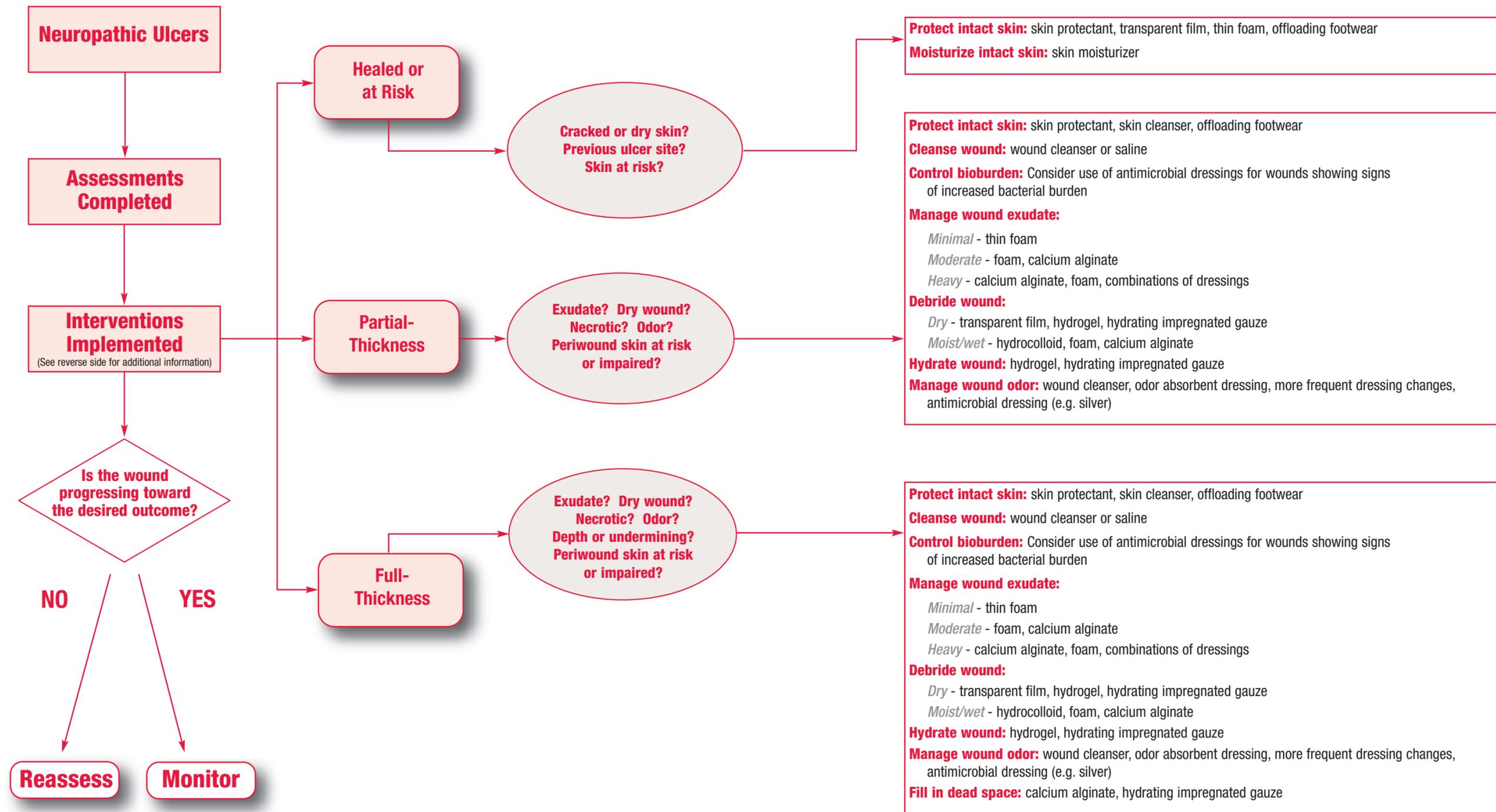


NEUROPATHIC ULCERS

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Healed Neuropathic Ulcer or Skin at Risk

A healed wound is epithelialized with adequate strength to maintain closure. At risk skin is tissue exposed to potential injury or tissue that is in a weakened condition (e.g. dry, thin).

Goals of Care: Maintain intact skin and improve tissue tolerance.

Wound and Skin Care Objectives: Protect and moisturize intact skin.

NEUROPATHIC ULCERS

BACKGROUND INFORMATION:

Neuropathic ulcers may occur in patients with diabetes, spinal cord injury, Hansen's Disease, or other conditions that result in loss of sensation in the feet. Diabetic foot ulcers are most commonly caused by a combination of peripheral neuropathy and peripheral vascular disease. (When the diabetic wound occurs in a patient with peripheral vascular disease alone, refer to educational materials on Arterial Leg/Foot Ulcers and autonomic changes).

In diabetes, **Neuropathy** is caused by prolonged glucose elevation and involves sensory motor changes. **Sensory neuropathy** leads to loss of sensation which is a protective function. The patient is unable to feel pain or discomfort so that friction or pressure from improperly fitting shoes, foreign objects in the shoes, or injuries from stepping on an object with bare feet does not result in corrective actions. Under these circumstances, patients may develop ulcerations, and they may not be aware of the injury. **Motor neuropathy** may result in deformities of the foot (Charcot deformities), thinning of the fat pad of the plantar area of the foot, and mid foot collapse with loss of the arch of the foot. These changes affect alignment of the foot and pressure distribution during ambulation which may result in pressure ulcers. **Autonomic Neuropathy** results in decreased sweating, resulting in dry skin that is at risk for skin breakdown.

Neuropathic ulcers typically share the following characteristics:

- most commonly found on the plantar surface of the foot
- varied wound depth
- even, well-defined wound margins
- varied presence and amount of necrotic tissue or exudate

Neuropathic foot ulcers are staged using numerous systems. For simplicity, these ulcers have been classified as partial-thickness which involves the epidermis and dermis, or full-thickness which involves deeper tissue such as subcutaneous tissue, muscle, bone and other supporting structures. The majority of diabetic patients will have osteomyelitis if bone is exposed in the wound bed.

The **periwound area** may demonstrate the following changes:

- a circumferential callous
- maceration
- dry, cracked skin
- warm skin temperatures

Multidisciplinary management of these patients with early intervention and close monitoring is key to prevention and proper treatment of complications such as gangrene and osteomyelitis which may result in amputation.

The algorithm on the reverse side provides a general path way for decision-making for assessment, management and treatment of neuropathic ulcers. Below is detailed information which is designed to assist health care providers. This tool should be used along with the consultative services of a wound care specialist, such as an WOC/ET nurse, physical therapist, clinical nurse specialist with expertise in wound management or a physician when indicated.

NURSING ASSESSMENTS:

The following provides a guideline for clinical assessment. Assessments must be done at regular intervals and are used to drive treatment decisions.

- **Assessment of risk or contributing factors:** patients at risk experience decreased sensation of their feet. Painless trauma may occur and be repetitive, precipitating ulceration. Groups at high risk are those with diabetes, spinal cord injury, smoking history, advanced age, or Hansen's Disease.
- **General assessments:** if the patient is diabetic, assessment of disease control is primary. Further assessment requires differentiation between neuropathic, arterial, and venous ulceration. Patients may have a combination of ulcer etiology (i.e., neuropathic and arterial insufficiency).
- **Assessment of foot ulcers** requires evaluation of the arterial perfusion, which may be performed by a non-invasive test named the ankle-brachial index. An index of <0.9 is an indicator of some degree of arterial insufficiency. However, diabetics with peripheral vascular disease may have falsely high results because of calcification of the arteries. These patients should be referred for further noninvasive vascular testing.
- **Assess for degree and type of pain** (e.g. reduced response to touch). Neuropathic ulcers without peripheral vascular disease involvement will have palpable pulses. Multidisciplinary evaluation and management is necessary in neuropathic ulcer care.
- **Assessment of nutrition, previous ulcer care (if applicable), level of understanding, compliance in care, and learning style.**
- **Assessment of wound:** infection; edema, exudate, odor; size (length, width and depth), necrotic tissue; granulation, epithelialization, and periwound skin condition.

GENERAL NURSING INTERVENTIONS:

- **Treat the cause of the problem.** Refer for medical and vascular evaluation. If the patient is diabetic, disease control is primary. Surgical consultation may be required for debridement and possible revascularization. Consider offloading footwear.
- **Support moist wound environment.** In a wound deemed to be healable moist wound healing may be appropriate. If significant arterial insufficiency moist wound healing is generally contraindicated and it is recommended to keep the wound dry to avoid further bacterial growth. Wounds between the toes may benefit from a dry dressing placed between the toes to absorb fluid and protect intact skin.
- **Prevent infection.**
- **Ambulate as tolerated.**
- **Control edema, if present.**
- **Aggressively treat infection:** Consult with physician to determine the need for antibiotic therapy, topical antimicrobial therapy, debridement, cleansing and dressing approach.
- **Debride:** This is based upon the condition of the patient and wound. *Debridement may be contraindicated in neuropathic wounds with significant arterial disease.* Consult a wound care specialist in these situations. Methods of debridement include: autolytic, mechanical, sharp and enzymatic.
- **Perform daily skin inspection and care:** Inspect for cracks, bruises or injury to the skin. Cleanse and moisturize the skin. Protect feet from injury. Avoid foot soaks. Check temperature of the water with a forearm or hand before bathing. Proper nail care is critical.
- **Provide adequate nutritional intake.**
- **Manage pain:** If pain is present, it may help to position legs and feet in a dependent position when arterial insufficiency is present. Sudden onset of pain in a normally insensate foot may be a sign of deep space infection. Notify the physician promptly.
- **Provide education to patient, family and caregiver.** Education plans should include the following: compliance with medications; control of diabetes (if applicable); smoking cessation; avoidance of exposure to trauma (e.g., friction, pressure, extremes in temperature, constrictive clothing, and walking bare foot).
- **Document assessments and interventions.**
- **Reassess at regular intervals per facility protocol.**
- **Monofilament testing may be considered for assessing sensation.**



Partial-Thickness Neuropathic Foot Ulcer

A partial-thickness wound involves the epidermis, dermis or both. It is a superficial wound and may present as an abrasion, blister or shallow crater.

Goals of Care: Restore skin integrity and avoid infection.

Wound and Skin Care Objectives: Protect intact periwound skin, cleanse wound, manage wound exudate, debride wound, hydrate wound and manage wound odor.

NOTE: Cautious use of moisture-retentive dressings and close monitoring is recommended with ischemic wounds. If peripheral pulses are absent, do not use occlusive dressings. Examples of non-occlusive dressings include a hydrogel in amorphous or sheet form, calcium alginate or impregnated gauze sponge. Examples of non-occlusive cover dressings include a composite dressing or gauze.



Full-Thickness Neuropathic Foot Ulcer

A full-thickness wound extends into deeper tissues which may involve subcutaneous tissue, muscle, bone or other supporting structures.

Goals of Care: Restore skin integrity and avoid infection.

Wound and Skin Care Objectives: Protect intact periwound skin, cleanse wound, manage wound exudate, debride wound, hydrate wound, manage wound odor, and fill in dead space.

NOTE: Cautious use of moisture-retentive dressings and close monitoring is recommended with ischemic wounds. When peripheral pulses are absent, do not use occlusive dressings. Examples of non-occlusive dressings include hydrogels in amorphous or sheet forms, calcium alginates or impregnated gauze sponges. Examples of non-occlusive cover dressings include foam dressings, composite dressings or gauze.



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Partial-Thickness Ulcer

PERIWOUND SKIN CARE

Restore Cleanser & Moisturizer

Restore Skin Conditioning Creme

WOUND CARE

Restore Wound Cleanser

Restore Hydrocolloid Dressing

Restore Hydrogel Dressing

(gel, sponge, packing strip) (hydrate)

Restore Calcium Alginate Dressing
with/without Silver (manage exudate)

Restore Foam Dressing with/without Silver
(manage exudate)

Restore Contact Layer Dressing
with/without Silver

Restore Odor-Absorbent Dressing
(manage exudate)

Full-Thickness Ulcer

PERIWOUND SKIN CARE

Restore Cleanser & Moisturizer

Restore Skin Conditioning Creme

WOUND CARE

Restore Wound Cleanser

Restore Hydrogel Dressing
(gel, sponge, packing strip) (hydrate)

Restore Calcium Alginate Dressing
with/without Silver (manage exudate)

Restore Foam Dressing with/without Silver
(manage exudate)

Restore Contact Layer Dressing
with/without Silver

Restore Odor-Absorbent Dressing
(manage odor)

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