

A Patient Safety: Preventing Pressure Ulcers

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Abstract

With today's critical nursing shortage, it is no surprise that there would be an increase in hospital-induced pressure sores given the complexity of this issue. Although nurses may complain there is not enough time to get everything done due to an overwhelming workload. Equally important to consider is that proper treatment be implemented routinely and consistently in accordance with the institution's policy and procedure manual. The responsibility ranges from the chief nursing officer to the bedside nurse to make sure treatment plans are implemented and evaluated. A skin care plan to prevent tissue injury in patients at risk for developing pressure sores and to promote wound healing in patients with existing breakdown must be developed. The staff must be involved in planning, implementing, and evaluating the skin care plan for it to be effective.

Keywords: Pressure Ulcer; Patient; Safety; Prevention.

Introduction

Skin is the Human body's largest organ it is Body's first line of defense. it function as Protector, Regulator, Sensor, Metabolism and Communicator. Pressure ulcer is the commonest problem which arises when tissue injury, ischemia and tissue necrosis has been occurred. It is prevalent in bedridden patient. Meticulous skin care is needed to prevent this condition. Earlier days Pressure ulcer also called as decubitus ulcers or bed sores.

Definition

According to *The National Pressure Ulcer Advisory Panel (NPUAP)* pressure ulcer is a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction that leads to tissue injury, ischemia, and tissue necrosis.

Incidence

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Around 70% occur in people over 65 yrs, 2-6 times greater risk of mortality, 95% it occur lower body, in sacrum(65%) and heal (30%) and Shoulder, heel, and ear were the favorite sites of newly developed Pressure ulcer.

Factors Causing Pressure Ulcer

They from in the bony prominences like occiput, ear, scapula elbow, sacrum ischial tuberosities, grater trochander, medial condyle of tibia, fibular head, medial malleolus, lateral malleolus and heal.

Intrinsic factors	Extrinsic factors
Malnutrition and dehydration	Friction
Critical illness	Shear
Bedridden/wheel chair.	Dryness
Incontinence	Moisture
Age/Fragile skin	Pressure
Chronic diseases	
Infection, Obesity	
Smoking	

Pathology

Unrelieved pressure on the skin squeezes tiny blood vessels, which supply the skin with nutrients and oxygen. When the skin is starved for too long, the tissue dies, and a pressure ulcer develops

Pressure sores (bed sores) are an injury to the skin and underlying tissue. They can range from mild reddening of the skin to severe tissue damage-

and sometimes infection-that extends into muscle and bone. Pressure sores are described in four stages:

- At *Stage 1* sores are not open wounds. The skin may be painful, but it has no breaks or tears. The skin appears reddened and does not blanch (lose color briefly when you press your finger on it and then remove your finger). In a dark-skinned person, the area may appear to be a different color than the surrounding skin, but it may not look red. Skin temperature is often warmer. And the stage 1 sore can feel either firmer or softer than the area around it.
- At *stage 2*, the skin breaks open, wears away, or forms an ulcer, which is usually tender and painful. The sore expands into deeper layers of the skin. It can look like a scrape (abrasion), blister, or a shallow crater in the skin. Sometimes this stage looks like a blister filled with clear fluid. At this stage, some skin may be damaged beyond repair or may die.
- At *stage 3*, the sore gets worse and extends into the tissue beneath the skin, forming a small crater. Fat may show in the sore, but not muscle, tendon, or bone.
- At *stage 4*, the pressure sore is very deep, reaching into muscle and bone and causing extensive damage. Damage to deeper tissues, tendons, and joints may occur.

In stages 3 and 4 there may be little or no pain due to significant tissue damage. Serious complications, such as infection of the bone (osteomyelitis) or blood(sepsis), can occur if pressure sores progress.

Lindan et al documented ranges of pressure applied to various anatomic points in certain positions.-The points of highest pressure with the patient supine included the sacrum, heel, and occiput (40-60 mm Hg). With the patient prone, the chest and knees absorbed the highest pressure (50 mm Hg). When the patient is sitting, the ischial tuberosities were under the most pressure (100 mm Hg). Obviously, these pressures are greater than the end capillary pressure, which is why these are the areas where pressure ulcers are most common.

Risk Factors for Pressure Ulcers

Certain groups of patients have a higher risk for developing pressure ulcers. These include:

- Patients who are older adults (those over age 65 are at high risk and those over age 75 are at even greater risk)

- Patients in critical care.
- Patients with a fractured hip (an increased risk for heel pressure ulcers).
- Patients with spinal cord injuries (spasticity, the extent of the paralysis, a younger age at onset, difficulty with practicing good skin care, and a delay in seeking treatment or implementing preventive measures increase the risk of skin breakdown).
- Individuals with diabetes, secondary to complications from peripheral neuropathy.
- Individuals who are wheelchair- or bed-bound.
- Patients who are immobile or for whom moving requires significant or taxing effort (i.e., morbidly obese).
- Patients who struggle with incontinence.
- Patients with neuromuscular and progressive neurological diseases (i.e., multiple sclerosis, ALS, Myasthenia gravis, stroke).

Etiology

Hypothermia

- Hyperthermia;
- Chemical substance (e.g., incontinence);
- Mechanical factors (e.g., friction, shearing forces, pressure, restraint);
- Physical immobilization;
- Humidity;
- Extremes in age;
- Moisture;
- Radiation;
- Medications.
- *Internal*
- Impaired metabolic status;
- Impaired nutritional status (e.g., obesity, emaciated);
- Impaired circulation;
- Impaired sensation;
- Altered pigmentation;
- Skeletal prominence;
- Developmental factors;
- Immunological deficit;
- Skin turgor alterations (change in elasticity);
- Impaired fluid status.

Clinical Manifestations

1. Rounded, crater like shapes with regular edges.
2. Usually dark regular base that do not bleed easily.
3. Over bony prominences, but can take on the shape of the bone.
4. Foul odor from ulcer.
5. Warm/swollen skin.
6. Fever, weakness, and confusion.

Pressure Ulcers are Graded or "Staged" to Indicate the amount of Tissue Damage

- Stage-I: Reddened area of skin
- Stage-II. Blister/Open Sore
- Stage -III: Crater (bowl shaped depression on surface)
- Stage-IV: Damage to muscle or bone

Risk Assessment Scale

Braden Scale

Criteria	Score			
	1	2	3	4
1. sensory perception	Unresponsive	Responsive to pain stimuli	Response to verbal commends	No impairment
2. Moisture	Constantly moist	Often moist but not always	Occasionally moist	Rarely moist
3. Activity	Bed fast	chair fast	Walk occasionally	Walks frequently
4. Mobility	Completely immobile	Very limited	Slightly limited	No limitations
5. Nutrition	Very poor	Probably adequate	Adequate	Excellent
6. friction and shear	Problem	Potential problem	No apparent problem	

Score and Interpretation

Criteria	Score
Very high risk	9 or less
High risk	10-12
Moderate risk	13-14
Mild risk	15-18
No risk	19-23

Norton Scale

Criteria	Score			
	4	3	2	1
Physical condition	Good	Fair	Poor	Very bad
Mental condition	Alert	Apathy	Confused	Stupors
Activity	Ambulant	Walks with help	Chair bound	Bed fast
Mobility	Full	Slightly impaired	Very limited	Immobilized
Incontinence	None	Occasionally	Usually urinary	Urinary and fecal

Score and Interpretation

Score	Criteria
>18	low risk
14-18	medium risk
10-14	high risk
<10	very high risk

Nursing Management

Assessment Pressure Ulcer

Systematic Skin Assessment (SSA): Every time you change, help to the toilet, dress, bathe, transfer, and/ or turn a resident... you have a chance to check and care for a resident's skin.

What to Look for on the Skin: An area of skin that is noticeably different than the surrounding area. It may look red, and the redness does not "fade" when the skin is touched, and released (blanched). For residents with darker skin, the skin may look darker or lighter than the surrounding skin. Skin may look a little red, blue, or purple in color. When you check a resident's skin, be sure to have good lighting.

Another thing to Try: Gently feel for a change in skin temperature, it may feel warmer or cooler than the surrounding area. A "suspicious area" may feel "spongy" or "raised".

Prevention of Pressure Ulcers

Reduce the of Risk Factor

- Inspect daily and Keep skin clean and dry
- Reposition residents at least every two hours

- Keep linen dry and free of wrinkles and objects that cause pressure to the skin.
- Clean urine and feces from skin as soon as possible.
- Make sure clothing and shoes do not bind or constrict.
- Pat skin dry when bathing; never scrub.
- Encourage adequate nutrition and fluids.
- Massage pressure points when the resident is repositioned.
- Report any changes in skin condition immediately.

SSKIN a 5 Step Model for Prevention of Pressure Ulcers
IS:

S- Surface

S- Skin inspection

K- Keep moving

I- Incontinence/ moisture

N- Nutrition and Hydration

Five Pillow Rule for Prevention of Pressure Ulcers:

1. Pillow 1 under legs to elevate heel.
2. Pillow 2 between ankles if on side.
3. Pillow 3 between knees if on side.
4. Pillow behind the back (unless you are using the Turn and position unit).
5. Pillow 5 under the head.

Treatment of Pressure Ulcer

1. Pressure management.
2. Cleaning and dressing wound.
3. Wound debridement.
4. Other interventions.
5. Surgery.

1. *Pressure Ulcer Management*

Regular Repositioning

In order to decrease the risk, it is important to reduce the time and amount of pressure the patient is exposed to.

All patients must have their positions changed on a regular schedule. How often this is done is determined by each patient's activity/mobility level,

general medical condition, overall treatment plan, skin condition, and support surface.

Frequent small position changes, rather than completely turning the patient, is faster, easier, and safer for all. Any change in position is beneficial. The patient need only be tilted to the side, no more than 30 degrees, with pillows or wedges to help support and reduce the pressure over bony prominences. A small pillow behind the shoulder or the hip alters position without having to move the entire body. Bending the knee alters the pressure on the sacrum and hip. A small pillow behind the heel will elevate the heel off the surface and prevent pressure.



When a patient is moved, it must be done in a way so as to prevent friction and shearing, as these forces will cause skin injury as readily as pressure.

- Always use a lift sheet or lift equipment to reposition the patient.
- The patient must be lifted, not dragged, while repositioning, which also means more than one person may be needed to move the patient. Pulling or dragging the patient will cause skin damage due to friction.
- Maintain the head of the bed at or below 30 degrees (or the lowest degree of elevation allowed based on the medical condition) to prevent the body from sliding down and causing a shear-related injury .
- Lower the head of the bed one hour after meals or intermittent tube feedings. If this is not possible, the sacral region will need to be checked even more frequently for possible injury.

When moving a patient, always use good body

mechanics and request help when needed. Have the patient assist in moving by using overhead trapeze bars. Even if the patient can only hold onto the bar, some of the weight will be reduced, making it easier and safer to move the patient. After the patient has been repositioned, be sure that he or she is not lying on a medical device, such as tubes or drains, and make sure the linens are smoothed.

Using Support Surfaces

Support surfaces on beds and chairs are used, however, to more evenly distribute body-weight pressure and to help reduce pressure to any one area of the body.

Types of Support Surfaces

- *Replacement Mattresses:* Mattresses with pressure-reducing features placed on an existing bed frame in place of a standard mattress.
- *Overlays:* A support surface placed on top of a standard mattress; made of foam, water, gel, air, or a combination.
- *Foam:* A thick slab of foam with a textured surface placed on top of a standard mattress to reduce pressure by surrounding the body; should be at least 3–4 inches thick to be effective at reducing pressure (2 inches is for comfort only).
- *Water:* A vinyl mattress or overlay with sections filled with water to distribute pressure more evenly and create a flotation effect.
- *Gel:* Made of a thick fluid that conforms to the contours of the body.
- *Air:* A vinyl mattress or overlay inflated with a blower to reduce pressure; powered or dynamic mattresses have a pump that inflates the mattress sections in an alternating cycle.
- *Low-air loss:* A mattress or overlay with controlled air-flow sections.
- *Air-fluidized:* Uses a high rate of blown air to fluidize fine particulate material (such as silicone beads) to “float” the patient on the surface.

Skin moisture from incontinence is a risk factor for pressure ulcer development. Water saturates the skin, which increases the risk that friction and shearing will result in erosion of the skin. The ammonia in urine raises the skin’s pH, which promotes growth of pathogenic bacteria, disrupts the protective acid mantle, and activates fecal enzymes. Fecal enzymes damage the skin, allowing the gastrointestinal bacteria to cause infections. These

result in a condition called incontinence-associated dermatitis (IAD). In and of itself, IAD is not a pressure ulcer. But if unrelieved pressure is added to IAD, the odds are five times higher that a pressure ulcer will develop. Proper cleansing and protection of the skin are the basis of prevention of IAD.

1. Cleanse the skin gently with a pH-balanced cleanser at each incidence of soiling.
2. Protective products with dimethicone, petroleum, or zinc oxide are recommended for patients with fecal incontinence or both urinary and fecal incontinence to protect against IAD.
3. Select underpads or incontinence briefs that are absorbent to wick moisture away from the skin instead of those that trap the moisture against the skin.
4. Pelvic Floor Muscle Training (PFMT): a program of repeated pelvic floor muscle contractions.
5. Scheduled toileting (i.e., timed voiding): monitoring and then matching of the individual’s typical toileting schedule.
6. Habit retraining: identifying the individual’s natural voiding pattern and developing an individualized toileting schedule.
7. Prompted voiding: establishing a routine in which a caregiver suggests voiding and provides assistance as needed.

Managing Nutrition

Malnutrition is associated with overall morbidity and mortality. Thus, assessing the patient’s nutritional status must be part of the total assessment for pressure ulcers. A nutrition assessment should be performed upon admission and whenever there is a change in the patient’s condition that puts him or her at risk for malnutrition.

Nutrition Assessment Parameters

- Current weight and usual weight.
- History of unintentional weight loss or gain (>5% change in 30 days or >10% change in 180 days).
- Body mass index (BMI).
- Food intake.
- Dental health.
- Ability to chew, swallow, and feed oneself.
- Medical and/or surgical history that influences intake or absorption of nutrients.
- Drug/food interactions.

- Psychosocial factors that can affect food intake.
- Ability to obtain and pay for food.
- Facilities for cooking and eating.
- Food preferences.
- Cultural and lifestyle influences on food selection.
- Over 65 years of age.
- Patients who are capable of shifting their weight every 10 minutes should be encouraged to do so.
- Reposition every 2 hours in case of bed ridden. After repositioning use a pillow to support the new position in the bed or chair.
- Heels elevated off mattress supported by pillows under the legs.
- Use a pillow to keep the knees and heels from rubbing together.
- Patients who are bedbound should be positioned at a 30° angle.
- Use draw sheet and trapeze if possible to decrease friction.
- Do not position, if possible, over area of break down.
- NEVER massage reddened areas (this is friction and will increase break down)
- Keep in mind heel pads and elbow pads prevent FRICTION not PRESSURE.
- Use Lift sheets, Trapeze, Heel and elbow pads, Moisturizers, Hydration, Transparent dressings and Skin sealants to prevent friction.
- Anti-shear mattress, lift sheets, elevating bed for 30 degrees, using pillows or wedges, using, turning and Positioning system can prevent shear.
- Wound management

Cleaning and Dressing Wound

- Stage I (not broken): gently wash it with water and mild soap and pat dry.
- Stage II (open sore): gently wash it with saline solution each time the dressing is changed.
- Dressing choice includes: films, gauzes, gels, and hydro cellular foams dressing.
- A combination of dressing may be used.

Wound dressings are a central component of pressure ulcer care. The selection of the dressing for the ulcer is very important and based on many parameters, such as:

- Presence of infection or necrosis.
- Size, depth, and presence of undermining or tunneling.
- Location.
- Drainage.
- Condition of the surrounding skin.
- Goals for healing.
- Individual or caregiver needs, such as pain reduction or odor control.
- Cost/reimbursement of the dressing.
- Availability.
- Ease of use.

(WOCN, 2010)

Maintaining a moist wound is a primary factor in dressing selection. If the ulcer is draining a large amount, then a dressing that will absorb but not dry out the wound is needed. If the ulcer has minimal drainage, then a dressing that replaces moisture and/or doesn't allow the ulcer to dry out is needed.

The "dead" space inside the wound needs to be filled so that the dressing is in contact with the wound bed, including any tunneling or undermining. A wound should not be stuffed with the dressing material; stuffing the wound puts pressure on the inside of the wound and will prevent exudate from draining out.

Dressings are changed based on the amount of drainage: a heavily draining wound will need to be changed often, while a minimally draining wound can be changed less than daily. There are many dressings available today to help maintain the correct environment to allow healing. It is important to follow manufacturer recommendations for the use of the product (Hess, 2013).

Examples of Dressing Types for Pressure Ulcers

Hydrocolloid (e.g., Duoderm): A type of dressing containing gel-forming agents applied to a foam or a film, which form an absorbent, self-adhesive, waterproof occlusive wafer. These dressings are used in stage II ulcers in body areas where they will not roll or melt. They are also used for autolytic debridement. Expect the formation and/or collection of drainage under the wafer. This does not indicate infection but is a property of the product. Do not use on infected or heavily draining wounds or wounds in which the dressing needs to be changed more than three times per week. Remove carefully.

Transparent Film: Can be used to protect body areas

at risk for friction injury. Can be used for autolytic debridement. May be used as a secondary dressing to hold in other dressings. Remove carefully.

Hydrogel: Water or glycerin-based gel, impregnated gauzes, and sheet dressings used to add moisture to a wound. Generally, these dressings are used on shallow, minimally draining ulcers. They are covered with a secondary dressing.

Alginate: These are used in moderately and heavily draining ulcers. Cover with a secondary dressing.

Foams: Used in draining stage II and shallow stage III ulcers. They absorb drainage and protect the wound.

Gauze: A cotton or synthetic weave that is absorptive and permeable to water, water vapor, and oxygen. Gauze may be impregnated with petrolatum, antiseptics, or other agents. Gauze should not be used in clean ulcers, as they are labor-intensive to use, cause pain when removed if dry, and will dry out a wound. However, if no other dressing is available, the use of gauze that is kept continually moist is preferable to dry gauze. Moist gauze can be used to loosely fill a cavity wound and one with undermining and tunneling.

Negative Pressure Wound Therapy (NPWT)

These mechanical systems include a vacuum pump, drainage tube, and dressing set. The use of NPWT has been associated with increased rates of healing in stage III and IV pressure ulcers. Necrotic tissue must be debrided prior to using NPWT. Follow manufacturer guidelines for use.

Antimicrobial Dressings

Silver-Impregnated Dressings

An antimicrobial dressing used in ulcers that are infected or at high risk for infection. The silver is incorporated into foam, alginate, and other dressings. The silver is activated when it comes in contact with wound fluid. Consider discontinuing use when infection is controlled and/or drainage reduces significantly. Can turn tissues a dark color. Do not use in patients allergic to silver.

Honey-Impregnated Dressings

FDA-approved manuka honey is used for antimicrobial effects and can be effective on antibiotic-resistant bacteria while promoting healing. Used in stage II, III, and IV ulcers. Assists in debridement. Do not use in patients allergic to bees or honey.

Cadexomer Iodine

An antimicrobial dressing containing iodine that absorbs drainage and matter from the wound surface, and as it becomes moist, the iodine is released. Used in moderately to highly draining wounds. Do not use in patients with iodine sensitivity or thyroid disease. Difficult to use in large-cavity wounds.

Impregnated Gauze Dressings

A gauze dressing impregnated with polyhexethylene biguanide that provides a barrier to bacteria and inhibits the growth of bacteria in the dressing, thus protecting the wound and potential spread of bacteria from the wound. Used in place of plain gauze.

Many of the advanced dressings do not need to be changed daily, which reduces pain, time, and expense. Follow manufacturer directions.

Wound Debridement

- Surgical debridement.
- Mechanical debridement.
- Autolytic debridement.
- Enzymatic debridement.

The object of treatment is to reproduce (to the best of one's ability) the normal environment of the exposed tissue of the wound. The normal environment of all tissue and cells, with the exception of the epidermis, is warm, dark, moist, and protected. In order to heal any wound, including pressure ulcers, some basic principles need to be followed. These are:

- Remove necrotic tissue.
- Treat infection.
- Fill dead space.
- Maintain a moist wound environment.
- Protect the wound from infection, trauma, and cold.

Some of these principles will require medical intervention; others, good clinical care. By following these principles, caregivers will provide the wound with the environment it needs to heal.

Debridement: Removing Necrotic Tissue

Removing necrotic tissue is the critical first step when healing the ulcer is the goal. By removing dead tissue, bacteria and the risk for infection are decreased as well as drainage and odor. Removing

these materials may also contribute to the release of available growth factors in the wound, thus allowing the cells to multiply and heal the wound.

The removal of necrotic tissue is called debridement, of which there are several types. The most appropriate type of debridement will depend on the patient's overall condition and goals of care. Factors to consider include the status of the ulcer; the type, quantity, and location of the necrotic tissue; the presence or absence of infection; pain tolerance; the care setting; and professional accessibility (EPUAP/NPUAP, 2009).

Removing the necrotic tissue will often reveal the true size of the ulcer and the damage done—the “iceberg” effect. The patient and family should be educated that the ulcer will look worse after debridement and that the ulcer cannot heal without debridement.

Surgical

Performed by a surgeon at the bedside or in the operating room, surgical debridement is the quickest way to remove extensive necrotic tissue, undermining, and tunneling. The benefits of surgical debridement in the presence of advancing cellulitis, crepitus, fluctuance, and/or sepsis secondary to ulcer-related infection usually outweigh the risks. However, relative contraindications include anticoagulant therapy, bleeding disorders, and immune incompetence. If the necrotic ulcer is on a limb, a thorough vascular assessment is conducted prior to debridement to rule out arterial insufficiency. The NPUAP recommends against debridement of stable, hard, dry eschar in ischemic limbs.

Conservative, sharp debridement—as opposed to surgical debridement—may be performed by specially trained, competent, qualified, and licensed healthcare professionals consistent with local, legal, and regulatory statutes. Sharp debridement removes only loose, easily identifiable necrotic tissue.

Autolytic

This method allows the body to break down necrotic tissue by using its own enzymes and defense mechanisms. Autolytic debridement is accomplished with the use of occlusive dressings such as hydrocolloids and films. These dressings help maintain a moist wound environment, reduce pain, and provide a barrier to infections. The dressing is left on for a few days, allowing the accumulation of fluids and enzymes at the site. The dressing is removed, the wound cleansed, and new dressing

applied. This method takes time but is effective.

Chemical

This method involves the use of enzyme debriding agents. These agents break down necrotic tissue without affecting viable tissue. The enzyme product is applied daily to the necrotic tissue and then covered by a dressing. Enzymes are by prescription only, and currently only one is available on the market.

Biosurgical

This method uses sterilized bottlefly maggots, which debride the wound by dissolving dead and infected tissue with their digestive enzymes (in other words, the maggots eat the dead tissue). The maggots also disinfect the wound by killing bacteria. This in turn stimulates the growth of healthy tissue.

Mechanical

Mechanical debridement utilizes physical forces to remove necrotic tissue.

In the past, the most common type of mechanical debridement was the use of wet-to-dry dressings and whirlpools, but wet-to-dry dressings are no longer recommended. In this method, wet gauze is applied to the wound and necrotic tissue is allowed to dry and then forcibly removed without re-wetting. The gauze will have stuck to the necrotic tissue, thus removing it when the gauze is removed. However, this method is nonselective in that healing tissue will also be removed, thus re-traumatizing the wound bed and causing significant pain. The use of whirlpools has also fallen out of favor due to the difficulty in assuring the equipment is free of pathogens before its use on the next patient.

High-pressure wound irrigation is now used with commercially available devices, such as pulsatile lavage units. A lower-pressure method to debride tissue is to use a 35-ml syringe with a 19-g needle held a few inches from the wound. Care must be taken to minimize splashing and exposure to wound drainage. Infection control precautions should be followed.

Other Interventions

- Pain management.
- Antibiotics.
- Topical application of Insulin drops.

- Granulated sugar.
- Electrotherapy.
- A healthy diet.
- Management of incontinence.
- Muscle spasm relief.
- Negative pressure therapy (vacuum assisted closure).

Surgery

- Stage III & IV with exudates : flap reconstruction.

Complications

- Sepsis .
- Cellulitis.
- osteomyelitis
- Arthritis .

- Cancer.

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