oomens, 2008) as does our knowledge regarding early detection (e.g., ultrasonography), treatment, prognosis, and prevention of PrUs (Aoi et al., 2009).

Table 3. Pressure Ulcer Etiology

• Magnitude and duration of pressure exceeds the tissue's tolerable level
• Shear forces
• Cellular deformation from compression
• Arterial occlusion
• Reactive hyperemia
• Ischemia-reperfusion injury theory
• Impaired interstitial and lymphatic fluid transportation
• Oxygen depletion
• Glucose depletion
• Acidification
• Increased accumulation of metabolic waste

Adapted from: 1) Berlowitz, D. R., & Brienza, D. M. (2007). Are all pressure ulcers the result of deep tissue injury? A review of the literature. [Review]. *Ostomy Wound Management*, 53(10), 34-38. 2) Stekelenburg, A., Gawlitta, D., Bader, D. L., & Oomens, C. W. (2008). Deep tissue injury: How deep is our understanding? *Archives of Physical Medicine & Rehabilitation*, 89, 1410-1413. doi: S0003-9993(08)00232-3 10.1016/j.apmr.2008.01.012

Patients, who are critically ill, have multiple-organ failure, or multiple end-stage comorbidities are at more risk for skin failure or terminal PrUs. Hypoperfusion and hypoxia are major contributors to organ failure. Multiple reasons (e.g., tissue edema, thrombi formation) have been cited as contributing factors (Gustot, 2011). It is well understood that impaired circulation is common in older adults, anyone who smokes, or who has co-morbidities that affect the circulatory system (Langemo, Thompson, Hunter, Hanson, & Anderson, 2008).

Capillary refill is a common method used to assess skin perfusion. It is essential to check this within the first 24 hours of admission. Unfortunately hypostasis, which is an early condition of tissue death, could exist and imitate good capillary refill within the first 12 hours of tissue death. The area blanches, but then refills due to the blood remaining in the area because of capillary collapse. Although variable, after 12 hours, the remaining or collateral blood supply is absent and reperfusion is unlikely (Farid, 2007). This is but one reason why tissue death may be difficult to pinpoint and it may take approximately two weeks for the eschar to fully develop from a sDTI (Farid, 2007; van Rijswijk & Lyder, 2008).

Implications for the Critically Ill, and Those at the End-of-Life or in Long-Term Care

The incidence of PrUs varies with the clinical setting and they are associated with poor outcomes, higher treatment costs, and litigation. Acute care accounts for over half of the incidences of PrUs and ranges from 0.4% to 38%. The incidence of PrUs in long-term care (LTC) ranges from 2.2%

to 23.9% and has resulted in increased litigation that typically favors the LTC resident (Reddy, Gill, & Rochon, 2006). These previous estimates were prior to the inclusion of the sDTI definition by the NPAUP. In 2009, 11,365 patients in the United States had one or more PrUs. Of the 19,730 PrUs identified in 2009, 6.67% were sDTI. Additionally, early reported incidences of sDTI may be inaccurate and continue to rise as all clinicians (e.g., physicians, nurses, physical therapists) become better educated at applying the revised 2007 classification scheme by the NPUAP (VanGilder, MacFarlane, Harrison, Lachenbruch, & Meyer, 2010).

Bansal, Scott, Stewart, and Cockerell's (2005) literature review reported that two-thirds of the PrUs occurred in patients over the age of 70. Patients with neurological impairments have a lifetime risk of 25% to 85% for developing a PrU, and the reoccurrence rates are as high as 90% depending on their condition (Bansal, Scott, Stewart, & Cockerell). Even when best practices (e.g., specialty beds, early nutrition, round the clock care) are employed, PrUs may develop. Significant predictors for the development of PrUs (i.e., Stage II or greater) in the surgical intensive care unit included: higher BUN/creatinine values, diabetes, paraplegic, > 60 years-old, and renal insufficiency. Elevated creatinine levels > 3mg/dl increased the risk almost 4-fold while a history of spinal cord injury increased the risk by 17-fold (Frankel, Sperry, & Kaplan, 2007).

The White Paper published by the NPUAP recognizes that not all PrUs are preventable especially those at the end-of-life who are frail (Langemo & Black, 2010). Although healing is still often the goal of the clinical team, efforts to control the client's pain and the unaesthetic consequences of a wound (e.g., odor, infection, drainage) become the focus. Skin failure can occur in a range of conditions from those who are acutely ill to those at the end-of-life. Skin failure that results in a terminal PrU does not necessarily imply that death is imminent (Langemo & Black, 2010). If a terminal PrU develops and the healing process cannot be reestablished in someone with a terminal illness, at the end-of-life or in the critically ill person, then the primary goal should no longer be wound closure. Palliative wound care as a concept is still developing and it is not restricted to hospice care; nor does it imply that curative treatments should not be implemented and cannot be effective. Instead, the primary goals should shift to symptom and psychological management (Emmons & Lachman, 2010).

Conclusion

The understanding, prevention, and care of PrUs have evolved since Dr. Jean-Martin Charcot recognized the *decubitus ominusus*. Although the understanding, recognition, and care of pressures have changed, not all PrUs are avoidable especially as our bodies relinquish life (Levine, 2005). During the natural physiological process of dying, the body shunts blood from the periphery to maintain the vital organs making it more difficult to prevent external stresses (e.g., pressure, friction, shear, and moisture) from damaging the integumentary. Medical imaging and blood values can detect internal organs

dying, but unlike the integumentary, they are not visible to the naked eye. The visual and sometimes malodorous nature of the largest organ dying is more noticeable and unfortunately often compounds a deteriorating situation with a negative emotional response. This review by no means indicates that most PrUs are unavoidable. Unfortunately when one develops a PrU, society often presumes it is due to negligence of the health care worker and institution when it could be one part of the natural history of dying (Langemo & Brown, 2006). Most PrUs are avoidable and a few are inevitable.

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Pressure Sores and the Law

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KEY WORDS

Pressure Ulcer, Decubitus Ulcer, Bed Sore, Expert Witness

Pressure sore litigation is legally and medically complex. This article provides an overview of the legal issues in a pressure sore case and how the legal nurse consultant can effectively screen meritorious from defensible cases and assist in preparing the case for trial.

Introduction

Despite the fact that most pressure sores are preventable, patients in nursing homes, assisted living facilities, and hospitals continue to develop pressure sores at alarming rates. While studies produce conflicting results, the number of patients developing pressure sores is staggering. It is estimated that each year between 1 and 3 million people in the United States develop pressure sores (Donner, Posthauer & Thomas, 2009). In skilled nursing facilities, it is estimated that up to 28% of patients suffer pressure sores (Donner et al, 2009.). The numbers increase dramatically with patients in high risk groups including 60% of quadriplegics suffering pressure sores (National Pressure Ulcer Advisory Panel, 2009.). Between 1993 and 2006, pressure ulcer related hospitalizations increased by 80% (Donner et al, 2009). Because most pressure sores are preventable with proper nursing care, these cases are often ripe for litigation (National Pressure Ulcer Advisory Panel, 1992).

Pressure sore litigation has become increasingly complex for many reasons. Nursing home and hospital nurses, more so than assisted living facilities staff, have become more adept at charting to give the impression the patient is receiving aggressive preventative care. The medical and nursing literature has moved in the direction of distinguishing pressure sores, stasis ulcers, deep tissue injury, and the debatable “terminal ulcers” also called “Kennedy ulcers” in the medical literature (Black et al., 2009). Consequently, it has become much more complex to prove that a pressure ulcer was due to malpractice than even a decade ago.

The legal nurse consultant (LNC) can play an invaluable role in reviewing these cases and assisting throughout litigation. The LNC must have an understanding of the federal nursing home regulations, the various scientific theories behind prevention and treatment of pressure sores, and nursing home documentation. These federal regulations require unique charting that differs from hospital records, including the Minimum Data Sets (MDS) and Resident Assessment Protocols (RAP sheets). In addition to understanding the medical, nursing, and charting issues, the LNC should have a basic understanding of the legal aspects of a pressure sore case.

Legal Consequences for Breaching Duties to Prevent and Treat Pressure Sores

A pressure sore case, at the most basic level, requires the plaintiff to prove the same elements of any case of negligence against a health care provider:

1. The health care provider owed a duty of care to the patient (i.e. patient-health care provider relationship);
2. The health care provider breached or violated the duty owed to the patient (i.e. the provider was negligent or committed malpractice);
3. The patient suffered an injury; and
4. The injury was caused by the provider’s breach of the duty owed to the patient.

(Prosser, Keeton, Dobbs, & Keeton, 1984; *Morrison v. MacNamara*, 1979; *Weimer v. Hetrick*, 1987; *Mitchell v. Parker*, 1984).

Although nursing home residents and acute care patients are older and weaker than the general population, the health care provider’s duty to the patient does not diminish. Under the *eggshell skull doctrine*, “tortfeasors (wrongdoers) take their victims as they come” (*Landman v. Royster*, 1973). In other words, a health care provider’s liability for breaching the standard of care is not avoided because the injuries would not have resulted had the patient been in better health.

Federal and State Regulations

Nursing homes are among the most heavily regulated businesses in the country. In 1987, Congress passed the Omnibus Budget and Reconciliation Act (OBRA) also called the Nursing Home Reform Act. It, along with the interpretive regulations, set forth how nursing homes must provide for the health, medical care, and general well-being of their residents. The regulations both generally and specifically address a nursing home’s duties to prevent and treat pressure sores.

In general, a “nursing facility must provide services and activities to attain or maintain the highest practical mental and psychological well-being of each resident in accordance with a written plan of care” (Health Care Financing Administration, 2001a). Upon admitting a resident, the nursing facility must have its staff conduct a complete assessment of the resident identifying the resident’s skin

condition and develop an appropriate plan of care for the resident (Health Care Financing Administration).

The regulations impose a high standard on nursing facilities regarding the prevention and proper treatment of pressure sores. The facility providers have a duty to ensure:

A resident who enters a facility without pressure sores does not develop pressure sores unless the individual's clinical condition demonstrates that they were unavoidable; and

A resident having pressure sores receives necessary treatment and services to promote healing, prevent infection and prevent new sores from developing (Health Care Financing Administration, 2001b)

Additionally, the regulations specifically require nursing homes to provide adequate and competent staffing, provide incontinence care, and provide for the nutritional needs of their patients (Health Care Financing Administration). Unfortunately, the federal regulations do not specify a staffing ratio that would be deemed adequate. It is well known that pressure sore prevention is labor intensive. This author has found cases where a certified nursing assistant (CNA) was caring for 24 patients on a shift with the majority of them needing to be turned and repositioned and requiring incontinent care at least every 2 hours. Therefore, it is not surprising that many lawsuits against health care providers allege that staffing deficiencies contributed to the development of pressure sores.

In most states, the federal regulations are not necessarily admissible as evidence that the nursing home breached the standard of care. The nursing home will usually argue that the regulations are too vague or that they were never intended to be the standard of care in a malpractice case (*Stogsdill v. Manor Convalescent Home, Inc.*, 1976). However, the plaintiff's nurse expert should be thoroughly prepared before his or her deposition regarding the role of the regulations in providing patient care. The regulations may become admissible if the nursing home nurses acknowledge that the regulations are the blueprint for providing patient care.

It is critical that when investigating a pressure sore case against a nursing home that the LNC review at least three years of surveys by the state's health department. These surveys may reveal a pattern of neglect. While most of the regulations are federal, not state, the routine surveys and complaint investigations are conducted by state agencies. If the state surveys identify deficiencies, the nursing home is required to respond to them with a "plan of correction (POC)."

It is equally important to scrutinize how the nursing home has responded to past violations. The responses often lead to documents that are otherwise withheld by a nursing home in response to a Health Insurance Portability and Accountability Act (HIPAA) request for medical records. For example, a nursing home may respond to a past violation by implementing a POC that identifies a particular person by title who will monitor weekly skin logs. In litigation these documents can be obtained through a Request for

Production of Documents or subpoena *duces tecum*. Likewise the persons responsible for carrying out corrective actions can be deposed. Failing to implement the POC can be used to prove negligence and notice of the risk of harm to patients.

The survey reports may be the foundation for building a punitive damage claim. Punitive damages, also called exemplary damages, are an additional recovery for the plaintiff. They are intended to punish the defendant for egregious conduct and to deter similar egregious conduct in the future (*Kemezy v. Peters*, 1996). In many states, to recover punitive damages the plaintiff must show that the defendant had knowledge of the employee's pattern of wrongful conduct or management ratified the wrongful conduct. A LNC can assist the lawyer in proving notice by tracking a pattern of preventable and inadequately treated pressure sores.

Expert Witnesses

Cases involving pressure sores almost always require expert witnesses because the nursing and medical issues are beyond the common knowledge of lay persons. In federal court the admissibility of expert testimony is governed by Federal Rule of Evidence 702 (2011):

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

In state courts, the standard for admissibility of evidence in a malpractice case varies. For example, in Virginia, a standard of care expert in a malpractice case must have an active clinical practice in the same field or related field as the defendant within one year of the alleged malpractice (Virginia Code Ann. § 8.01-581.20, 2008). In Tennessee, the expert must practice either in Tennessee or a border state (Tennessee Code Ann. § 29-26-115, 2011).

Multiple experts are usually required to prove the different aspects of breaches of the standard of care and injuries. Nurses may be required to testify regarding whether the defendant breached the standard of care, but a physician typically must testify that the patient's injuries were caused by the breaches of the standard of care. A medical director of a nursing home can often testify regarding the injuries with a better understanding of the operation of a nursing home than other physicians. If there is evidence of malnutrition and dehydration, consider consulting with a dietician. A plastic surgeon with a sub-specialty in wound care can provide invaluable testimony regarding whether the sore was caused

by pressure or other conditions like diabetes, peripheral vascular disease, or end stage illnesses.

Damages in Pressure Sore Cases

Like most medical malpractice actions, these cases are expensive to pursue and defend. From the plaintiff's perspective, the LNC can be very useful in assessing whether there are sufficient damages to warrant pursuing the case.

The starting point is assessing the physical harm to the patient. The defendant is liable for all harm proximately caused by the breaches of the standard of care. A stage IV pressure sore is of course a serious injury. However, if the patient arrived from the community with a stage III sore, the damages probably are insufficient to support an adequate award. This is because the defendant is only responsible for the worsening of the condition. Likewise, damages may be insufficient if the patient recovered from the pressure sore promptly without additional hospitalizations or surgery. In some cases, damages may not be sufficient if the patient had a very limited life expectancy due to cancer, advanced Alzheimer's disease, etc. While there is no rule of thumb, if the patient was already on hospice care, damages probably are not sufficient to pursue the case.

If the patient subsequently dies, determining whether the patient's death resulted from the pressure sore or an unrelated medical condition is critical and unfortunately often unclear. The LNC should obtain all the pertinent medical records for several years prior to the injury and up until death. A death certificate is a useful but often an unreliable means of determining cause of death. In many cases the physician signing the death certificate is not adequately informed of the patient's complex medical history. In some states, the death certificate is not admissible to prove cause of death (*Edwards v. Jackson*, 1970).

Many states now impose caps or limits on recovery regardless of the severity of the injuries as part of tort reform. Some states have a global cap limiting the plaintiff's recovery regardless of the severity of the injury. Others have caps on non-economic damages like pain and suffering without limits on economic damages. Others have both caps on the total award and on non-economic damages (Webel, Chu & Newman, 2011).

For the elderly, economic damages are usually limited to medical bills and funeral expenses. Particularly in those states with caps on non-economic damages, but no cap on economic damages, it is especially important to calculate all related bills. Without substantial medical bills, the case may not make economic sense to pursue.

According to reports from the Center for Medicare and Medicaid Services the average hospital cost for treating pressure sores is \$43,180 (Donner, et al, 2009). The LNC should obtain itemized bills from all providers recognizing that physicians often bill separately from hospitals and nursing homes. Since all patients with pressure sores have co-morbidities, those unrelated charges must be separated and removed from the claim.

Non-economic damages for pressure sore patients can be tremendous. Pressure sores are painful in themselves. They increase a patient's nutritional demands, often require surgical treatment, and may lead to loss of mobility and independence. Proving non-economic damages to skeptical jurors is challenging especially if the patient is deceased or unable to testify. While lay witnesses can be helpful, a LNC can find the hard data in the medical records to prove these damages. A detailed flow chart of all complaints of pain, administration of pain meds, and non-verbal signs of pain like grimacing can be used to effectively prove the severity of the injury. Similar charts can graphically show changes in activity level, signs of depression, and other consequences of pressure sores.

Examples of Verdicts and Settlements

In the 7 years following the enactment of OBRA the average award in nursing home negligence cases nearly doubled to approximately \$525,000 (Felsenthal, 1995). The increased awards may be due to three factors: First, nursing homes are required to document injuries under OBRA so fewer injuries go unreported and plaintiffs have more information to pursue their claims. Second, the violation of federal law by a provider makes a verdict in favor of the plaintiff more likely. Third, the cost of medical care has increased faster than inflation which in turn increases the damages claimed in these cases.

While there are no comprehensive studies assessing the percentage of preventable pressure sores resulting in litigation, six and seven figure settlements and verdicts are not unusual. The following are illustrative examples of notable, certainly not average, settlements and verdicts:

In a Georgia case, the jury awarded \$1.25 million to the estate of a 67 year old nursing home patient who developed a stage IV pressure sore on his left buttock and became malnourished and dehydrated. The plaintiff alleged that the nursing home staff failed to prevent and treat the pressure sore by failing to turn and reposition him, failing to keep him clean and dry, and by the nursing home's failure to provide adequate staffing (*Mosby v. Tucker Nursing Ctr. Inc.*, 2008).

In a case filed in Cook County, IL, a quadriplegic patient developed multiple Stage IV pressure sores on his coccyx, hips, and heels after being admitted to the nursing home for rehabilitation. The suit alleged that the nursing home was understaffed, and the staff failed to turn him at appropriate intervals, to keep his skin clean and dry, and to appropriately assess his condition. The parties settled for \$1 million (*Wazydrag v. Alden N. Shore Rehab. & Health Care Ctr., Inc.*, 2007).

A Virginia jury returned an \$850,000 verdict against a nursing home finding the nursing home negligently caused or contributed to the patient's death due to pressure sores, malnutrition and dehydration. The plaintiff introduced evidence that the nursing home staff charted care on the patient when he was not in the facility and even after he died.

In a Texas trial, the jury awarded the plaintiff \$83 million including \$70 million in punitive damages against

a nursing home after an 83 year old resident who entered the facility alert but unable to walk allegedly died from infected pressure sores. The plaintiff also asserted that the nursing home failed to provide water due to insufficient staffing causing the decedent to suffer severe dehydration. The plaintiff introduced evidence of other medical problems at the facility and evidence of 18 other residents who were hospitalized during the weeks before the decedent's death. Perhaps most damaging to the nursing home, the plaintiff alleged that the facility fraudulently concealed that the staff was not licensed and the staffing was inadequate. Following the verdict the parties settled for an undisclosed sum (*Holder v. Beverly Enterprises Texas, Inc.*, 1995).

While most pressure sore lawsuits appear to arise in nursing homes, a Las Vegas, N.M. jury recently awarded \$10.3 million to the estate of a patient who developed bed sores at a regional medical center following hip surgery with \$595,000 designated as compensatory damages and \$9.75 million as punitive damages. According to the plaintiff's lawyer, the hospital failed to follow its own protocols for screening and preventing pressure ulcers (Haywood, 2011).

Conclusion

The staggering number of preventable pressures sores has numerous health care and legal implications. As the vast majority of pressure sores are preventable, health care providers who fail to acquaint themselves with developments in the prevention and treatment of pressure sores subject their patients to unnecessary risk of serious injury or premature death. They also subject themselves to a range of legal consequences including sizable verdicts, civil penalties, and in the most egregious cases criminal penalties. When these cases result in litigation, a well-informed LNC can play a critical role in ferreting out the meritorious from the defensible and preparing the case for a successful trial.

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Pressure Ulcers: Is it a Case of Negligence?

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KEY WORDS

Pressure Ulcer, Venous Ulcer, Arterial Ulcer, Diabetic Ulcer, Chronic Wounds

Legal Nurse Consultants working on lawsuits arising from pressure ulcer development will need to determine if the pressure ulcer is avoidable or unavoidable.

Introduction

Many legal nurse consultants are familiar and/or involved with litigation stemming from pressure ulcers. In lawsuits concerning pressure ulcers, the plaintiff stance is often that the pressure ulcer is preventable while the defense will point out contributing factors and positions held by such healthcare organizations as the National Pressure Ulcer Advisory Panel (2007), the Wound, Ostomy and Continence Nurses Society position (Stokowski, 2010), and the American Medical Directors Association (AMDA) (Maclean, 2003). It is important for the legal nurse consultant reviewing such cases to be aware of the controversy and knowledgeable of the factors influencing whether pressure ulcers are avoidable or unavoidable (Knowlton & Brown, 2008).

Cost of Pressure Ulcers

Pressure ulcer wounds cause patients both emotional and physical stress and pain and place a heavy financial burden on the patient and healthcare system. As of 2006, \$22.2 to \$3.6 billion was spent annually caring for patients with pressure ulcers in acute care (Joint Commission, 2006). In 2010, despite initiatives to prevent pressure ulcers, the costs continued to rise with the total annual cost of treating pressure ulcers reaching \$17.1 billion in direct costs and \$2.5 billion in indirect costs (Shreve, et al., 2010).

The Society of Actuaries classifies pressure ulcers as injuries resulting from medical errors noting that 374,964 pressure ulcers occurred in 2008 resulting in 1,393 deaths (Shreve, et al., 2010). The term "medical error" suggests negligence and can have a profound emotional impact on patients and families. Multiple law suits have been filed as a result of pressure ulcer development (*Guide One Insurance*, n. d.) with verdicts and settlements reaching into the millions of dollars (Radel, 2001). Two cases of note are *Brown v. Menorah Home & Hospital* (NY 2007) which awarded a \$1.25 million compensatory damage award for negligent treatment of a pressure ulcer and *Myers v. National Healthcare Corp.* (Tenn. 2007) which awarded \$4.1 million in compensatory damages and \$29.8 million in punitive damages for wrongful death due to a pressure ulcer. The Tennessee Court of Appeals

subsequently dismissed the punitive damages in 2009 and a retrial date for punitive damages is to be set.

Factors Influencing the Development of Pressure Ulcers

In 2004 the Centers for Medicaid and Medicare Services (CMS) determined that "Based on the comprehensive assessment of an individual, the facility must ensure that an individual who enters the facility without pressure sores does not develop pressure sores unless the individual's clinical condition demonstrates it was unavoidable" (Department of Health and Human Services, 2004, p. 4). This statement raised many questions and in 2010 the National Pressure Advisory Panel held a conference to establish a consensus regarding the conditions under which a pressure ulcer may be unavoidable (Black, Edsberg, Baharestani, Langemo, Goldberg, McNichol & Cuddigan (2011). It was concluded that not all pressure ulcers were avoidable.

Co-morbid conditions such as diabetes, end-stage renal failure, and thyroid disease are recognized as risk factors for pressure ulcers (Rowe, 2011; State Operations Manual (SOM), 2011, pp. 201-202). Moreover the healing process is affected by physiological factors such as infection, anemia, malignancy immune deficiency, diabetes and peripheral vascular disease, functional factors such as immobility, psychosocial factors such as dementia, psychosis, and ethical considerations. The AMDA recognizes that ulcer healing is not always achievable and differentiating the pressure ulcer from the vascular ulcer is required in developing treatment strategies. The AMDA also recognized that ulcer development may not be avoidable in the presence of such conditions as cachexia, metastatic cancer, sacropenia, severe vascular compromise, and terminal illness (AMDA, n. d.).

Wound Chronicity

The role of poor vascular supply and bacterial colonization in wound chronicity is well researched and documented in the literature. A wound is deemed chronic if it persists for 8 to 12 weeks; some wounds may persist for years or may never heal. Chronic wounds are classified in one of four categories -

pressure ulcers, diabetic ulcers, venous ulcers, and arterial ulcers [DHHS, 2004, p.3; SOM, 2011].

- **Pressure Ulcers** – These occur in people with conditions that inhibit or limit movement with wounds developing on bony surfaces such as the heels, sacrum, and shoulder blades (SOM, 2011, pp.195- 217)
- **Diabetic Ulcers** – The risk of injury and re-injury due to decreased pain sensation associated with neuropathy along and peripheral vascular changes preventing oxygenation of tissues are factors contributing to diabetic ulcers (Rowe, 2011).
- **Venous Ulcers** – Usually occurring in lower extremities, venous ulcers result from venous insufficiencies causing a disruption of the blood flow to an area leading to tissue damage and wound development (SOM, 2011, p. 154).
- **Arterial Ulcers** – More common in diabetic and elderly patients, arterial ulcers appear in distal areas and are notable for diminished or absent pulses which can lead to gangrene (SOM, 2011, p. 154).

Wound Description

Staging wounds is not an exact science as it may seem to the attorney reviewing nursing textbooks, but is based on what the nurse who is assessing the wound observes, and the description of the wound could be different from one nurse to another nurse. Since staging, from Stage I to Stage IV, implies a progression the National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (2009) recommended the neutral word “category” replace the word “stage”. The recommended classification is as follows:

- Category/Stage: Non-blanchable erythema
 - Category/Stage II: Partial thickness
 - Category/Stage III: Full Thickness skin loss without exposure of bone or tendons
 - Category/Stage IV: Full Thickness skin loss with exposure of bones/tendon
- In the United States two additional categories have been added:
- Unstageable/Unclassified: Full thickness skin or tissue loss – depth unknown
 - Suspected Deep Tissue Injury-depth unknown.

NPUAP (2007) published its recommendations for staging, with possible descriptions, of pressure ulcers. The paper admonishes the reader that the staging system is only intended for pressure ulcers and may not be appropriate for other chronic ulcers.

Documentation for pressure ulcers should include the following:

- Location, onset, course, and duration
- Category/stage
- Wound bed description including color, odor amount of drainage
- Periwound, including wound margin, description including color, temperature, induration, maceration,

and denuding and whether the edges are smooth or rolled

- Measurement including length, width, depth, undermining, and tunneling; measures should be in centimeters and terms such as “quarter size” should be avoided.

Tools such as NPUAP’s PUSH Tool- version 3.0 (1998) provide direction on measuring pressure ulcers and estimating the amount of drainage. To improve accuracy and eliminate variability, one clinician should be assigned measure the wound. Consistent and routine measurements will help determine if the wound is healing or if the treatment plan should be changed.

Evaluation

The article by Silverman in this issue describes and provides several examples of litigated cases related to injuries suffered by patients as a result of pressure sore cases. However, it is important to question if all elements of the nursing process were applied when a patient develops a pressure ulcer or if an existing ulcer worsens. Regulation F314 (Self Survey Module, 2007) and a review of pressure ulcer prevention and treatment protocols (Institute for Clinical Systems Improvement, 2010) may also provide helpful guidelines to the LNC reviewing a pressure ulcer case.

While it is obvious that if a patient has a pressure ulcer, a standard of care must be met to reduce or relieve the pressure to the affected area. Thus, the scope and standard of care, practice guidelines, wound care guidelines, research evidence, and the facility’s policies and procedures should be evaluated as consistent with best practice. This includes not only implementation of patient assessment and treatment protocols for pressure ulcers but also implementation of prevention protocols, such as a protocol for incontinence and pressure ulcer prevention in at-risk patients.

In addition, other areas that need to be considered are documentation of pain assessment and intervention, treatment effectiveness, consultation or referral, nutritional assessment including serum protein and albumin levels, use of formal pressure ulcer risk assessment and prevention protocols such as the Braden Scale or Norton Scale, and emotional status of the patient regarding treatment success (Hawkins, 2011; Lockhart, 2002). Patient and/or family education about healing and prevention should be provided and include the patient and caregiver, when possible. If there is care refusal or non-adherence to the plan of care, this should be assessed for documentation along with the basis for refusal and potential alternatives offered.

Conclusion

When reviewing a pressure ulcer case, the legal nurse consultant should consider the factors contributing to the development of the ulcer. Preventive measures, appropriate assessment, and treatment are important but comorbid conditions and barriers to healing must also be considered.

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Wound Care Primer: What to Consider When Reviewing a Pressure Ulcer Case

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KEY WORDS

Pressure Ulcer, Pressure Sores, Bedsores

Litigation involving pressure ulcers often stems from a belief that pressure ulcers are avoidable. Whether working with the plaintiff or defense, the legal nurse consultant reviewing such cases should have an awareness of preventive and clinical management measures and intervening factors.

Introduction

The incidence of pressure ulcers in patients within healthcare and community settings ranges from 4 to 30% (Bennet, Dealey, & Posnett, 2004; Dormer, Posthauer & Thomas, 2009; Joint Commission International, 2010) and is associated with high costs. In addition to a reduced quality of life and increased morbidity and mortality, the cost per pressure ulcer has been estimated at \$21,000-151,700 (Zulkowski, Langemo, & Posthauer, 2005) with the annual healthcare cost of pressure ulcers in the United States being between \$9.1 – 11.6 billion (Zulkowski, Langemo, & Posthauer, 2005). Often thought of as avoidable and resulting from nursing negligence, litigation drives the cost even higher (Bennett, Dealey, & Posnett, 2004).

The Centers for Medicaid & Medicare Services (CMS) include pressure sores as 1 of 10 quality measures when evaluating a facility's performance. Regulation 42 CFR §483.25(c) requires facilities to provide services for the prevention and care of pressure sores and the outcome expectations outlined by Tag F314 (CMS, 2004) note that:

- A resident who enters the facility without pressure sores will not develop pressure sores unless unavoidable due to the individual's clinical condition; and
- Necessary treatment and services to promote healing, prevent infection, and prevent new sores from developing are provided.

Although it is recognized that not all pressure ulcers can be prevented [Stokowski, 2010; Wound, Ostomy, and Continence Nurses Society (WOCN), 2009], the legal nurse consultant (LNC) reviewing a pressure ulcer case will want to determine the interventions implemented in an effort to prevent skin breakdown. (Tables 1 and 2 provide a listing of acronyms and a glossary of wound terms that the LNC may find useful.) Pressure ulcers' assessment checklists were developed by the Quality Improvement Organization (QIO) (n. d.) from the Centers for Medicare & Medicaid Services' Nursing Home Quality Initiative and are readily available on the internet (Quality Insights of Pennsylvania, n. d.). They

can provide a guide to a facility's commitment to reduce pressure ulcers and its potential nursing care measures.

Clinical Management

Nursing process is a continuous cyclical process consisting of assessment, diagnosis, planning, implementation, and evaluation. It requires the nurse to consider the whole person when collecting and analyzing data to make a clinical judgment and arrive at a decision when delivering care. Standard of care reflects the process the average, prudent nurse should follow in managing a specific illness/condition under the same or similar circumstances.

Clinical practice guidelines (developed to assist and support the nurse's decision-making process) and protocols (which set forth more rigid steps for managing a specific condition) influence standards of care. There is no gold standard for treating pressure ulcers. Treatment is focused on assessing severity, reducing pressure/friction/shearing, optimizing wound care and removing necrotic debris, managing infection, and correcting nutritional deficits (Thomas, 2006). Guidelines and protocols adopted within a facility's protocols, and policies and procedures set the required standard of behavior for that facility.

Risk Assessment Scales

A first step the LNC should consider when looking at a potential negligence case involving a pressure ulcer would be to review the pressure ulcer risk assessment utilized by the facility. Risk assessments are intended to help the nursing staff identify newly admitted patients at risk for developing pressure sores, to minimize the risk by instituting measures to support skin integrity, and to establish a baseline for reference in case skin breakdown occurs following admission (Bell, n.d.). According to the CMS the care plan should be consistent with the resident's specific conditions, risks, needs, behaviors, preferences and with current standards of practice and include measurable objectives and timetables with specific interventions (CMS, 2009).

CMS's decision not to reimburse expenses for preventable pressure ulcers has heightened the focus on prevention. Skin assessments at the time of admission should address risk factors, pressure points, nutrition, hydration, and moisture (Armstrong et al., 2008).

Extrinsic pressure ulcer risk factors include pressure, shear and friction, moisture, smoking (Guy, 2007), and ICU stay (Baumgarten et al., 2007)

Internal pressure ulcer risk factors include:

- Paralyzed and/or immobilization
- Cognitive deficit
- Chronic illness (e.g., anemia, diabetes mellitus, hypertension, hypotension, cerebral vascular accident, heart failure, obstructive pulmonary disease, peripheral vascular disease, and neuropathy.)
- Poor nutrition
- Obesity
- Hip fracture
- Incontinence
- Use of steroids
- Aging (skin changes in elderly e.g., thinning of the dermal layer, decreased epidermal vasculization, and proliferation) (Guy, 2007).

Although widely used, the ability of risk assessment tools to predict who will develop a pressure ulcer is variable depending upon the assessors' education and interpretation of terminology, and there is insufficient research available to recommend any particular tool (Bell, n. d.). Several tools are discussed here.

- **Braden Scale** – The most commonly used pressure assessment tool used in the US has six subscales: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Used appropriately, this tool allows the nurse to score a patient's risk for developing pressure ulcers. The total score ranges from 6 (high risk) to 23 (low risk); however, the final score may be affected by unclear parameters (Bell, n. d.). This scale has 83% to 100% sensitivity and 64% to 77% specificity but only 40% predictability (Lyder & Ayello, 2008). A copy of the Braden scale may be reviewed at http://media.haymarketmedia.com/Documents/2/braden_score%28rotated%29_1003.pdf
- **FRAGMMENT Score** – Components of this tool include friction, age, mobility, and mental status. Scores for friction, mobility and mental state range from 0 to 2 and for age from 0 to 4 with high total scores associated with development of pressure ulcers within 5 days. A short ulcer prediction scale used in acute care settings, this relatively new tool lacks research to verify its validity (Lyder & Ayello, 2008). (A sample of this scale may be viewed at <http://www.medicine.ox.ac.uk/bandolier/band101/b101-5.html>)
- **Gosnell Scale** – Developed for evaluating long-term care residents over the age of 65, this scale evaluates the

Table 1: Acronyms

AAWC: Association for the Advancement of Wound Care
APWCA: American Professional Wound Care Association
ASV: Accessory Saphenous Vein
CMS: Centers for Medicare & Medicaid Services
CRIES: Crying; Requires O2 for Saturation >95%; Increasing vital signs; Expression; Sleepless Scale. (Pain measurement scale for neonates up to 6 months)
DWC: Diabetic Wound Certified
EPUPAP: European Pressure Ulcer Advisory Panel
FIM: Functional Independence Measure
FLACC: Face, Leg, Activity, Cry, Consolability scale (Pain measurement scale for children two months to seven years)
FRS: Faces Rating Scale (Pain measurement scale)
GSV: Great Saphenous Vein
HBO: Hyperbaric Oxygen
HIGN: Hartford Institute for Geriatric Nursing
IAD: Incontinence Associated Dermatitis
LCD: Local Coverage Determination
MVTR: Moisture Vapor Transmission Rate
NAWC: National Alliance of Wound Care
NICE: National Institute for Health and Clinical Excellence
NHQI: Nursing Home Quality Initiative
NO ULCERS: Nutrition and fluid status, Observation of skin, Up and walking or turn and position, Lift [don't drag] skin, Clean skin and continence care, Elevate heels, Risk assessment and Support surfaces for pressure redistribution
NPUPAP: National Pressure Ulcer Advisory Panel
NPWT: Negative Pressure Wound Therapy
PDGF: Platelet Derived Growth Factor
PRO: Peer Review Organization
PUPPI: Pressure Ulcer Prevention Protocol Interventions
PUSH: Pressure Ulcer Scale for Healing
QIO: Quality Improvement Organization
QM: Quality Measures
RVT: Registered Vascular Technologist
SSV: Small Saphenous Vein
SKIN: Surface selection, Keep turning, Incontinence management, Nutrition
STAR: Setting Targets, Achieving Results
TGF-B: Transforming Growth Factor-Beta
TNP: Topical Negative Pressure
VAS: Visual Analogue Scale (Pain measurement scale)
WCC: Wound Care Certified
WHS: Wound Healing Society
WOCN: Wound, Ostomy and Continence Nursing

Table 2: Glossary of Wound Care Terms

Abrasion: A scraped or worn away area of the upper layer of skin resulting from the force of friction.	Healing by secondary intention – Closure of wound by granulation.
Abscess – Localized collection of pus. An acute abscess is accompanied by inflammation, pain, and possible an increase in temperature.	Hemosiderin staining – Brown staining of lower leg due to hemoglobin deposited in tissues in venous disease.
Angiogenesis – Formation of new capillaries providing nutrients to regenerating tissue and producing the redness of granulating tissue.	Honey–Impregnated Dressing – Dressing impregnated with medical–grade honey to help control bacteria and odor.
Arterial ulcer – Ulcers commonly affecting the lower extremity caused by insufficient oxygenation (due to blocked arteries) of the skin and underlying tissues.	Hydrophilic – Attracts moisture.
Atrophie blanche – Smooth white, scar tissue with hyperpigmented borders and satellite telangiectasia occurring as a result of lower leg ulcers.	Hydrophobic – Repels moisture.
Autolysis – Destruction of cells by their own enzymes.	Hyperemia – Excess of blood vessels.
Autolytic debridement – Liquefaction of necrotic tissue.	Induration – Localized hardening tissue found in wound edges.
Bioburden – The sum total of microbes living on a surface.	Kennedy Terminal Ulcer – Unavoidable skin breakdown that occurs as part of the dying process.
Cadexomer iodine dressing – Dressing impregnated with the antimicrobial agent cadexomer iodine to help control bacteria and odor.	Maceration – Softening of tissues due to soaking in fluids (exudates).
Cell migration – Migration of epithelial cells to form a border at wound’s edge.	Macrophage – White blood cell capable of destroying bacteria and devitalizing tissue.
Chemotaxis – The migration of leukocytes (white blood cells) to a specific part of the body in response to chemical stimulus.	Moisture vapor transmission rate – The rate at which moisture vapor passes from a wound bed through a semi–permeable matrix.
Collagen – Fibrous protein providing support to skin, tendon, bone, cartilage, and connective tissue.	Nosocomial – Hospital acquired infection.
Debridement – The removal of nonviable tissue from a wound.	Partial thickness wounds – Injury involving epidermis and/or dermis, such as Stage II pressure ulcers.
Decubitus ulcer – Pressure ulcer, pressure sore, bedsore, or pressure necrosis.	Sanguineous – Bloody drainage.
Desiccation – The process of drying out a wound.	Serosanguinous – Drainage containing both serum and blood.
Epidermis – The outer layer of skin.	Serous – Thin, watery and clear drainage.
Epithelization – Formation of epithelial tissue over a denuded surface forming a seal between the wound and the environment.	Shearing – Downward and forward pressure enabling tissue layers to slide against each other disrupting blood vessels.
Eschar – Thick leathery necrotic tissue that forms on wounds exposed to the environment.	Silent infection – Lacking clinical signs and symptoms of infection.
Excoriation – Abrasion of the epidermis.	Silver–Impregnated Dressings – Dressing impregnated with the antimicrobial agent silver used for ulcers at high risk for infection.
Exudate –Wound drainage containing protein and cellular debris fluid in a wound.	Sinus tract – Narrow passage extending from the wound.
Fibrin – Insoluble protein forming an interlacing filament which entangles red and white blood cells.	Slough – Loose, stringy dead tissue.
Fibroblast – Immature fiber producing cell critical for granulation tissue growth.	Strike through – Leakage of wound drainage from the edges of the dressing.
Granulation – Newly formed growth of small blood vessels and connective tissue in a wound.	Tensile strength – Maximum amount of pressure which can be applied to a wound without causing it to rupture.
Granulocyte – A type of white blood cell having granules in the cytoplasm.	Tunneling – Tissue destruction underlying intact skin along wound margins.
Growth factor – A therapeutic agent administered to the wound bed to enhance healing.	Viable tissue – Healthy living tissue.
	Wound base – Uppermost viable tissue layer of a wound; may be covered with slough or eschar.
	Wound margin – Edge or border of wound.

residence’s mental status, continence, mobility, activity, and nutrition to predict a prognosis. Scores range from 5 (worse prognosis) to 20 (best prognoses). Reliability and validity are unknown [Spinal Cord Injury Rehabilitation Evidence (SCIRE) Project (2010)]. A copy of the scale is available at <http://www.meda.org/visitor/www%5CFiles%5CSheets%5Cch21%5Cpressure%20ulcer%20Gosnell%20scale%5Cpressure%20ulcer%20Gosnell%20scale.aspx>

- **Norton Scale** – This commonly used tool originally was developed with five subscales: physical condition, mental condition, activity, mobility, and incontinence, but has been modified to include nutrition as a risk factor. Designed for an elderly care environment, there is little research to support its use beyond this setting (Bell, n. d.). The total score ranges from 5 (high risk) to 20 (low risk). This tool has 73% to 92% sensitivity and 61% to 94% specificity but only 20% predictability (Lyder &

Ayello, 2008). (A sample of this scale may be viewed at <http://www.med-pass.com/Docs/Products/samples/mp5468sp.pdf>)

- **Schoonhoven Prediction Rule** – A clinical pressure ulcer prediction tool based on five patient characteristics (age, weight at admission, abnormal appearance of skin, friction/shear, and impending surgery in the upcoming week). Each characteristic is divided into subcategories, for example, age is subdivided into ≤ 49 years, 50-74, and ≥ 75 , and each sub-category is assigned a value with a 20 as the cut off score for predicting pressure ulcer development. This new tool lacks research to verify its validity (Schoonhoven et al., 2006).
- **Waterlow Score Card** – Used primarily in Europe, the scale identifies risk factors within the categories of body build, skin type, sex/age, continence, mobility, malnutrition, and special risks (tissue malnutrition, neurological deficit and surgery/trauma). Scores are assigned for each category and totaled with scores ranging from 4 (low risk) to 40 (very high risk) (Bell, n. d.). While easy to use, this tool lacks research to verify its validity and predictability (Bell, n. d.). (A copy of the Waterlow score card is available at <http://www.judy-waterlow.co.uk/the-waterlow-score-card.htm>)

Skin Assessment

Skin should be inspected on admission and daily to assess its general condition and determine any existing damage. Aged, moist, or very dry skin may be more at risk of breakdown than well-nourished, adequately hydrated skin. Bony prominences resting against each other cause pressure.

Skin checks should address intactness, color, sensation, turgor, moisture status, skin integrity, and temperature (Armstrong et al., 2008). Special consideration should be directed to high risk areas such as the heels. Blanching erythema over a bony prominence is often the first sign of pressure damage and warrants initiation of preventive measures. Identifying erythema in darkly pigmented skin is often difficult and the National Pressure Ulcer Advisory Panel (NPUAP) Task Force on Darkly Pigmented Skin and Stage I Pressure Ulcers (1998) recommends observing for persistent red, blue, or purple hues. Localized edema, heat, and induration are other indicators to be watched for (Royal College of Nursing, 2005).

The majority of pressure ulcers begin soon after the patient is admitted to the facility (Lyder & Ayello, 2008). Pressure ulcers can develop within 2 to 6 hours (Kosiak, Kubicek, Olson, Danz, & Kottke, 1958; Kosiak, 1959); therefore, the key to preventing pressure ulcers is to accurately identify at-risk individuals quickly, so that preventive measures may be implemented.

Skin care preventive measures include:

- Avoid hot water, use mild cleansing agents
- Avoid vigorous rubbing/massage over bony surfaces

- Use lotions after bathing
- Protect skin from moisture (urinary and fecal incontinence, fever, sweating, wound drainage). – Use barrier creams/pastes, offer bed pans with each turning, do wet checks, use skin protectant on incontinent patients, consider indwelling catheter or fecal containment device, use absorbent pads to wick moisture away from the skin, and use transparent film to isolate wound drainage
- Change position frequently using proper lifting techniques to prevent injury (such as blistering) from fracture/shearing
- Use lubricants/barrier creams, ointments, or pastes over bony prominences to reduce fracture/shearing as patient turns
- Provide a surface that redistributes the pressure [Hartford Institute for Geriatric Nursing (HIGN), 2008; WOCN, 2010].

Nutritional Assessment

Adequate nutrition is needed to support granulation tissue growth. Poor nutrition and hydration contributes to tissue breakdown and poor healing. A diet high in protein, vitamins and minerals, and adequate hydration is thought to be necessary to maintain fluid and chemical balance necessary for healing. Prevention and management of pressure ulcers includes:

- Dietician consult as needed; increased protein and calorie intake as needed
- Adequate nutrition with a minimum of 30-35 kcal per kg body weight per day with 1.25-1.5 g/kg/day protein and 1 ml of fluid intake per kcal per day (Moss, 2009; WOCN, 2010)
- Vitamin supplements (A, B, C, or E) as medically indicated
- Mineral supplements (selenium, manganese, zinc, and copper) as required
- Monitor labs – Serum albumin (less than 3.5 gm/dl predisposes a patient for increased risk of pressure ulcers)
- Monitor hydration status; a glass of water offered at each turning to help keep the patient hydrated (HIGN, 2008)
- Monitor weight – Unintentional weight loss; malnutrition is risk factor in pressure ulcers; the goal is to achieve weight as near as possible to the patient's ideal weight
- Monitor ability to chew and swallow – obtain swallow evaluation as indicated, consider tube feeding, parenteral feedings (Whitney et al., 2006)

Managing Tissue Load

The goal of tissue load management is to relieve pressure with vigilant positioning techniques and support surfaces to provide an environment that will maintain tissue viability and promote healing.

Turn and Position

- Decrease mechanical load by positioning and repositioning of bed bound patients every 2 hours (the accepted standard). Every 2-4 hours has been recommended for patients on pressure relieving mattresses but more research is needed in this area (WOCN, 2010)
- Reposition chair bound patients unable to reposition themselves every hour and encourage those who are capable to shift position every 15 minutes
- Pre-medicate the individual 20 to 30 minutes prior to a scheduled position change for patients who experience pain on movement [Agency for Healthcare Research and Quality (AHRQ, 2011c)]
- Maintain a written repositioning schedule (sample record available at <https://shop.briggscorp.com/pdf/CFS6-7HH.pdf>)
- Document turning and repositioning and the factors influencing these decisions (AHQR, 2011b; CMS, 2004; Whitney et al., 2006)

Redistribute Pressure

Pressure relieving devices are recommended to reduce and redistribute body pressure over body surfaces. The main approach to achieving this result is to provide a body conforming support surface such as a fluid filled mattress or by using an alternate pressure device such as an alternating air mattress. Some of the available devices are listed below.

- Specialized mattresses
 - Static air-filled mattresses, overlays, and cushions (used for patients at low risk)
- Gel mattresses, overlays, and seating such as cushions
- Water overlays or mattresses
- Foam mattresses, overlays, and cushions
 - Air fluidized mattress recommended for patients who are at moderate to high risk for pressure ulcers or have full-thickness pressure ulcers
 - Alternating air mattresses, overlays, and seating such as cushions recommended for patients who are at moderate to high risk for pressure ulcers or have full-thickness pressure ulcer
 - Low air loss beds and mattresses recommended for patients who are at moderate to high risk for pressure ulcers or have full-thickness pressure ulcers
 - Bead-filled overlays and seating such as cushions used for patients at very high risk
 - Fibre-filled overlays and cushions to provide support while redistributing body weight
- Turning beds to reposition the patient and redistribute body pressure
- Chair cushions (air, gel or foam) (selection should be done by trained caretaker-usually physical therapist) to minimize pressure

Minimize Friction and Searing, Redistribute Pressure

- Encourage mobilization
- Use trapeze to assist in lifting self up in bed
- Limit sitting time to 60 minutes or less 3 times per day for patients with a pressure ulcer
- Avoid pressure on trochanter – use side lying position; use 30° lateral incline position
- Maintain head of the bed at or below 30° or at the lowest position accommodating the patient's condition
- Use lift sheets or lift equipment to reposition and transfer
- Use pillows or other devices to keep bony prominences from direct contact with each other
- Use elbow and heel protection devices
- Use other devices such as synthetic sheepskins, limb protectors, and water-filled cushions; avoid using donuts (HIGN, 2008; National Medical Policy, 2009; NPUAP, 2007b; WOCN, 2010)

Education

In addition to epidemiology, risk factors and prevention, in-service training on the prevention of pressure ulcers should be evidence-based and include categorizing/staging system and treatment (NPUAP, 2001).

Categorizing/Staging of Pressure Sores

While there are no universal parameters for assessing a pressure ulcer, the nurse should assess and document location, size (length, width, and depth), color, and character of the wound. For example, notation should be made of the presence of granulation tissue, slough or eschar; amount and type of drainage (serous, sanguinous, pustular); odor; description of wound edges and surrounding tissue; and the presence, nature, and frequency of associated pain.

Assess pressure ulcer initially and with each dressing change at least weekly (AHRQ, 2011c). National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (2009) recommended the neutral word “category” replace the commonly used term “stage” or the term “grade” which is less commonly used. Categorizing/staging systems used in pressure ulcer assessment vary with the most commonly used system consisting of six categories:

- Suspected deep tissue injury – localized discolored intact skin or blood-filled blister due to pressure or shearing injuring underlying tissue.
- Category/Stage I – intact skin with an area of localized non-blanchable redness
- Category/Stage II – partial thickness loss of dermis, presenting as a shallow open ulcer
- Category/Stage III – full-thickness tissue loss
- Category/Stage IV – full-thickness tissue loss with exposed bone, tendon, or muscle
- Unstageable/unclassified – full thickness tissue loss with wound covered by slough and/or eschar (NPUAP, 2007a)

Accurate wound description is important as reverse staging or re-categorizing a pressure ulcer to a lower stage is not recommended because muscle mass, subcutaneous fat and dermis are not replaced during the healing process (NPUAP, n.d.). The wound should be evaluated every two weeks for progress and if not healing treatment strategies should be re-evaluated (EPUAP & NPUAP, 2009).

Treatment of Pressure Sores

The goal of cleansing and dressing pressure ulcers is to keep the area clean and free of infection while promoting healing. Cleansing can be accomplished by using cleansing or irrigation solution or by debridement. Dressings help keep the wound bed moist. Dressing protocol should be adapted as the wound changes (EPUAP & NPUAP, 2009).

- Cleanse area to remove devitalized tissue. Cleanse wound using tap water, distilled water, cooled boiled water or saline (salt water) (AHRQ, 2011c). Povidone iodine, iodophor, Dakin's solution, hydrogen peroxide and acetic acid should not be used due to their suspected cytotoxic effect on the fibroblasts needed for tissue regeneration (Porter, 2007; Lundgren, 2005; Miller, Creazzo & Witt, 1992). High-pressure irrigation may be needed in the presence of slough or necrotic tissue (Spear, 2011).
- Use properly diluted antiseptic solutions for limited periods of time to control odor (AHRQ, 2011c).
- Dressing should be selected for ability to keep the wound bed moist, control drainage, and to promote healing (Whitney et al., 2006). (Table 3 provides a partial listing of specific available products.) Available products include:
 - Transparent film dressings – Transparent waterproof dressings that maintain a moist environment and are permeable to oxygen and vapor and impermeable to bacteria and contaminants. Used on blisters, superficial wounds, or lightly draining wounds
 - Hydrocolloids – Waterproof absorbent adhesive dressings used on lightly to moderately draining wounds
 - Hydrogels - Transparent and water-based dressings that maintain a moist environment and promote autolytic debridement
 - Foam dressings – Non-adhering highly absorbent dressings that insulate and cushion the wound while providing a moist environment
 - Alginate dressings – Absorbent dressings for heavily draining wounds, used as packing for deep wounds and require a cover dressing
- Infection prevention and treatment- Adequate cleansing and debridement may control infection. Interventions may include:
 - Monitor wound for signs and symptoms of infection (increasing pain; friable, edematous, pale, dusky

granulation tissue; foul odor and wound breakdown; pocketing at base; or delayed healing)

- Use dressings impregnated with antimicrobial agents as warranted
- Antibiotics are not used unless failure to heal and/or continued exudate production warrant antibiotic therapy (Whitney et al., 2006). Topical antibiotic should be tried and if ineffective, systemic antibiotics should be selected.

Pain Management

Pain assessment and management will promote a patient's comfort and compliance with treatment (AHRQ, 2011a).

Recommended actions include:

- Pain assessment on every shift and with each dressing change
- Opioids and/or non-steroidal anti-inflammatory drugs administered 30 minutes prior to dressing changes
- Local topical treatment, for example, ibuprofen-impregnated dressings, Lidocaine preparations, Diamorphine hydrogel
- Transcutaneous electrical nerve stimulation (TENS) (AHRQ, 2011c)

Debridement

Debridement of necrotic tissue will promote healing. The method selected depends on the stage of the wound and needs of the patient.

- Surgical intervention (sharp debridement) - Used for stage III and IV ulcers, sharps or lasers are used to selectively remove necrotic debris (eschar and devitalized tissue) from wounds
- Mechanical – Using wet to dry dressing, the necrotic debris adheres to the dressing and is removed with the dressing
- Autolytic debridement – Contradicted in infected wounds, this method uses the body's own enzymes and moisture to soften and liquefy eschar and slough
- Enzymatic debridement – Chemical enzymes to produce slough of necrotic debris
- Biosurgery – Uses maggots to eat away necrotic debris of wound (AHRQ, 2011c; Wound Care Information Network, 2010)

Adjunctive Therapies

There are multiple adjunct therapies available but evidence of efficacy is not yet available to warrant recommendation.

- Electrical stimulation for recalcitrant Stage II pressure ulcers and Stage III and IV pressure ulcers that have not responded to conventional therapy (AHRQ, 2011c)
- Hyperbaric oxygen therapy for ischemic wounds
- Negative pressure wound therapy – Used with Stage III and IV wounds that do not respond to more conventional

Table 3: Examples of Manufacturers of Skin and Wound Care Products

MANUFACTURER	CONTACT INFORMATION	SAMPLING OF PRODUCTS*
3M Health Care	http://solutions.3m.com/wps/portal/3M/en_US/3MSWC/Skin-Wound-Care/ProductDirectory/	<p>Cavilon No Sting Barrier Film – hypoallergenic, non-cytotoxic and non-sticky film to protect skin from body fluids.</p> <p>Tegaderm Absorbent Clear Acrylic Dressing – allows monitoring of pressure ulcers, skin tears, and other moderately exuding wounds without changing the dressing.</p> <p>Tegaderm Ag Mesh Dressing with Silver – provides an antimicrobial barrier for up to 7 days.</p> <p>Tegaderm Hydrogel Wound Filler – provide a moist wound healing environment.</p>
AMD Ritmed	http://www.amdritmed.com/AboutUs.htm	<p>Dermafill – biosynthetic skin substitute made from 100% natural cellulose that stimulates the growth of skin cells.</p>
Andover Healthcare	http://www.andovercoated.com/healthcare/wound_care_dressings.html	<p>CoFlex Absorbent Foam Dressing – absorbent cohesive dressing with a waterproof film for retention of exudates.</p> <p>CoFlex TLC (two layer compression) dressing – a two-step compression system designed to treat venous leg ulcers.</p>
Bard Medical	http://bardmedical.com/HCSkinWoundCare	<p>Biolex Wound Cleanser – non-toxic, hydrogel dressing used in the management of Stage II–IV pressure ulcers.</p> <p>Vigilon Wound Dressing – non-adherent hydrogel sheet dressing for use on partial and full thickness wounds.</p>
Blairex Labs	http://www.blairex.com/	<p>Boudreaux’s Butt Paste – diaper rash protection.</p>
BSN Medical	http://www.bsnmedical.com/en/whatwedo/woundcare/page.html	<p>Cutimed Gel – a clear hydrogel used on dry wounds.</p> <p>Cutimed Sorbact – used to help cleanse unclean, colonized, and infected wounds.</p>
Coloplast	http://www.coloplast.com/woundand skincare/	<p>Critic–Aid Skin Paste – provides a thick moisture barrier to relieve severe skin irritation.</p> <p>Comfeel Sea–Clens Wound Cleanser – no rinse saline–based wound cleanser.</p> <p>Contreet Silver Wound Dressings – polyurethane foam film dressing containing silver that provides a bactericidal, warm, moist environment that facilitates healing.</p> <p>InterDry Ag Textile Wound Dressings – used to manage moisture, odor, and inflammation in skin folds and other skin–to–skin contact areas.</p> <p>SeaSorb–Ag Silver Calcium Alginate Wound Dressings – highly absorbent, fiber–free alginate dressing that forms a soft and protecting gel that protects the wound surface</p> <p>SeaSorb Calcium Alginate Wound Dressings – highly absorbent dressing for deep cavity or weeping wounds such as leg ulcers and pressure ulcers.</p> <p>Comfeel Plus Pressure Relief Foam Dressings – indicated for low to medium exuding wounds, its foam rings provide some reduction and redistribution in the local pressure load around the wound.</p> <p>Comfeel Ulcer Dressing – is a hydrocolloid wound dressing that provides a moist wound environment to supports the natural healing process.</p>

Table 3: Examples of Manufacturers of Skin and Wound Care Products (continued)

MANUFACTURER	CONTACT INFORMATION	SAMPLING OF PRODUCTS*
Convatec	http://www.convatec.com/en/cvtus-assmngpuus/cvt-cntsngcol/0/detail/0/1465/1548/assessing-and-managing-pressure-ulcers.html/	<p>Aquacel AG (Silver) Wound Dressing – provides broad-spectrum antimicrobial properties and is indicated for highly exuding wounds that are infected or at risk of infection.</p> <p>Aquacel Hydrofiber Wound Dressing – primary wound dressing indicated for use on moderate to highly exuding chronic and acute wounds.</p> <p>CarboFlex Dressing – indicated for shallow wounds or as a secondary dressing over wound fills.</p> <p>CombiDERM – indicated for low to moderate exudating wounds.</p> <p>DuoDerm CGF Control Formula Dressing – indicated for lightly or moderately draining pressure.</p> <p>Hyalofill Wound Dressing– degrades on contact with wound exudates to form a soft gel that maintains a moist environment. Hyalofill–F is indicated for: Leg ulcers, pressure ulcers (Stages II–IV) and diabetic ulcers and Hyalofill–R is recommended for deep exuding wounds, sinuses and fistulae.</p> <p>Kaltostat – an absorbent fibrous fleece composed of the sodium and calcium salts of alginic acid cut in the shape of the wound and applied directly to the surface of heavily exuding wounds such as diabetic leg ulcers and pressure sores.</p> <p>Lyof foam – an open cell, hydrophobic, polyurethane foam sheet placed in contact with the wound to absorb blood and tissue fluids.</p> <p>Unna–Flex Compression Bandage – indicated for the management of venous leg ulcers.</p> <p>Versiva XC Gelling Foam Dressing – absorbs and interacts with wound exudate to form a soft gel that traps wound.</p>
Derma Sciences	http://www.dermasciences.com/products/	<p>Algicell Ag antimicrobial silver alginate dressing– releases broad spectrum antimicrobial silver to control pathogens in the wound and provides a barrier to external contamination.</p> <p>Bioguard – a dressing offers cationic biocide action to provide a barrier to bacterial penetration and reduce bacteria and other pathogens in wound fluid.</p> <p>Medihoney– a medical–grade honey–based dressing for the management of wounds and burns.</p>
DeRoyal	http://www.deroyal.com/MedicalProducts/Default.aspx?div=WC	<p>Algidex Ag® Silver Alginate Wound Dressing – provides antimicrobial action and provides a moist environment to support wound healing.</p> <p>Kalginat® Calcium Alginate Wound Dressing – indicated for heavily draining pressure wounds, leg ulcers, infected wounds etc, it creates a fibrous absorbent gel when in contact with wound exudates.</p> <p>Jetox–ND Jet Lavage Wound Cleansing & Debridement System – uses compressed air/oxygen combined with standard sterile solution to clean and debride wounds.</p> <p>Procol Hydrocolloid Wound Dressing – a sterile hydrocolloid wound dressing that interacts with wound exudate to form a soft gel and create a moist environment to assist wound healing.</p>
Dynarex	http://www.dynarex.com/productdetails.asp?subcat=25	Adhesive Bandages, Gauze Sponges, Surgical Tape and Unna Boot Bandages
Ferris	http://www.imed.com/b/Ferris-Mfg-Corporation/12781.html	PolyMem Max Wound Care Dressing – semi–occlusive dressing with a semi–permeable thin film backing that provides a bacterial barrier.
Gentell	http://www.gentell.com/	Gentell Wound Cleanser – non–irritating spray that aids in removal of necrotic substances and microorganisms from the wound bed.
Hollister	http://www.hollisterwoundcare.com/	<p>Restore CalciCare Calcium Alginate Dressings – indicated for highly exudating wounds, this absorbent dressing creates a moist environment to assist in the healing process.</p> <p>Restore Foam Dressings – absorbent foam pad that holds exudates and prevents maceration around wound edges.</p> <p>Restore Hydrocolloid Dressings – absorbent dressing indicated for moderately draining partial thickness wounds.</p>

MANUFACTURER	CONTACT INFORMATION	SAMPLING OF PRODUCTS*
Johnson & Johnson	http://www.woundsonline.com/	<p>Actisorb Silver 222 – adsorbs toxins and wound degradation products while providing antimicrobial action and managing wound odors.</p> <p>Fibracol Plus Collagen Wound Dressing with Alginate – non-adherent absorbent dressing that maintains moist environment.</p> <p>Promogran Matrix – a sterile, freeze dried matrix composed of collagen and oxidized regenerated cellulose, hexagonal dressing that absorbs wound drainage and forms a soft gel, it is indicated for pressure sores and leg ulcers.</p> <p>Nu-Derm Hydrocolloid – maintains a moist wound environment and is indicated for the management of light to moderately exuding pressure sores and leg ulcers.</p> <p>Nu-Gel Hydrogel – recommended for pressure sores, this dressing containing sodium alginate that helps rehydrate necrotic tissue and fibrinous slough, and creates a moist wound environment needed for granulating and epithelizing wounds.</p>
Mölnlycke Health Care	http://www.molnlycke.com/com/Wound-Care-Products/Product-selector---Wound-division/Tabs/Products/Alldress/	<p>Alldress – indicated as a primary dressing for clean open and closed wounds it provided a viral and bacterial barrier while maintaining a moist environment. It is also used as a secondary dressing (with gels, desloughing dressings or alginates) for open wounds.</p> <p>Melgisorb – a non-adhering absorbent dressing indicated for heavily draining partial to full thickness wounds, it maintains a moist environment and blocks lateral wicking reducing peri-wound maceration.</p> <p>Mepilex – a soft comfortable and absorbent foam dressing that maintains a moist wound environment and prevents drainage leaking onto and maceration of the surrounding skin.</p> <p>Mesalt – absorbent dressing indicated for the management of heavily exuding and infected wounds in the inflammatory phase and for deep cavity wounds such as pressure sores.</p> <p>Normigel – provides a moist environment to support the healing process and is indicated for granulating and open wounds such as pressure ulcers, leg ulcers, and diabetic ulcers.</p>
Smith & Nephew Healthcare	http://global.smith-nephew.com/us/9650.htm	<p>Acticoat – silver coated antimicrobial dressings effective against Gram-positive and Gram-negative organisms, it is indicated for use over partial, full thickness, and acute wounds.</p> <p>Allewyn Cavity Wound Dressing – absorbent dressing indicated for the management of full thickness cavity wounds, such as pressure sores, healing by secondary intention.</p> <p>DryNet Wound Veil – used as post-surgical covering over epithelial autograft sites, it supports the graft and helps prevent shearing of the graft while permitting the graft site to drain.</p> <p>Viscopaste PB7 – zinc oxide containing bandage indicated in management of leg ulcers.</p>

* Visit Manufacturer's web site for full listing of products. For complete product information, see the manufacturer's insert.

therapies, it is thought to increase wound perfusion and support granulation of tissue (Whitney et al., 2006; AHRQ, 2009)

- Growth factors [specifically platelet-derived growth factor (PDGF)] – Attracts macrophages and fibroblasts to wound bed and promotes healing (Gabriel & Molnar, 2009)
- Skin grafts and skin equivalents – Thought to assist wound healing by providing collagen growth factors and biological occlusion to protect wound (AHRQ, 2009)

Conclusion

In determining whether the appropriate standard of care has been breached, the LNC should be aware of the on-going debate regarding avoidable versus unavoidable pressure ulcers. Unavoidable means a pressure ulcer developed even though nurses implemented interventions consistent with patient's needs and standards of practice. Keeping these issues in mind while reviewing a case, the LNC should determine the patient's risk factors, the informed choices made by the patient, whether evidence-based interventions

were implemented, and whether factors influencing the nurses' judgment and decision-making were documented.

The reader is referred to the Appendix for a listing of resources that might aid in evaluating a pressure ulcer case.

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42 CFR §483.25(c)

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Appendix

Wound Care Resources

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- Internet Sites**
- Association for the Advancement of Wound Care*: <http://www.aawconline.org>
- Centers for Disease Control*: <http://www.cdc.gov>
- Columbia Wound Healing Center*: <http://www.ColumbiaWoundHealing.org>
- DermWeb*: <http://www.derm.ubc.ca>
- Food and Drug Administration*: <http://www.fda.gov>
- Guideline Central*: <http://www.guidelinecentral.com/CustomContentRetrieve.aspx?ID=1826663>
- Hartford Institute for Geriatric Nursing*: http://www.consultgerinr.org/topics/...and_skin.../want_to_know_more
- Health Care Financing Administration (HCFA)*: <http://www.cms.hhs.gov>
- HHS—Department of Health and Human Services*: <http://www.hhs.gov>
- Mayo Clinic*: <http://www.mayoclinic.com>
- National Institutes of Health*: <http://www.nih.gov>
- National Institute of Nursing Research*: <http://ninr.nih.gov>
- National Library of Medicine*: <http://sis.nlm.nih.gov/NettoPDF.info Ebook>: <http://nettopdf.info/ro/pdf/npwt-1.html>
- NIDDK Home Page*: <http://www.niddk.nih.gov>

Temple University School of Podiatric Medicine: <http://podiatry.temple.edu>
Texas Quality Matters.org: <http://www.dads.state.tx.us/qualitymatters/qcp/woundcare/index.html>
The Joanna Briggs Institute for Evidence Based Nursing: <http://www.joannabriggs.edu.au>
The Wound Care Information Network: <http://www.medicaledu.com>
University of Miami Dermatology Department: <http://www.med.miami.edu>
Wound Care Infolink Literature Search: <http://www.woundcarenet.com>
Wound Care Institute: <http://www.woundcare.org>
Wound Care Protocols, Inc.: <http://woundcareprotocols@earthlink.net>
WoundCommunity.com: <http://www.woundcommunity.com>
Wound Healing Society: <http://www.woundheal.org>
Wound Health Reference Library (WHRL): <http://www.dumex.com/whrl/pages/index.html>
Wound Research.com: <http://www.woundsresearch.com/>
Wound Tx.com: <http://www.woundtx.com>
World Wide Wounds: <http://www.worldwidewounds.com/index.html>
Wound Product Sourcebook: <http://www.woundsource.com>

Professional Organizations

American Academy of Dermatology: <http://www.aad.org>
American Academy of Wound Management (AAWM): <http://www.aawm.org>
American Association for the Advancement of Science: <http://www.aaas.org/>
American Board for Certification in Orthotics and Prosthetics: <http://www.abcop.org>
American Board of Podiatric Orthopedics and Primary Podiatric Medicine: <http://www.abpoppm.org>
American Burn Association: <http://www.ameriburn.org>
American College of Foot & Ankle Orthopedics & Medicine: <http://www.acfaom.org>
American College of Foot and Ankle Surgeons: <http://www.acfas.org>
American College of Surgeons: <http://www.facs.org>
American Diabetes Association: <http://www.diabetes.org>
American Heart Association: <http://www.amhrt.org>
American Physical Therapy Association: <http://www.apta.org>
American Podiatric Medical Association: <http://www.apma.org>
American Professional Wound Care Association: <http://www.apwca.org>
American Society for Investigative Pathology: <http://www.asip.org>
American Society of Plastic Surgeons: <http://www.plasticsurgery.org>

Association For The Advancement of Wound Care (AAWC): <http://www.aawc1.com>
Australian Wound Management Association: <http://www.awma.com.au>
Canadian Association of Wound Care: <http://www.cawc.net>
European Pressure Ulcer Advisory Panel: <http://www.epuap.org>
European Wound Management Association: <http://www.ewma.org>
Inflammation Research Association: <http://www.inflammationresearch.org>
National Alliance of Wound Care: <http://www.nawccb.org>
National Lymphedema Network: <http://www.lymphnet.org>
National Pressure Ulcer Advisory Panel (NPUAP): <http://www.npuap.org>
Podiatry Division: The Department of Orthopedics: <http://www.diabeticfoot.org>
Society for Investigative Dermatology: <http://www.sidnet.org>
American Society for Investigative Pathology: <http://www.pathol.faseb.org>
South Australia Wound Management Association: <http://www.awma.com.au>
Tissue Engineering Society International: <http://www.tesinternational.org>
Tissue Viability Nurses Association: <http://www.tvna.org>
Tissue Viability Society: <http://www.tvs.org.uk>
World Council of Enterostomal Therapists: <http://www.wcetn.org>
World Union of Wound Healing Societies: <http://www.wuwhs.org>
Wound Care Institute: <http://www.woundcare.org>
Wound Care Society: <http://www.woundcaresociety.org>
Wound Healing Society (WHS): <http://www.woundheal.org>
Wound Management Practice Resource Center: <http://www.smtl.co.uk>

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State Boards of Nursing Disciplinary Actions: Use of Social Media

Holly Hillman, MSN, RN and Eileen Watson, EdD, MSN, RN, ANP, GNP, LNCC

The primary mission of state boards of nursing (BON) is to ensure public safety through the regulation of nursing practice. These government agencies enforce their respective nurse practice acts and nursing licensure, accredit nursing education programs within the state, develop policies, rules and regulations, and take action against the licenses of nurses who exhibit unsafe practice (National Council of State Boards of Nursing [NCSBN], 2012a).

Public access to several individual state BONs reveals that the majority of disciplinary actions centers on substance abuse, criminal, or civil violations. Sanctions may include reprimand, probation, license suspension or revocation, or voluntary surrender of the license. Civil penalties in the form of monetary fines can also be imposed. Nurses are held to a high standard, so nurses who are under the influence of drugs or alcohol are certainly not competent to safely practice nursing and provide care to patients. Operating a motor vehicle while under the influence of a substance could also cause physical and/or property injury or even death. Other infractions such as theft or fraud, while not directly causing harm to patients, can also result in disciplinary actions by the BON, as well as violating the American Nurses Association Code of Ethics (American Nurses Association [ANA], 2001).

However, a new area of concern is the increase in disciplinary actions due to improper use of social media and electronic communication. Not only must nurses keep up to date with the use of technology in their professional lives, but the explosion in the number of electronic devices, social networking sites, blogs, emails, and online chat rooms, forums, and video sites are avenues in which nurses frequently communicate information about their patients, thus potentially jeopardizing privacy and confidentiality which then may mandate disciplinary actions.

A survey of BONs was conducted by the NCSBN in 2010 to determine the number of complaints lodged concerning the use of social media. Out of the 46 respondents, 33 BONs had received complaints about nurses who had violated patients' privacy by using social networking sites to either post their photographs or personal information, with 26 boards dispensing disciplinary actions (Cronquist & Spector, 2011).

While nurses may have accounts or personal pages with the very same social networking sites as the healthcare organizations in which they are employed, the employer sites generally have regulations for what information can be posted

and only by specifically designated personnel. In addition, organizations have policies regarding employees' use of in-house computers and equipment, as well as what internet sites can or cannot be accessed during work (Cronquist & Spector). However, when off duty, nurses may turn to these sites to vent about stressful situations, seek collegial advice, or share humorous or touching moments. Although most postings are made with good intentions, some have contained disparaging comments about patients, other healthcare workers, or the employing organizations, potentially causing problems for all involved. Even if the nurse tries to delete the posting, once sent, it can still be retrieved by the administrator of the site. Additionally, a communication intended to be private to only one recipient could then be forwarded by that person to several others, or a screen shot taken and posted on other sites. In a short period of time the original message has "gone viral" and is out of the nurse's control.

Simply omitting a name is insufficient to protect a patient's right to privacy and confidentiality. Referring to a diagnosis, room number, or other details which could identify the individual can also be considered a breach of confidence. According to Cronquist and Spector, confidentiality and privacy are related, but are distinct concepts. Any information learned while caring for a patient is confidential and must only be shared with other healthcare members who have a need to know. Confidential information can be shared if the patient has given informed consent to do so, but must be disclosed if it is legally required or if failure to do so could result in serious harm. "Privacy relates to the patient's expectation and right to be treated with dignity and respect" (Cronquist & Spector, 2011, p. 38).


The ease and commonplace use of social media may only perpetuate the breach of patients' confidentiality and privacy. Termination from employment, sanctions by the BON, and monetary fines are serious consequences for such violations. In addition, the nurse may also be subject to civil or criminal lawsuits. To prevent additional infractions the NCSBN published a White Paper with guidelines for the use of social media and a brochure and a video are also available at the website (NCSBN, 2011; NCSBN, 2012b). Recently, the ANA and the NCSBN have mutually endorsed each organization's guidelines for the use of social networking (NCSBN, 2011b). This joint collaboration further emphasizes the ethical responsibility of nurses to safeguard their patients' privacy and confidential healthcare information.

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American Heart Association (AHA)/ American Academy of Pediatrics (AAP) Neonatal Resuscitation Guidelines 2010

Raji Thomas, MSN, MBA, RNC

Q: Are there new recommendations in the AHA/AAP Neonatal Resuscitation Guidelines of 2010?

A: Yes.

The American Academy of Pediatrics (AAP) has published the 6th Edition of the Neonatal Resuscitation Program (NRP), which describes the major changes to the 2010 Guidelines for Neonatal Resuscitation. This extensively updated edition is an important educational tool that incorporates the 2010 AAP neonatal resuscitation recommendations and the AHA “Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care: Neonatal Resuscitation Guidelines” (McGowan, 2010). The new AHA/AAP guidelines are based on the recent recommendations of the International Liaison Committee on Resuscitation’s (ILCOR) evidence-based consensus on science and the NRP curriculum changes that focus on simulation and active hands-on learning (Kattwinkel et al., 2010). Beginning January 1, 2012, all NRP instructors are required to include the 6th edition of NRP guidelines in all NRP certification courses (Zaichkin & Weiner, 2011). The 2010 AHA/AAP Guidelines for Neonatal Resuscitation included several major changes to the way neonates are resuscitated (Zaichkin & Weiner, (2011); Biban et al., (2011)). The most important changes are indicated below:

- Use of pulse oximetry (SpO₂) monitoring to guide the administration of supplemental oxygen during neonatal resuscitation, and to assess neonate oxygenation and the need to initiate Positive Pressure Ventilation (PPV). The guideline endorses monitoring of preductal oxygen saturations for preterm and term neonates who require initial resuscitation. The guideline also specifically defined targeted SpO₂ ranges during resuscitation, as part of the Newborn Resuscitation Algorithm, which is the same for both preterm and term neonates. The guidelines encourage the use of PPV if SpO₂ monitoring indicates that the neonate is having persistent central cyanosis. They suggest that once PPV is started, an

increase in the neonate’s heart rate should be identified as the most sensitive indicator of resuscitation efficacy.

- Use of room air or 21% oxygen during the resuscitation of term neonates requiring PPV. If there is no improvement in heart rate or oxygenation as assessed by pulse oximetry at 90 seconds from birth, supplemental oxygen is started at higher concentrations by gradual increase up to 100% to reach target saturations. In the initial resuscitation of preterm babies less than 32 weeks of gestation, judicious use of blended air and oxygen mixture and appropriate titration guided by pulse oximetry is recommended. The initial resuscitation of preterm babies less than 32 weeks should start with oxygen concentration between 30-90% and be increased or decreased gradually to reach targeted SpO₂ ranges. The use of an oxygen blender in the delivery room to titrate a gradual increase in the concentration of the delivered oxygen is also recommended.
- Addition of Positive End Expiratory Pressure (PEEP) in the initial stabilization of preterm babies using suitable equipment such as a T- piece or flow inflating bags. The recommended Peak Inspiratory Pressure (PIP) for initial breaths in preterm babies is 20 to 25cm H₂O and 30 to 40cm H₂O for some term neonates. Administration of PPV should be guided by evaluating heart rate and oxygenation especially in preterm neonates as the new guidelines remove chest rise as a reliable method of assessing initial breath.
- Use of Continuous Positive Airway Pressure (CPAP) for spontaneously breathing preterm infants with respiratory distress. This is now included in the algorithm for persistent cyanosis or labored breathing after initial steps. Indications for endotracheal intubation and the guidelines for tracheal placement have not changed in the new guidelines.

- Removal of evaluation of amniotic fluid at the time of birth for presence of meconium from their new guidelines by the AAP. Tracheal suction of non-vigorous babies with meconium stained amniotic fluid is still recommended to be continued as part of clearing the airway in the initial steps. In the treatment of neonates born with meconium stained amniotic fluid, there were no changes to existing practice, as there is no evidence for or refuting of tracheal suction even in non-vigorous neonates. The AAP recommends proceeding to PPV, if tracheal intubation is unsuccessful or there is severe bradycardia.
- Removal of “color” criterion from the “signs to look for” during the assessment to decide whether progressive steps are needed after initial steps.
- No administration of free-flow oxygen to neonates who appear dusky in the first few minutes after delivery to “pink them up.” The regular suctioning of the mouth and nose of a neonate who has no secretions is discouraged because it may depress the neonate’s respirations. It is recommended that a source of blended air/oxygen and pulse oximetry be present at every high-risk birth and be immediately available if there is a neonate who unexpectedly requires resuscitation.
- Precordial auscultation of heart instead of palpating umbilical cord to assess neonate’s heart rate during resuscitation efforts.
- Minimize interruption of coordinated chest compressions and ventilation during chest compressions and check the heart rate every 45 to 60 seconds. The chest compressions may be discontinued once the heart rate is more than 60 beats per minute, and the neonate’s heart rate is evaluated every 30 seconds.
- Elimination of Naloxone as a resuscitative drug in babies with respiratory depression, since the safety and long term effects on Naloxone is not established.
- Use of therapeutic hypothermia for infants with gestational age ≥ 36 weeks with moderate to severe hypoxic ischemic encephalopathy in settings where proper follow-up services can be provided.
- Delayed cord clamping for one minute in all uncomplicated term and preterm births not requiring resuscitation.
- Placing neonate on mother’s chest for skin to skin contact immediately after birth.
- Use of simulation, briefing, and debriefing techniques as effective strategies in acquiring and maintaining necessary skills for effective neonatal resuscitation.
- Revisions in NRP Resuscitation Flow Diagram to reflect the new changes to the guidelines.

Adopting these best practices for neonatal resuscitation and clinical competency requirements ensures the gift of life for neonates.

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Airway Support: Review of Tracheostomies: The Complete Guide

By L. Morris, & M.S Afifi

Reviewed by Kathleen C. Ashton, RN, ACNS-BC

Caring for a patient with a tracheostomy is a challenge considering that in a moment the airway can be lost and the individual will be deprived of oxygen. Fortunately, the editors of *Tracheostomies: The Complete Guide* have compiled a handbook that informs and supports the practitioner in competently providing care and preventing complications of this rather common procedure. Linda Morris and M. Sherif Afifi have put together a guide replete with background anatomy, equipment descriptions, and recommendations for safe and appropriate care when a tracheostomy is required.

Frequently used interchangeably, the term tracheotomy refers to the actual surgical procedure to create a tracheostomy, the opening in the neck. Tracheotomy is one of the earliest recorded surgical procedures and it has changed little over time. Yet, it can be challenging to perform since individuals who need one usually have many medical comorbidities and are frequently acutely ill. First described over 3500 years ago, the procedure was modified by Chevalier Jackson in 1909 and has become more efficient and safer. There are many things to keep in mind when performing a tracheotomy and the editors provide a review of the associated anatomy as a backdrop for considering the procedure in a patient. They compare the adult and the infant airways and include excellent diagrams and tables to enhance understanding of the essential parameters.

Throughout the text the editors integrate research evidence to provide a basis for considering alternative procedures and for evaluating the effectiveness of the tracheostomy. When no clear evidence is available in certain situations, the editors synthesize the extant data and make a recommendation, for example, "early tracheotomy within 7 to 10 days of mechanical ventilation appears appropriate" (p. 20).

The editors are very thorough in their coverage of all aspects of tracheostomy insertion and care. Included is a pre-procedure checklist for bedside tracheostomy insertion that can be quite useful in a clinical situation. The diagrams and photos of techniques for insertion and various tubes and their manufacturers make the procedure rather straightforward for the appropriate practitioner.

Some devices are less commonly used in practice, such as t tubes, tracheostomy caps, and custom-made tracheostomy tubes. The authors include these items and describe the associated care and nursing implications of their use. Although safety is addressed throughout, the text could be enhanced with more attention to safety issues such as in the discussion on the obturator and being sure not to leave it in after use. There have been some instances when novices were

not sure if the obturator should remain intact and the result has been some scary moments for patients. The obturator is only used during tube placement, and then promptly removed to create an open passageway for air exchange.

The editors provide an excellent description and explanation of the many types of tracheostomy tubes and their indications. In Chapter 6 they explore currently used valves such as the Passy-Muir valve and how they can be used to enable speech in the presence of a tracheostomy. Basic care and cleaning of a tracheostomy including use of an inner cannula are discussed in Chapter 7, including a careful explanation of the difference between colonization and infection. Once a standard of care, the use of blue dye has been banned by the American Association of Critical Care Nurses and the background of this decision is explained. Chapter 8 focuses on the child with a tracheostomy and details important aspects of care. Laryngectomies are discussed in Chapter 9 including insertion and an important section on quality of life issues.

Tracheostomies can result in myriad complications and these are competently addressed in Chapter 10. Complications associated with the insertion, maintenance, and removal of tracheostomies are covered in this chapter including air embolism, obstruction, erosion, emergency extubation, and infection. The prevalence and possibility of operating room fires are also included. Chapter 11 gives clear guidelines for downsizing the tracheostomy tube and proper decannulation procedures. The comprehensiveness of the text is evidenced in Chapter 12 with the discussion of economic aspects. Reimbursement and Medicare allowances are an important part of this area and they are discussed very objectively.

The editors have compiled an important text that can be used not only by care providers but also by legal nurse consultants as they measure nursing care against the standards of practice. It is certain to be used as an authoritative reference for any cases involving patients with tracheostomies.

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