Advanced Wound Care for Primary Care and Beyond

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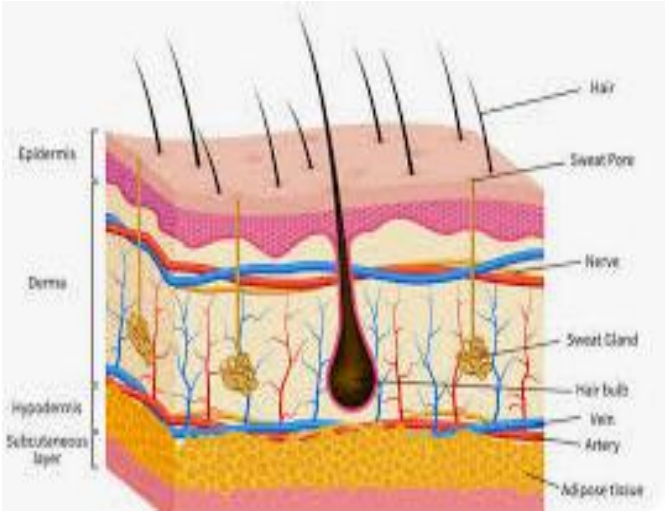


Objectives

- Understand basic principles of wound care
- Differentiate between various wound etiologies such as vascular, arterial, diabetic, and pressure ulcers
- Identify the different stages of pressure ulcers and when a wound is non-stageable
- Recognize which wounds can be managed in primary care versus those that require referral to specialty care

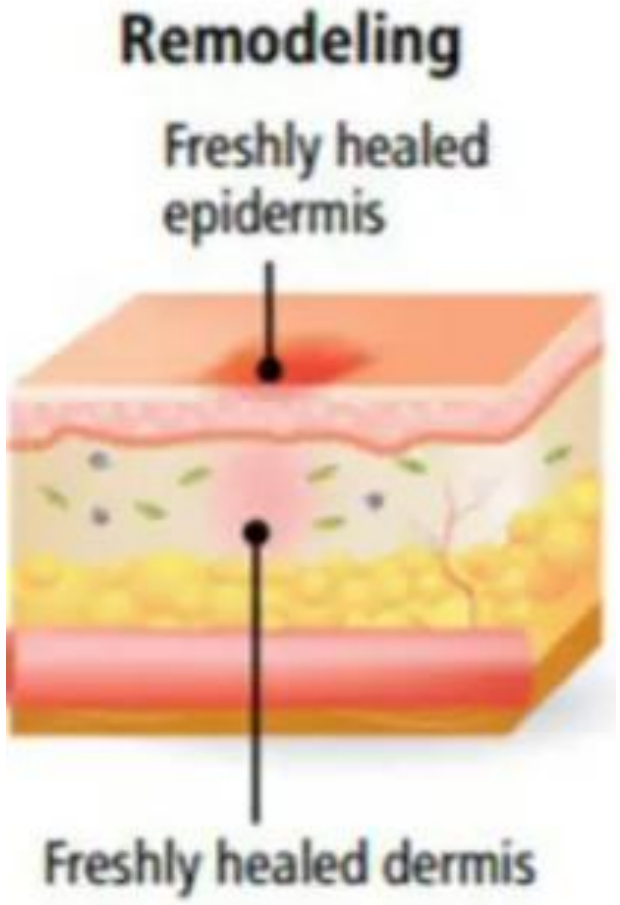
Basic Principles of Wound Care

Fundamental to Healing

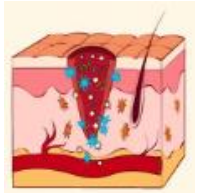
- Healthy patient
- Healthy and clean wound environment

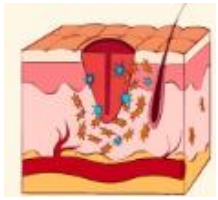
Essentials for Wound Healing

- Determine and remove or control the cause
- Establish adequate tissue perfusion
- Establish adequate nutrition
- Remove necrotic tissue and epibole
- Manage bioburden
- Moist wound healing



Four Stages of Wound Healing





- Hemostasis
  - Vasoconstriction, release of platelets-coagulate with fibrin (fibrous protein) at the wound site → formation of a blood clot (may last two days or longer)
- Inflammation
  - Vasodilation to prevent infection through the healing process. Characterized by erythema, swelling, pain, heat (may last 6 days or longer)
- Proliferation
  - Angiogenesis (the genesis of granulation tissue). Tissue regeneration depends on fibroblast synthesis and collagen production. Vital that moisture and oxygen levels remain high to ensure proper healing (may last more than two weeks)
- Maturation (Remodeling)
  - Collagen production continues to instill durability and elasticity in the skin, resulting in new scar tissue. Tensile strength is only 80% as strong as pre-injured skin

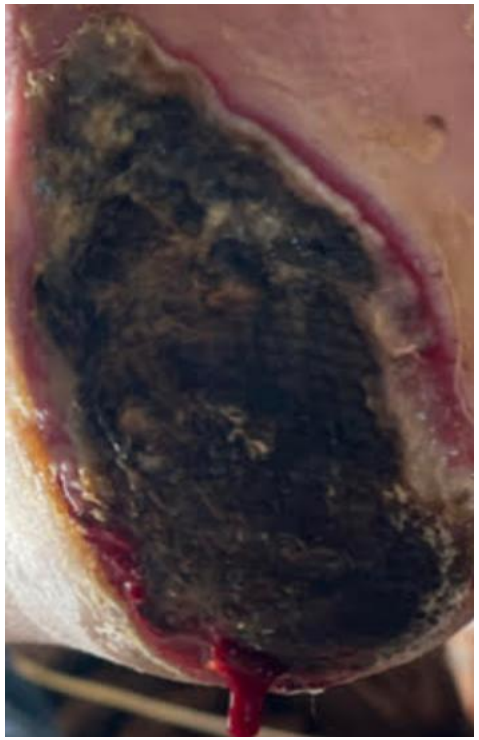
Necrotic Tissue: tissue has died and has lost its physical properties and biological activity

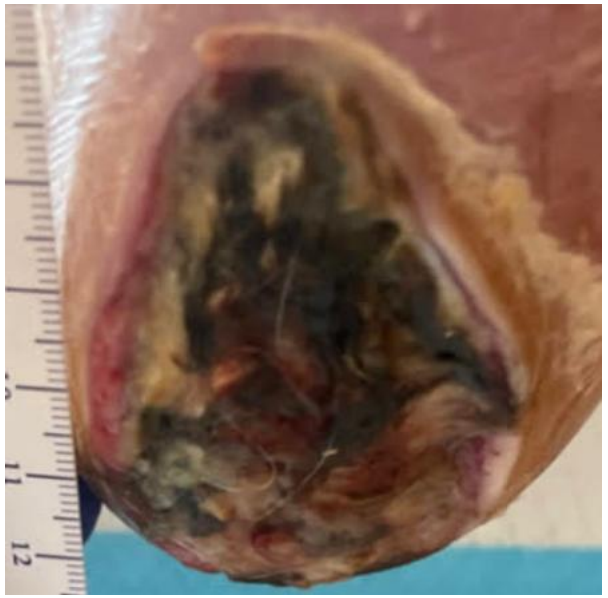
SLOUGH (YELLOW)	ESCHAR (BLACK/BROWN)
Soft, moist, avascular (devitalized) tissue; can be white, yellow, or green	Black or brown necrotic devitalized tissue; tissue can be loose or firmly adherent; hard or soft

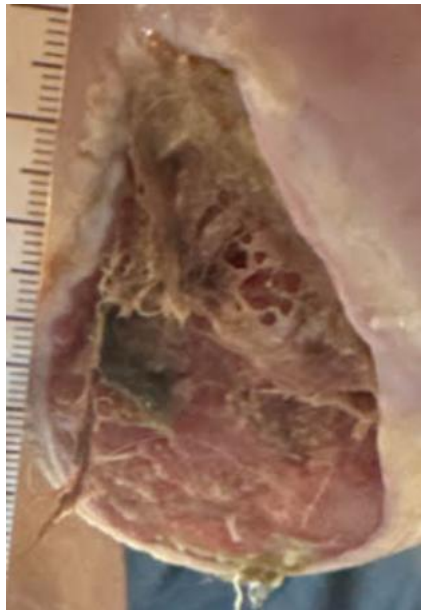
Conservative Sharp Wound Debridement

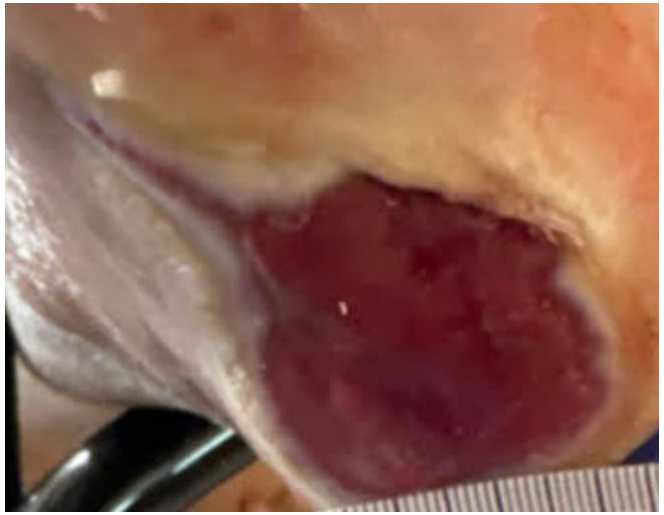
Contraindications to Debridement

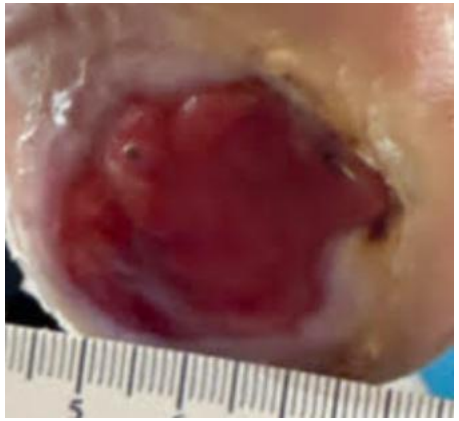
- Stable heel ulcers with eschar
  - Firmly adherent to surrounding skin, no inflammation, no drainage, no fluctuance.
- Ischemic wounds
- Patients with septicemia in the absence of systemic antibiotic treatment
- Medically unstable patients
- Active lesions of pyoderma gangrenosum
  - Creates a condition called pathergy which causes wound to worsen











Granulation Tissue

- Pink to red
- Granular buds present
- Soft to firm consistency

CLEAN

MOIST

COVERED

Wound Care Products

My wound is too wet....

My wound is too dry....

Collagen


MEDLINE
COLLAGEN
PURACOL®
WOUND DRESSING
MICROSCAFFOLD™
COLLAGEN
1x1
SQUARE
PRODUCT IS NOT
MADE WITH NATURAL
RUBBER LATEX
REF MSC8511


3M Promogran Prisma™
Collagen Matrix
Ag


Simpurity
WOUND DRESSING
COLLAGEN
PARTICLES
100% Bovine
Collagen
1g
5
Vials
Safe n Simple

Collagen: Key Roles in Wound Healing

- Critical structure and biological component for wound healing
- Scaffold Formation: provides a 3D matrix that serves as a matrix for cellular migration and proliferation ⟹ new tissue formation
- Angiogenesis Promotion: facilitates formation of new blood vessels, providing oxygen and nutrients to healing tissue
- Attracts fibroblasts ⟹ new tissue synthesis
- Supports re-epithelialization
- Matrix Metalloproteinase Modulation (MMP):
  - Zinc-dependent enzymes crucial for breaking down the extracellular matrix and facilitate all wound healing stages by clearing debris and allowing cell migration
  - When overactive, they can impair healing by degrading vital growth factors and matrix components .....**chronic wounds**
- Hemostasis: promotes platelet aggregation

Etiologies of Chronic Wounds

Arterial Ulcers
Venous Ulcers
Pressure Ulcers
Diabetic Foot Ulcers

Arterial Ulcers

- Causes:
  - Peripheral artery disease
  - Atherosclerosis/occlusion
  - Critical limb ischemia
  - Dyslipidemia

- Dysregulation:
  - Predominance of M1 macrophages
  - Inflammation
  - Oxidative stress
  - Necrosis
  - Nutrient deficiency

- Standard of Care
  - Restoration of blood flow

Etiology of different types of chronic wounds underlying causes,... | Download Scientific Diagram

Arterial Ulcer Treatment

- Avoid compression bandages
- Proper wound management
- Possible surgical interventions
  - Angioplasty
  - Bypass
  - Skin grafting
- Lifestyle modifications
  - Smoking cessation
  - Increased walking to promote circulation and formation of new blood vessels
  - Diet and Medication (manage BP and cholesterol)

Venous Ulcers

- Causes
  - Endothelial dysfunction
  - Ischemia
  - Venous insufficiency
- Dysregulation
  - Inflammation
  - Leakage of fibrin
  - Elevated MMPs levels
  - Oxidative stress
  - Iron overload
  - Tissue metabolites accumulation
- Standard of Care
  - Restoration of venous hydrostatic pressure

Etiology of different types of chronic wounds underlying causes,... | Download Scientific Diagram

Venous Ulcer Treatment

- Wound care
- Compression Therapy
- Treat infection
- Pentoxifylline to improve blood flow
- Lymphatic massage

Diabetic Foot Ulcers

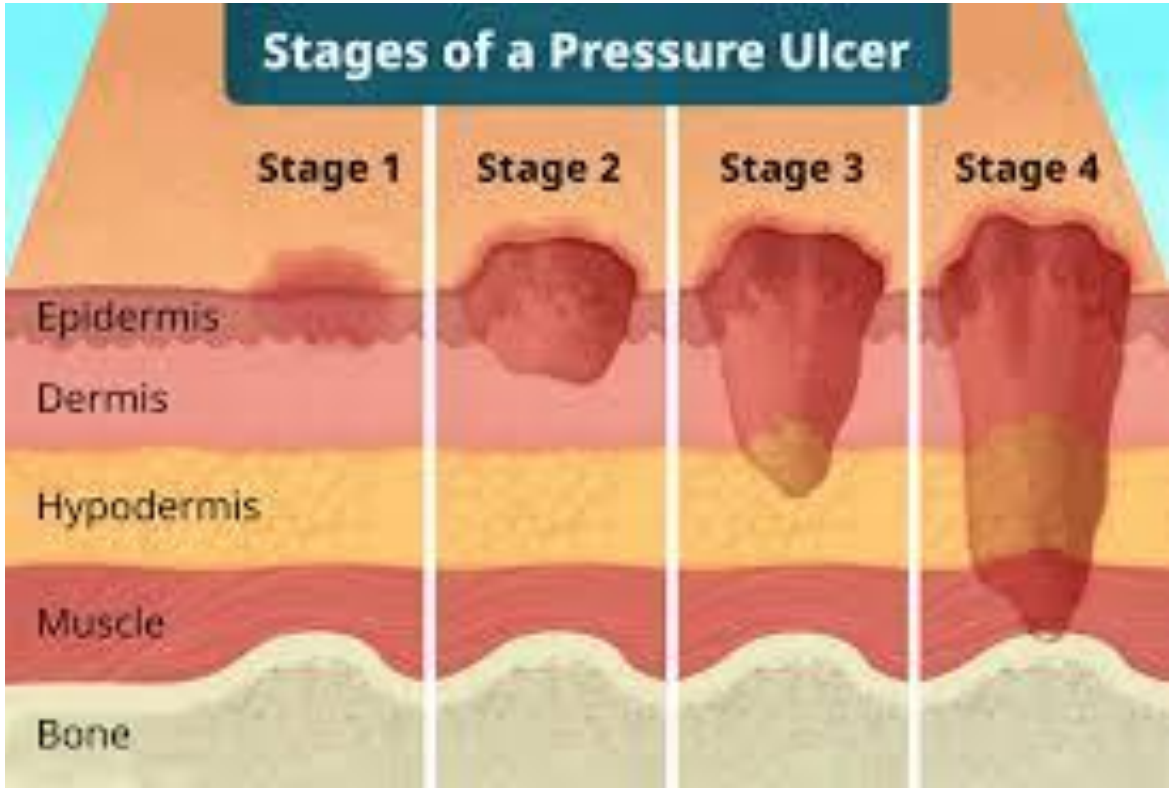
- Causes
  - Impaired angiogenesis
  - Neuropathy
  - Endothelial dysfunction
  - Micro-vascular disease
  - Dysregulated cytokines levels
- Dysregulation
  - Inflammation
  - Elevated MMPs levels
  - Hyperglycemia
  - Hyperlipidemia

- Standard of Care
  - Multifactorial; counteract pathogenesis for microenvironment restoration

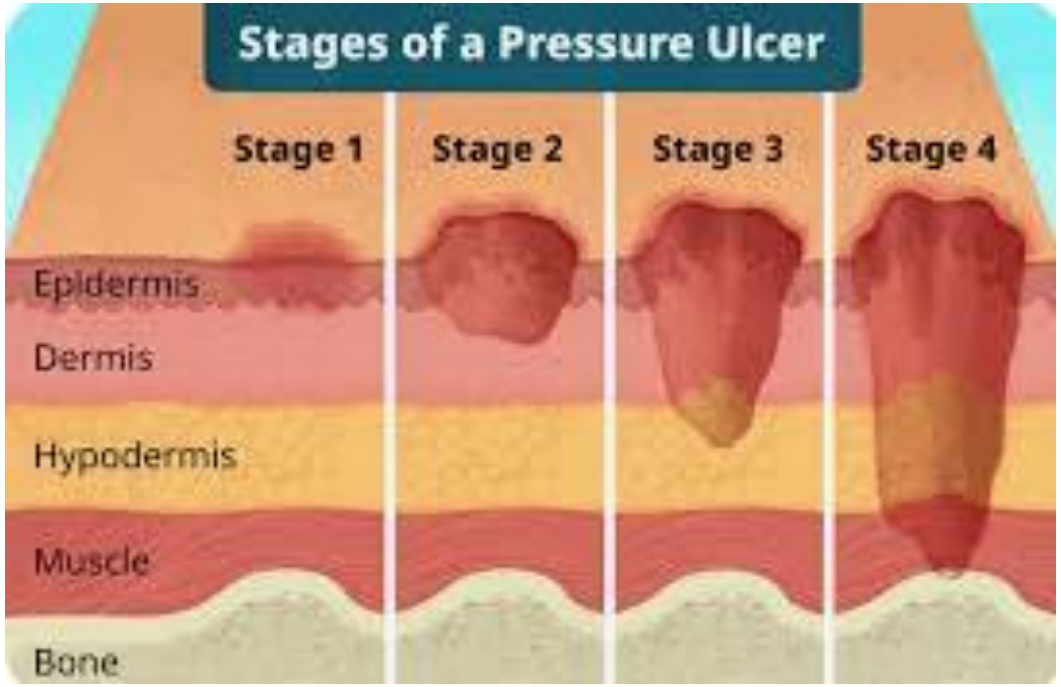
Etiology of different types of chronic wounds underlying causes,... | Download Scientific Diagram

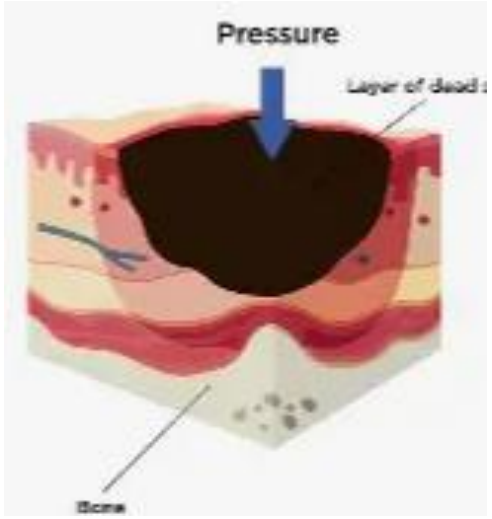
Pressure Ulcers

- Causes
  - Deep tissue edema
  - Pressure
- Dysregulation
  - Inflammation
  - Oxidative stress
- Standard of Care
  - Relief of pressure

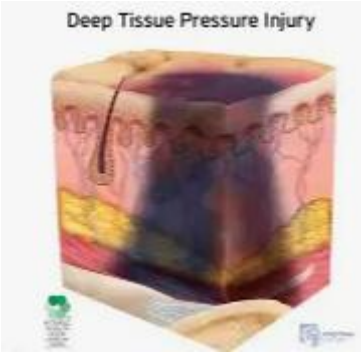


Etiology of different types of chronic wounds underlying causes,... | Download Scientific Diagram

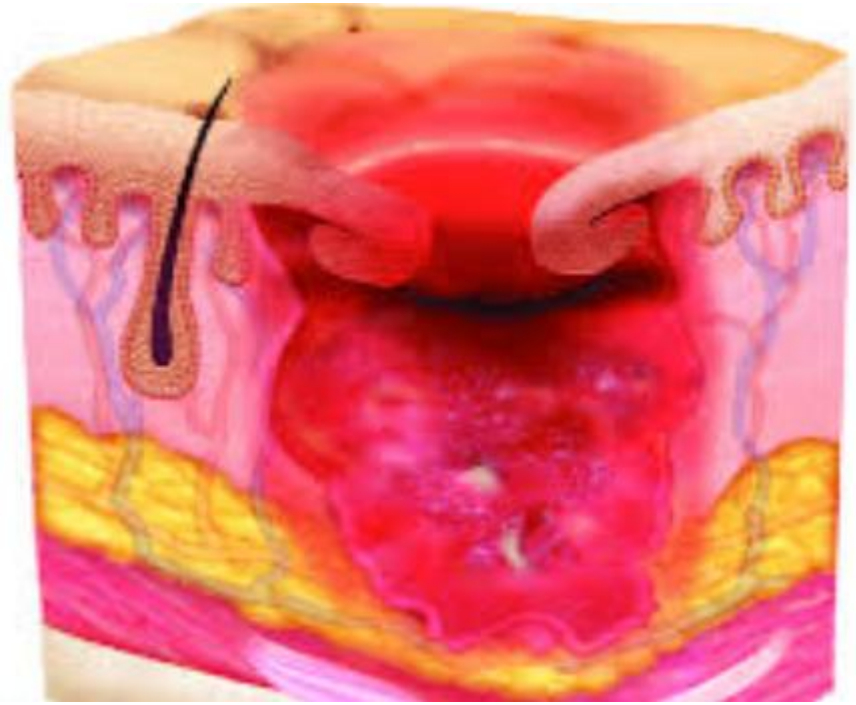




Pressure Ulcer Staging



Epibole



Wound Management

Advanced Wound Care Modalities

When to refer…

Manageable in PCP Office

- Wounds <30 days old
- Patients that have the ability to change dressings or have competent caregivers
- Do not require advanced wound care

Refer to Reskin Medical

- Chronic wounds >30 day old
- Require significant debridement
- Require advanced wound care including allograft application and/or Negative Pressure Wound Therapy
- Require home health involvement

Negative Pressure Wound Therapy

- Uses controlled suction to promote healing by applying sub-atmospheric pressure to a wound bed
- Mechanism of Action
  - Macrodeformation /approximation of the wound as wound edges are brought closer together by the suction which reduces the space required to be healed by primary closure or secondary granulation
  - Microdeformation of the wound surface; NPWT produces strain across healing tissues that promotes cell division and proliferation, growth factor production, and angiogenesis
- Extraction of fluid and exudate from the extracellular space, preventing further inflammation and/or necrosis
- Promotes a warm and moist environment, preventing desiccation and enhances formation of granulation tissue

https://pmc.ncbi.nlm.nih.gov/articles/PMC4110389/

Allografts

- Sterile, processed human amniotic membrane and fluid tissues
- Contain extracellular matrix proteins, cytokines, and hyaluronic acid to support tissue repair
- Used as a scaffold to promote tissue regeneration
- Reduce inflammation, fibrosis, and adhesions
- Derived from pre-screened healthy donors during cesarean sections
- Rich in growth factors and collagen

ReSkin MEDICAL

WOUND LOG

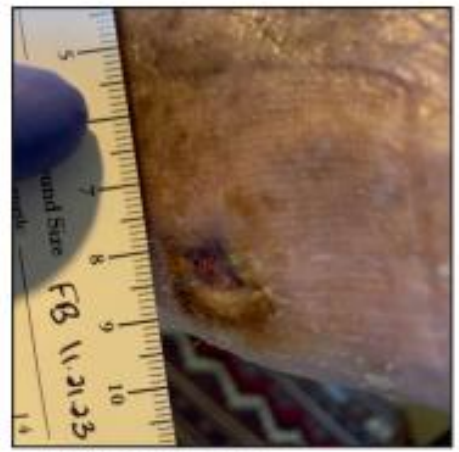
PATIENT PROFILE: ☒ Male ☐ Female Age 85 Date _____ Dx _____

DIAGNOSIS / CONDITION: Non-pressure chronic ulcer of skin of other sites with muscle involvement without evidence of necrosis; Puncture wound without foreign body, right foot

OCTOBER 23, 2023

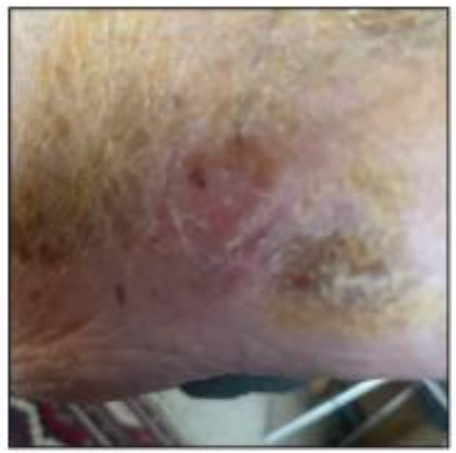
OCTOBER 17, 2023

NOVEMBER 7, 2023



NOVEMBER 21, 2023

DECEMBER 5, 2023



DECEMBER 12, 2023

NOVEMBER 29, 2023

JANUARY 3, 2024

MARCH 13, 2024

MAY 8, 2024

JUNE 3, 2024

JUNE 26, 2024

ReSkin MEDICAL

WOUND LOG

PATIENT PROFILE: ☐ Male ☒ Female Age 76 Date _____ Dx _____

DIAGNOSIS / CONDITION: Pressure ulcer of other site, stage 3; Unspecified open wound of abdominal wall, right upper quadrant without penetration into peritoneal cavity

SEPTEMBER 26, 2024

NOVEMBER 4, 2024

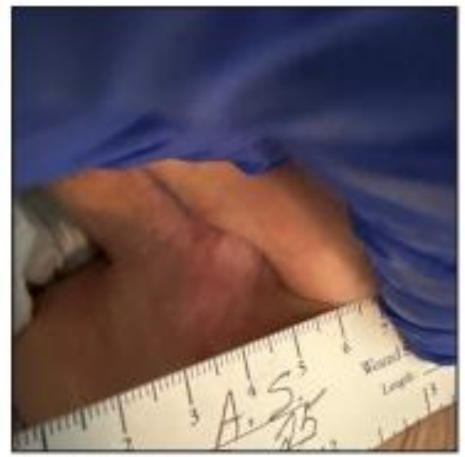
DECEMBER 18, 2024

JANUARY 22, 2025

FEBRUARY 18, 2025

MARCH 12, 2025

APRIL 2, 2025



APRIL 9, 20245

ReSkin MEDICAL

WOUND LOG

PATIENT PROFILE: ☐ Male ☒ Female Age 72 Date _____ Dx _____

DIAGNOSIS / CONDITION: Non-pressure chronic ulcer of other part of right lower leg limited to breakdown of skin

FEBRUARY 4, 2025

FEBRUARY 10, 2025

FEBRUARY 17, 2025

FEBRUARY 24, 2025

MARCH 3, 2025

MARCH 10, 2025