ＸⅡ　安全な医療連携について　グループ討議

講師：坂本　すが（東京医療保健大学）

フォーカスグループインタビュー

目的　　高度創傷管理技術の質の担保となるものを決定する。

責任者　紺家千津子（須釜淳子）、貝谷敏子（真田弘美）

日時　　平成21年3月8日　　15：00－17：00

対象　　高度創傷管理教育を受けたWOC看護師10名

方法　　5名のグループを単位として、ファシリテーターを中心にディスカッションを行う。

Aグループ	Bグループ
＊貝谷敏子（真田弘美）	＊紺家千津子（須釜淳子）
中川ひろみ	木下　幸子
津畑亜紀子	西浦　一江
祖父江正代	加瀬　昌子
小柳　礼恵	丹波　光子
樋口　ミキ	小林　陽子

（敬称略、＊印はファシリテーター）

インタビューガイド

1．　高度創傷管理技術（デブリードマン、ドレッシング材の選択、陰圧閉鎖療法）は必要な技術であるか？

2．　高度創傷管理技術を施設で行う際にどのような妨げがあるか？

3．　技術施行の際の安全性と質をどのように担保できるか？

4．　具体的にはどのような医療連携の構築が必要と考えるか？

XIII Wound Debridement for Nursing

講師：Dr. Courtney Lyder（University of California, Los Angeles）

Wound Debridement for Nursing

Courtney H. Lyder, ND, GNP, FAAN
Dean and Professor
UCLA School of Nursing

I. Anatomy and Physiology

VIABLE TISSUE

1. Skin
   a. Epidermis
      (1) Avascular, outer layer
      (2) Function is to repel H20, prevent H20 loss, protective barrier
   b. Dermis
      (1) Supports and nourishes epidermis
      (2) Contains nerves, blood vessels, sweat glands, hair follicles, sebaceous glands
2. Subcutaneous tissue
   a. Composed of mostly adipose (fat) and connective tissue
   b. Lymphatics and deep blood supply
   c. Yellowish in color
3. Fascia
   a. Appearance
      (1) Shiny white
      (2) Thick to thin
      (3) Sheath-like tough covering over muscle, blood vessels, and nerves
      (4) Non-viable fascia is grayish in color and slimy to touch
   b. Function
      (1) Supports muscle fibers to keep them together so they can act as a unit

I. Anatomy and Physiology

A. VIABLE TISSUE

4. Muscle
   a. Approx 650 muscles in body
   b. Appearance
      (1) Dull red to red, striated
      (2) Contractile
   c. Vascular - bleed easily
   d. Low tensile strength - can tear or be cut easily
   e. Important for movement
   f. Non-viable muscle is grayish in color and difficult to cut
5. Ligaments
   a. Fibrous band or sheet connecting bone and cartilage
   b. Facilitate motion
   c. Poor vascularity
   d. Appearance
      (1) Yellowish white due to higher concentration of elastin than tendons

I. Anatomy and Physiology

6. Tendon
   a. Appearance
      a. (1) White shiny when healthy
      b. (2) Fibrous tissue - cords, elastic, high tensile strength
      c. (3) Dull white or gray when dead (DEAD TENDON CANNOT BE RECOVERED)
         a. b. Attach bone to muscle ~
         b. Vascularity is poor
         c. Easily infected

I. Anatomy and Physiology

VIABLE TISSUE

7. Bones
   a. Appearance
      (1) Bright white in color
      (2) Solid, hard - very distinct sound/feeling when touched
      (3) Becomes yellow/brown when exposed
   b. Composition
      (1) Periosteum - external layer, will granulate or accept skin graft
      (2) Cortical- will die with exposure, infection portal
8. Blood vessels
   a. Arteries are bright red; veins are deep maroon/purple
   b. Tend to run side by side
   c. Observe for pulsing of structure before cutting
9. Adipose/Fat
   a. Yellow, globular, slippery and will recoil when touched
   b. Non-viable fat is grayish in color; dissolves or is hard/crunchy when touched
10. Viable Tissue in the Wound Bed
    a. Granulation - beefy red, bubbly tissue
    b. Epithelial - pink, fragile, new tissue; migrates from wound margins towards the center
    c. Clean, non-granular - pink to red in color; no visible signs of granular buds
11. Necrotic/Non-viable Tissue in the Wound Bed
    a . Definition: avascular, dead tissue which is insensate dull in color
       (1) Eschar -leathery, crusty, or scabbed dead tissue; usually black or brown in color
       (2) Slough - Can be yellow, grey or white in color; may present as wet, stringy or fibrous (adherent)
       (3) Maceration - softening and breakdown of a tissue due to prolonged exposure to moisture; usually white in color.
       (4) Callus - thickening and hypertrophy of horny layers of the skin. Usually yellow, light brown or white in color.

II. Debridement

A. Definition: the removal of necrotic tissue, cellular waste, harmful exudate, and other metabolic waste from a wound

B. Essential component of wound preparation

C. Objectives of Debridement Notes:

1. Remove necrotic/devitalized tissue or foreign material from a wound.
   a. Necrotic tissue impairs the development of healthy granulation tissue and the migration of keratinocytes
   b. Necrotic tissue prolongs the inflammatory Phase
      (1) Increases leakage of blood vessels in the wound bed leading to loss of protein/fluid in open wound
      (2) Protein leakage results in fibrin leaking onto wound surface that converts into hard, soluble protein coat of fibrin
      (3) Loss of protein from the vascular space leads to edema and malnutrition locally as well as protein malnutrition in general
   c. Necrotic tissue is a medium for bacteria/infection
      (1) When bioburden is high, delays wound healing
         i. Contamination: presence of bacteria on the surface that are not actively multiplying
         ii. Colonization: pathogens attach to surface of wound, but do not invade healthy tissue. Bacteria compete with wound cells for oxygen and nutrients, secrete byproducts that can be toxic to cells, and may cause increased cellular production of protein degrading enzymes,
         iii. Critical Colonization: presence of replicating bacteria that are beginning to cause local tissue damage
         iv. Infection: invasion of pathologic organisms into healthy tissue, The organisms multiply and overwhelm the immune system, This results in host reactions (pain, heat, induration, fever, edema, and erythema),100,0000rganisms/ml
      (2) Necrotic tissue can interfere with host defenses and facilitate deeper penetration of bacterialeading to cellulitis, osteomyelitis or septicemia

II. Debridement

d. Necrotic tissue is a physical barrier to wound contraction

C. OBJECTIVES OF DEBRIBEMENT:

2. Prevent infection / Remove source of pathogenic flora i.e. bone (ex. Osteomyelitis)

3. Interrupts the cycle of a chronic wound by bringing protease and cytokine levels closer to that of an acute wound, thus increasing cellular activity
   a. Debridement removes aging fibroblast cells, necrotic epithelial cells, and MMP's (matrixmetalloproteinases) thus allowing greater proliferation and migration of cells as well as growth factors

4. Restore circulation at the wound site

5. Correct abnormal wound repair
   a. Hypergranulation, epiboly hyper-contraction with hypogranulation, fistula and deep pressure necrosis

6. Facilitates visualization of wound wall and base
   a. Necrotic tissue may conceal abscesses and tunnels

7. Good vs. Harm

II. Debridement

D. CONSEQUENCES OF NOT DEBRIDING:
1. Increased risk of infection
2. Imposition of additional metabolic load
3. Psychological stress
4. Ongoing inflammation
5. Compromised restoration of skin function
6. Abscess formation
7. *Odor*
8. Inability to fully assess wound depth
9. Nutritional loss through exudate
10. Sub-optimal clinical and cosmetic outcome
11. Delayed healing

II. Debridement

GENERAL CONTRAINDICATIONS
1. Ischemic wounds

2. Stable/intact heel ulcers/eschar
   a. Definition
      (1) Firmly adherent to surrounding skin
      (2) No inflammation
      (3) No drainage
      (4) Eschar does not feel boggy or soft

   b. AHCPR Recommendations
      (1) Heel ulcers with dry eschar need not be debrided if they do not have edema, erythema, fluctuance, or drainage.
      Assess these wounds daily to monitor for pressure ulcer complications that would require debridement (e.g., edema, erythema, fluctuance, drainage). (Strength of Evidence = C.)
      (2) Stable heel ulcers with a protective eschar covering are considered an exception to the recommendation that all eschar be debrided. The eschar provides a natural protective cover.
      If any signs of complications appear, however, debridement is usually mandatory.
      (3) DO NOT DEBRIDE!!! Just keep clean and dry.

3. Patients with septicemia in the absence of systemic antibacterial treatment

4. Medically unstable patients

5. Active lesions of Pyoderma gangrenosum

II. Debridement

F. TYPES OF DEBRIDEMENT
1. Selective
   a. Removal of only devitalized tissue
   b. Types
      (1) Autolytic
      (2) Enzymatic
      (3) Bio Surgical

2. Non-selective
   a. Removal of both healthy and necrotic tissue
   b. Viable tissue sacrificed for rapid results with some methods
   c. Types
      (1) Mechanical
      (2) Chemical
      (3) Surgical sharp debridement
      (4) Conservative sharp debridement

II. Debridement

G. SELECTIVE METHODS
1. Autolytic Debridement
   a. Body uses own endogenous enzymes to dissolve necrotic tissue
      (1) Proteolytic, fibrinolytic and collagenolytic
      (2) Non-invasive, painless and non-harmful to healthy tissue
      (3) Typically a slow process especially in the elderly population, the malnourished, and patients with comorbidities
         I. As a person ages production of these enzymes are decreased and in some cases ineffective
         II. Risk of increased bioburden
   b. Must maintain moist wound healing to promote this process
      (1) Select dressing that maintain moisture and fluid within wound bed
      (2) George Winter, PhD, University of London questioned if allowing wound to dry out was the best method of healing.
         I. 1962 conducted study by creating multiple small partial thickness wounds on the backs of pigs. Portion of the wounds were allowed to dry out and form scabs, while others were covered with a polymer film.
         II. Results: Wounds that had been covered by polymer film re-epithelialized twice as quickly as the wounds exposed to air.
      (3) In 1972, DT Rovee presented a study regarding water loss thru the epidermis.
         I. Trans-epidermal water loss through intact skin is 42gm of water vapor per square meter of skin every day.
         II. Trans-epidermal water loss through skin with the stratum corneum removed increased to 7,874 gm of water vapor per square meter of skin every day.
      (4) Temperature Effects
         I. The loss of moisture from any surface by evaporation is accompanied by cooling of that surface; therefore as wound tissues lose moisture, there is local cooling of the wound.
         II. Cells and enzymes function optimally at normal body temperature. A temp fall of 2° C is sufficient to affect the biological process. A dressing change can drop the wound bed temperature for up to four hours before it returns to normal.
         III. Tissue cooling can lead to increased risk of infection by causing vasoconstriction and increasing hemoglobin's need for oxygen. This results in decreased oxygen available for neutrophils which fight infection.

II. Debridement

G. SELECTIVE METHODS
   c. Indications
      (1) Any wound with necrotic tissue, although other forms of debridement may be faster
      (2) Dry Gangrene

   d. Contraindications
      (1) Wet gangrene
      (2) Severe neutropenia
      (3) Immunocompromised patients
      (4) Deep, extensive wounds

   e. Criteria for dressing selection
      (1) Select dressing that maintain moisture and fluid within wound bed or add moisture?
      (2) Amount of drainage?
      (3) Maceration or fragility of periwound skin?
      (4) Frequency of dressing change
      (5) Minimal disruption of wound bed

II. Debridement

G. SELECTIVE METHODS
- f. Dressings
  - (1) Alginates
    - i. Sorbsan, Curasorb, Kaltostat
    - ii. Advantages
      - Excellent exudate absorption
      - Moist wound environment
      - Can be used on infected wounds
      - Biocompatible to tissues
      - Easy application
      - No irritation to healing tissue with removal
      - Can fill in dead space
      - Conformable
    - iii. Disadvantages
      - Permeable - poor barrier
      - Can dehydrate wound bed if inadequate exudate
      - Require secondary dressing

II. Debridement

G. SELECTIVE METHODS
- (2) Semi-permeable Films (transparent)
  - i. Tegaderm, Opsite, Polyskin
  - ii. Advantages
    - Good visual monitoring
    - Moist wound environment
    - Limited permeability to oxygen/H20 vapor
    - Biocompatibility to tissue
    - Waterproof
    - Excellent bacteria barrier
    - Cost effective in long run
    - Good for superficial wounds
- (3) Semi-permeable foams
  - i. Alevyn, Flexzan, Curafoam, Lyofoam
  - ii. Advantages
    - Moist wound environment
    - Fair to Good exudate absorption
    - Limited permeability to oxygen/H20 vapor
    - Easy application
    - Minimal irritation to healing tissue (nonadherent)
    - Biocompatible with tissue
    - Decreases pain at wound site
    - Most brands can be used on infected wounds (see manufacturer recommendations)
    - May be used under compression
  - iii. Disadvantages
    - No direct visual monitoring of wound
    - May macerate tissue of they become saturated
    - May need secondary dressing

II. Debridement

G. SELECTIVE METHODS:

- (4) Hydrogels and Hydrogel Sheets
  - i. Hydrogels: Curasol, IntraSite, SoloSite
  - ii. Hydrogel Sheets: Elastogel, Vigilon, Carradres, Flexderm
  - iii. Impergenated gauze: Transigel, Carragauze
  - iv. Advantages
    - Moist wound environment
    - Good for dry wounds/rehydrate
    - Biocompatible with tissue
    - Can fill in dead space
    - Can be used with infected wounds
    - Non-irritating to healing tissues
    - Some allow visual monitoring
  - v. Disadvantages
    - Poor/fair exudate absorption
    - Permeable (sheets semi-permeable)
    - May be difficult to secure
    - May require secondary dressing
    - May cause maceration
    - Poor barrier to infection

II. Debridement

SELECTIVE METHODS:

- (5) Hydrocolloids
  - i. Duoderm, Restore, Replicare, Tegasorb
  - ii. Can be occlusive or semi-occlusive
  - iii. Advantages
    - Moist wound environment
    - Easy application
    - Can be used in high moisture environment
    - Biocompatible with tissue
    - Occlusive/microbial barrier
    - Fair/Good exudate absorption
    - Decreases pain in wound site
    - Some are semi-occlusive and/or semitransparent
    - May be used under compression products
    - Change Q 3 to 7 days
  - iv. Disadvantages
    - Poor moisture vapor transmission
    - Not for heavily draining wounds, fragile periwound skin or exposed bone/tendon
    - May curl at edges
    - Can leave residue behind
    - Occlusive dressings cannot be used on infected wounds
    - Not recommended fro diabetic ulcers

II. Debridement

SELECTIVE METHODS:

- (6) Composites
  - i. Telpha Island, Alldress, Covaderm
  - ii. Advantages
    - Limited permeability to oxygen/H20 vapor
    - Conformable to wound
    - Easy application
    - Adhesive border
    - Can be used on infected wounds
    - Good exudate absorption
    - Dressing change 3x1wk
  - iii. Disadvantages
    - Require border of intact skin
    - May cause tissue trauma with removal
    - Can be expensive
- (7) Specialty Absorptives
  - i. Aquacel, Comdiderm, Exu-Dry
  - ii. Advantages
    - Can be used on any type of wound
    - Infected wounds
    - Min to heavy draining wounds
    - Non-adherent
    - Prevents maceration
  - iii. Advantages
    - Can be costly

II. Debridement

SELECTIVE METHODS:

- (8) Collagens
  - i. Fibrac, Woundres, Medfil Pads/'
  - ii. Available as freeze-dried sheets, pastes, gels
  - iii. Advantages
    - PM- FTW, tunneling wounds, skin grafts
    - Facilitate debridement
    - Min to heavy draining wounds
    - Non-adherent
    - Can be used on infected wounds
    - Conformable
    - Stimulate new tissue formatio~
  - iv. Disadvantages
    - Not to be used on 3rd degree burns (full thickness)
    - Require secondary dressing

II. Debridement

SELECTIVE METHODS:

(9) Wound Fillers
- i. Flexigel, Iodoflex, Multidex
- ii. Advantages
  - Moist wound environment
  - Easy application and removal
  - Fair to Good exudate absorption
  - Fill dead space
  - Conformable
  - Can use in infected wounds
- iii. Disadvantages
  - Not recommended for dry wounds
  - Require secondary dressing
  - May require extra cleansing

II. Debridement

. SELECTIVE METHODS:

g. Basic dressing application guidelines
- (1) Always cleanse with appropriate solution before
- (2) Reassess wound each time to determine if current wound treatment plan is most appropriate
- (3) Use skin protectants (i.e. Skin prep, barrier creams) to protect perlwound area
- (4) Use cytotoxic agents (i.e. Dakins, povidine-iodine, etc) only when necessary
- (5) Keep dressing approx 1-2 inches larger than wound itself unless specified by manufacturer.

II. Debridement

G. SELECTIVE METHODS:

2. Enzymatic Debridement
- a. Application of proteolytic substances/exogenous enzymes to wound bed to facilitate the breakdown of devitalized tissue (protein, collagen, fibrin)
- b. Types of Enzymatic Agents
  - (1) Accuzyme (Papain/urea)
    - i. Papain is a proteolytic enzyme
    - ii. Urea denatures non-viable protein facilitating the action of papain
    - iii. Effective over broad pH range 3-12
    - iv. Hydrophilic
    - v. Non-harmful to viable tissue
    - vi. Once daily dressing change
  - (2) Collagenase Santyl
    - i. Breaks down collagen which provides the framework that adheres necrotic tissue to wound bed
    - ii. Effective over narrow pH range 6-8
    - iii. Hydrophobic
    - iv. Non-harmful to viable tissue
    - v. Once daily dressing change
- c. Process/technique
  - (1) Follow product guidelines per manufacturer
  - (2) Cleanse wound prior to application of each Tx
  - (3) Cover with appropriate secondary dressing
- d. Indications
  - (1) >20% necrotic tissue in wound bed typically
  - (2) Elderly patients-supplement body's own enzymes
- e. Contraindications
  - (l) Sensitivity to the enzymes
  - (2) <20% necrotic tissue in wound

II. Debridement

G. SELECTIVE METHODS:

3. Bio Surgical Debridement
- a. Also known as larval or maggot therapy
- b. Process/technique
  - (l) Use of sterile maggots from "green bottle fly" applied to wound and covered with secondary dressing
  - (2) Maggots liquefy necrotic tissue and ingest it; consume bacteria and promote growth of fibroblasts
  - (3) Leave in wound 1-3 days
  - (4) Most ulcers completely debride in 2 to 6 cycles
- c. Indications
  - (1) Extensive necrotic tissue >70%
  - (2) Chronic non-healing wounds
  - (3) Infected wounds
  - (4) Wounds in which debridement may expose bone, tendon or joint
  - (5) Patient unable to tolerate surgery
- d. Contraindications
  - (1) Patient uncomfortable with thought of maggots
  - (2) Granulating wounds
  - (3) Deep, tunneling wounds
  - (4) Life- or limb-threatening wounds
  - (5) Patients with bleeding abnormalities
  - (6) Osteomyelitis
  - (7) Rapid progressing infection
  - (8) Patients with allergies to fly larva, chicken eggs, brewer's yeast or soy beans
- e. To order maggots go to following website: www.uclhs.ucl.edu/com/pathology/sherman/home_page.htm

II. Debridement

NON-SELECTIVE METHODS – MECHANICAL

1. Wet to dry dressings
- a. Process/technique
  - (1) Application of saline moistened, single layer large weave gauze to a wound, then allowed to dry out over a 4-6 hour period. Then remove dressing with a force great enough to pull non-viable tissue attached to gauze from the wound bed.
  - (2) Process repeated every 4-6 hours
  - (3) Can be painful with removal
  - (4) Minimal effectiveness in removing necrotic tissue
- b. CMS (DHHS) "May be appropriate in *limited* circumstances, but repeated use may damage healthy granulation tissue
  In healing ulcers and may lead to excessive bleeding and increased resident pain". **Considered to be against standard of practice in LTC.
- c. Indications
  - (1) Necrotic tissue in wound bed >70%
  - (2) Stage III and IV wounds
  - (3) Chemical or endogenous enzymes unable to remove debris
  - (4) When surgical or other debridement not indicated

II. Debridement

d. Contraindications
- (1) Wounds with < 70% necrotic tissue - traumatic to granulation and epithelial tissue
- (2) Superficial wounds
- (3) Bleeding
- (4) Pain (may need analgesics if other debridement options not indicated)
- (5) Infected wounds
- (6) Exposed tendon
- (7) May leave strands of gauze in wound
- (8) Blood thinning meds (precaution)

e. Why not "Wet to Dry"?
- (l) Allows loss of moisture vapor and local wound tissue cooling
- (2) Trauma to viable tissue with removal
- (3) Provides no physical barrier to exogenous bacteria
- (4) Removal disperses bacteria into air (cross contamination)
- (5) Labor intensive

II. Debridement

NON-SELECTIVE METHODS – MECHANICAL

2. Wound Scrubbing
   a. Process/technique
      (1) Use gauze or sponge and scrub from center of wound outward
      (2) Purpose is to remove soft slough and debris
      (3) Recommend 1x1day or less; as needed
   b. Indication
      (1) Shallow wounds
      (2) Stage II, III, IV wounds
   c. Contraindications
      (1) Granulation
      (2) Infected wounds
      (3) Bleeding (4) Patients on Coumadin or blood thinning meds (precaution)

II. Debridement

H. NON-SELECTIVE METHODS – MECHANICAL

3. High Pressure Irrigation
   a. Irrigation of wound with fluid delivered at 8-15 psi to remove debris and necrotic tissue
   b. Process/technique
      (1) Use 35 ml syringe and 19 gauge angiocatheter
      (2) Direct stream of fluid into wound bed at approximately a 60-70 degree angle
      (3) Typically use normal saline
      (4) Can use prepackaged canisters of pressurized saline
      (5) Wear personal protective equipment due to risk of splashing
      (6) 1x day or less; as needed
   c. Indications
      (1) Superficial non-attached cellular debris
      (2) Malodorous wounds
      (3) Venous ulcers
      (4) Neuropathic ulcers
      (5) Pressure ulcers
      (6) Deliver bactericidal agent
   d. Contraindications/precautions
      (1) Clean, granulating wounds
      (2) Infected wounds (protective equipment)
      (3) Tunneling/undermining (precaution)

II. Debridement

. NON-SELECTIVE METHODS - MECHANICAL
4. Pulsed Lavage
   a. Hydrotherapy delivered with handheld device
   b. Provides pressurized solution to wound bed for irrigation and debridement
   c. Purpose/Benefits
      (1) Soften and remove debris
      (2) Reduce bacteria
      (3) Can be used with undermining and tunneling wounds
      (4) Portable
      (5) Less labor intensive than whirlpool
      (6) Typically will not harm granulating tissue esp at lower psi
   d. Process/technique
      (1) Pulsed lavage offers return suction and variable pressure control
      (2) 4-15 psi with 8 psi most effective
      (3) Utilizes interchangeable tips for different size wounds
      (4) Tx time varies depending on wound size and extensiveness of necrosis or debris
      (5) Frequency varies from 1-2x1day for 3-7days/wk
      (6) Where appropriate protective clothing

II. Debridement

H. NON-SELECTIVE METHODS - MECHANICAL
4. Pulsed Lavage
   e. Indications
      (1) Superficial non-attached cellular debris
      (2) Malodorous wounds
      (3) Venous ulcers
      (4) Neuropathic ulcers
      (5) Pressure ulcers
      (6) Fasciotomies
      (7) Sternal wounds
      (8) Pulsed lavage good for large or multiple wound sites
      (9) Febrile patients
   f. Contraindications/precautions
      (1) No absolute contraindications
      (2) Clean, granulating wounds
      (3) Tunneling/undermining_
      (4) Patients on anticoagulants
   g. Can be costly

II. Debridement

H. NON-SELECTIVE METHODS - MECHANICAL
5. Whirlpool
   a. Effects/Purpose
      (1) Vasodilation and increase blood flow
      (2) Soften and loosen necrotic tissue
      (3) Wound cleansing
      (4) Mechanical debridement
      (5) Analgesic effects
   b. Process/technique
      (1) 10 to 20 minutes as determined by goal and size/amount of Necrotic Tissue
      (2) Optimal temperature 92 to 98 degrees F
      (3) Can be done 1-2x/day
   c. Chemicals used in Whirlpool treatments
      (1) Chlorazene
      (2) Betadyne
      (3) Povidineclodine
      (4) Sodium hypochlorite
   d. Indications
      (1) . Extensive necrosis >90%
      (2) Malodorous wounds
      (3) Infected wounds
      (4) Wounds with loose debris and foreign material
      (5) Ischemic wounds where vigorous perfusion of wound and surrounding tissue is desired

II. Debridement

H. NON-SELECTIVE METHODS - MECHANICAL
5. Whirlpool
   e. Contraindications
      (1) Superficial wounds
      (2) Wounds with <90% necrotic tissue
      (3) Granulating wounds
      (4) Systemic complications i.e. cardiopulmonary dysfunction, severe peripheral vascular impairment
      (5) Maceration
      (6) Acute phlebitis
      (7) Renal failure
      (8) Wet/Dry gangrene
      (9) Febrile conditions
      (10) Active bleeding
      (11) Moderate to severe edema
      (12) Callous or Hyperkeratotic tissue

   f. Should have written, reviewed and implemented P&P for all hydrotherapy treatments that incluc guidelines for disinfecting/cleaning, sterilizing and culturing equipment

II. Debridement

I. NON-SELECTIVE METHODS - CHEMICAL
1. Dakins Solution (sodium hypochlorite)
a. Primary action is antibacterial and odor control
b. Denatures proteins to loosen slough (controversial)
c. Indications
(1) Infected wounds
(2) Malodorous wounds
(3) Extensive slough
d. Contraindications
(1) Thick eschar
(2) Granulating wounds
(3) Epithelializing wounds
e. Process/technique
(1) Saturate gauze with solution
(2) Lightly pack into wound.
(3) Cover with gauze dressing
(4) Change twice daily :1
f. Precautions
(1)Cytotoxicity - damages fibroblasts
(2) Use ¼ strength to decrease cytotoxic effects (0.25%)

II. Debridement

. NEW DEBRIDEMENT TECHNOLOGIES AND TECHNIQUES
1. JETOX
a. Made by Tavtech, Ltd
b. Uses compressed O2 and Normal saline for irrigation and debridement
c. Portable
d. Two Types
(1) JETOX ND
I. No debris evacuation
(2) JETOX HDC
I. Debridement with debris evacuation
e. Ideal for patients sensitive to traditional debridement methods
2. Ultrasonic-Assisted Debridement
a. Low frequency US in conjunction with a gravity fed saline solution which aids in gently flushing of wound .
b. Little to no pain
c. Biological Effects
(1) Ultrasonic energy generates a cavitational response at cellular level
I. Gas bubbles created, separate non-viable matter from viable because tensile strength of necrotic cells is less than that of viable tissue
(2) Bactericidal Effect
I. Kills bacteria, viruses and fungi
II. Direct correlation between level of antibacterial effects and the length of time US is delivered to wound
d. Indications
(1) Locally infected wounds
(2) Wounds with impaired circulation
(3) Necrotic tissue (slough, fibrin, biofilms)

II. Debridement

J. NEW DEBRIDEMENT TECHNOLOGIES AND TECHNIQUES
e. Contraindications
(1) Untreated advancing cellulitis
(2) Metal hardware (i.e. artificial joints, plates, screws) in treat field
(3) Electronic devices in treatment fields
(4) Uncontrolled pain
f. Treatment parameters
(1) Frequency at 20-80 kHz
(2) Tx time: varies based on size of the wound, amount of necrotic tissue and patient tolerance
(3) Do not operate without irrigating fluid
(4) Can only be administered by trained and licensed providers: MD, PA, PT, APNP and RN.
g. Devices
(1) Qoustic Wound Therapy System (Arobella Medical)
I. Device utilizes a combination of US and sharp curettes
II. 3 different curette tips available (autoclavable and reusable)
- Full curette
- Half curette
- Open curette
III. www.arobella.com
(2) Sonoca 180 (Soring)
I. Delivers US at 25 kHz
II. 3 different probes available to handle various wound topographies (autoclavable and reusable)
III. www.soringinc.com
(3) SonicOne (Misonix)
I. Delivers US at 22.5 kHz
II. 4 different probes that offer a variety of aggressiveness for debridement (autoclavable and reusable)
III. www.misonix.com

III. Sharp Debridement

III. SHARP DEBRIDEMENT

A. Also known as instrumental debridement
B. Fastest and most effective way to remove necrotic tissue
C. Comes from French word desbrider, meaning to unbride
D. Reasons for Sharp Debridement
1. Removing nonviable tissue is imperative in improving the outcomes for individuals requiring wound care.
2. Produces more rapid results than other forms of debridement, and can reduce the risk of infection, and possible sepsis.
3. Various experts view sharps debridement as essential to the healing process and the conclusion that some draw from research is that sharp debridement should be considered the "gold standard", from the different methods of debridement studied, because it minimizes complications and maximizes healing
4. Migration of epithelial cells will not occur with necrotic tissue in the base of the wound because they need nutrients in order to migrate across the membrane - nonviable tissue removal is imperative.
5. A wound cannot properly be assessed without removing the nonviable tissue.
6. Some studies have shown that sharp debridement can improve healing rates (Steed DL et al, Effect of extensive debridement and treatment on the healing of diabetic foot ulcers, 1996)
7. Clinical experience and basic wound physiology tells us that the more rapidly you remove the necrotic tissue, the quicker a wound can close.

III. Sharp Debridement

F. GENEREAL CONSIDERATIONS

1. Anticoagulant therapy
2. Terminally ill
3. Wounds on hands and face
4. Immunocompromised patients
5. Smoking
6. Pain tolerance

III. Sharp Debridement

G. TYPES OF SHARP DEBRIDEMENT

1. Surgical Debridement v LO
a. Debridement was originally described by Napoleon's surgeon Baron Dominique Jean Larrey
b. Process/technique
(1) Major procedure performed by MD/podiatristsurgeon in an operating room under anesthesia
(2) Complete debridement transforming a chronic wound to an acute one
(3) Rapid results at the sacrifice of viable tissue
c. Indications
(1) One time use
(2) Extensive Necrotic Tissue>70%
(3) Osteomyelitis
(4) Advancing cellulilis and sepsis from a wound
(5) Life threatening necrosis, i.e. necrotizing fasciitis
(6) Abnormal wound repair
d. Contraindications
(1) Wounds < 70% Necrotic Tissue
(2) Patient unable to tolerate /survive procedure
(3) See general contraindications of debridement

III. Sharp Debridement

G. TYPES OF SHARP DEBRIDEMENT

e. Laser Debridement
(1) Form of surgical debridement
(2) Performed by physicians or surgeons
(3) Use of focused beams of light to cauterize, vaporize, or slice through tissue
(4) Indications/Contraindications
i. Same as Surgical
(5) Advantages Notes:
i. Wound bed is sterilized
ii. Severed vessels usually cauterized
(6) Disadvantages
i. Limited availability
ii. Injury to adjacent healthy tissue
f. Versa Jet (Hydrosurgery System)
(1) High pressure jet of saline solution 1200 psi) that travels parallel to the wound surface comb excision, cleansing and aspiration
(2) Surgeon able to differentiate tissue types using technique and varying the power settings
i. Able to target damaged tissue and decrease damage to viable tissue
ii. MUltiple tip configurations provides more flexibility
(3) Smith Nephew (www.versajetinfo)

III. Sharp Debridement

G. TYPES OF SHARP DEBRIDEMENT

2. Conservative Sharp Debridement
a. Process/technique
(1) Minor procedure performed by therapist or nurse (if state practice act allows) to remove only devitalized tissue
(2) May require several sessions
(3) Recommend ABI
i. ABI calculation: Ankle systolic divided by brachial systolic
ii. Interpreting Readings
Normal > 1.0
LEAD < 0.9
Borderline 0.6 - 0.8
Severe ischemia < 0.6
b. Indications
(1) Cross hatching of eschar
(2) Extensive devitalized tissue.
(3) Signs of advancing cellulitis or sepsis
(4) Adjunct in combination with other methods
(5) Hyperkeratotic rim diabetic neurotrophic foot ulcers tcallus formation)
(6) Unstable eschar caps
c. Contraindications
(1) Bleeding disorders/abnormalities
(2) Arterial insufficiency
i. Check ABI prior to debridement if lower extremity wound
(3) Dry Gangrene
(4) Stable heel ulcer or stable eschar
(5) Malignant wounds
(6) Unidentifiable structures
(7) If wound can be managed without procedure
(8) State law or practice disallows performance by therapist or nurse

III. Sharp Debridement

IV. LEGAL IMPLICATIONS/POLICY AND PROCEDURE FOR SHARP DEBRIDEMENT

A. Legal Standards of Practice
1. State Practice Act
2. Company Policy & Procedures
3. National Professional Standards of Practice
B. Who can do sharp debridement?
1. Physicians and Podiatrists
2. Physicians assistants
3. Physical Therapists and PTA's
4. Nurse Practitioners and nurses
C. Policy and Procedure
1. Must have a physician / NP order that specifically notes each site; new site new order.
a. Ex: P.T. (or R.N.) to perform conservative sharp debridement to left heel and left lateral malleolus prn (or state specific frequency i.e. 3x1week x 2 weeks)
2. Be sure that facility policy & procedures reflect what disciplines can perform sharp debridement
3. Nurses must complete the following to perform sharp debridement (following is an excerpt from a WOCN position statement)
a. Must have additional didactic education in the skill
b. Must have additional laboratory education to develop the skill
c. Must participate in a clinical practicum involving patients with wounds
4. It is highly recommended that PT's/PTA's complete an education course on wound debridement and a competence validation of debridement skills

III. Sharp Debridement

VI. OTHER THINGS TO CONSIDER BEFORE PERFORMING SHARP DEBRIDEMENT

A. Does your state or employer require any special education, training or credentials?
B. Are you required to periodically updated knowledge and skills?
C. Are there any specific guidelines outlined by your professional organization or employer?
D. Are there policies and procedures in place?
E. Is there any physician supervision required and if so to what extent?
F. Is malpractice insurance provided by employer?
G. Do you have malpractice insurance?

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

A. What does it take for effective sharp debridement?
1. Good working knowledge of anatomy
2. Ability to identify viable tissue
3. Adequate equipment, lighting and assistance
4. Ability to explain the procedure to the patient
5. Pain management skills before, during and after procedure
6. Ability to deal with complications, i.e. bleeding
7. Recognition of clinician skill limitations and those of the technique
8. Use of secondary debridement technique as indicated

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

B. Sharp Debridement Tools
1. Tools used in conservative sharp debridement
a. Scalpels - for cutting away nonviable tissue and crosshatching eschar.
(1) Size 11: small pointed blade tip for getting into small areas and cross-hatching eschar.
(2) Size 15: small rounded blade for cutting away necrotic tissue, trimming loose tissue, and cross hatching eschar.
(3) Size 10: large rounded blade for cutting away large amounts of necrotic tissue (i.e. callous formation)
b. Forceps - for holding or pulling away nonviable tissue.
(1) With teeth (pick-ups): contain small metal teeth at the end of the forceps for grabbing and pulling tissue up or out in order to remove or cut away.
(2) Without teeth (serrated): most commonly used tool.

III. Sharp Debridement

c. Scissors - for cutting and trimming away nonviable tissue.
(1) Sharp: used for getting into small areas. v
(2) Blunt: not used often.
(3) Curved: tip curved up; helpful for trimming edges safely.

d. Curettes: spoon-shaped instruments with a sharp edge. Comes from the French verb, "curer", which is to "scrape clean".
(1) Ear curette: spoon-shaped, for removal of soft necrotic tissue. (melon-ball scooper)
(2) Loop curette: looped end for removal of soft or fibrous, necrotic tissue
(3) Dermal curette: looped, with a sharp end for the removal of fibrous necrotic tissue
(4) Fox Curette: flat handle with a cylindrical arm extending from the handle. There is an oval or rounded-looped cutting edge at the end of the arm. This tool is generally metallic.
(5) Piffard Curette: large metal handle tapering inwardly from the bottom of the handle. It is similar to the Fox Curette with the cylindrical arm, and similar cutting edges. It differs from the Fox Curette in that it is provided with ribbed and grooved surfaces extending lengthwise along the handle.
(6) Eye curette: very similar to the Fox Curette except the working element is dish-like rather than loop-shaped allowing for a scooping action. (melon-ball scooper) It is metallic, rather than plastic, like the ear curette, and scan be disposable rather than autoclaved. The eye curette also has ribbing on the handle.

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

B. Sharp Debridement Tools
2. Disposable verses Reusable
a. Disposable pros - single patient use, quality is improving, custom pack
b. Disposable cons - lower quality than reusable, higher long term cost, limited choices
c. Reusable pros - numerous choices, wide range of quality, unlimited usage
d. Reusable cons - higher initial cost, sterilization process capabilities, instruments have to be maintained, exposurerisk with sterilization process

C. Analgesics
a. May be needed in some cases
b. Oral Analgesics
c. Topical analgesics
(1) EMLA (topical lidocaine anesthetic) cream, applied 60 to 90 minutes before a sharp debridement procedure, can successfully eliminate pain.
(2) LMX-4 (formerly ELA-Max): over-the-counter (OTC) topical anesthetic that produces dermal anesthesia in 15 to 30 minutes. The 4% lidocaine preparation contains 40 mg of lidocaine per gram. The lidocaine molecules are encapsulated in a lipid layer (liposomes) to enhance dermal absorption
(3)CETACAINE - comes in a spray and gel. Applied directly to wound site. Federal law requires MD order.
I. Spray: Applied for 1 second or less for normal anesthesia.
II. Gel: Applied with cotton applicator. Should not be held in one area for extended periods of time.
III. Improper use can cause Methemoglobinemia which is a condition when more than 1% of hemoglobin in the blood has been oxidized to the ferric form. If increases to 30 % it can lead to cyanosis, dizziness, headaches, drowsiness. If increases to 50% it will progress to seizures, cardiac arrhythmias and coma. Requires large quantities for it to be harmful.
(4) Interferential current or TENS

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

D. Safety with Sharp debridement
1. Stay FOCUSED! Eliminate distractions.
2. Stay organized.
3. Use safety scalpels if possible.
4. Wear cotton gloves under sterile gloves: www.eriehandcare.com
5. Double glove if possible
6. Be comfortable with the tools in your hand.
7. Keep free hand away from debridement area when not using forceps.
8. Place patient in comfortable position and stabilize area of the body being treated.
9. Adhere to standard precautions.
a. Goggles
b. Mask
c. Gown
d. Shoe covers

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

E. Preparing to Debride
1. Collect supplies
2. Arrange for help if needed
3. Ask patient for history regarding blood thinners, and allergies if known
4. Position patient for their comfort, and to decrease clinician fatigue
5. Prepare sterile field and place instruments needed
6. Ensure containers are available for sharps and tissue disposal

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

F. When to 'STOP' Sharp Debridement Procedure
1. Intolerable pain
2. Reach viable tissue - the best indicator of viability is bleeding during debridement
3. Clinical/patient fatigue
4. High patient anxiety
5. Location of a fascial plane
6. Change in patient's medical status
7. Severe bleeding
a. Most frequent complication
b. How to 'STOP' Bleeding
(1) Pressure -Should stop most bleeding. Using the palm of your hand on the gauze or cloth, apply direct pressure to the wound for 5 minutes. (During the 5 minutes, do not stop to check the wound or disturb any blood clots that may form on the gauze.) If blood soaks through the gauze, do not remove it. Apply another gauze pad on top and continue applying pressure
(2) Silver Nitrate - cauterize by holding a silver nitrate (AgN03) applicator firmly over the bleeding source for 15-30 seconds. Repeat 2-3 times as needed.
(3) Elevation
(4) Calcium alginate

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

G. Selecting the Right Method of Debridement
1. Wound Characteristics Notes:
a. Amount of necrotic tissue to be removed
b. Type of necrotic tissue
c. Infection
d. Pain
e. Exudate
f. Required rate of debridement
2. Patient's concerns and individual wishes
a. Patient's medical history (comorbidities)
b. Patient allergies and medications (blood thinners, NSAIDS, steroids, etc)
c. Pain tolerance
d. Personal preferences and perception of condition
3. Clinician concerns
a. Clinician skill level and confidence
b. Time
c. Cost
d. Available resources
e. Potential for bleeding and complications
4. MD order state specific method?

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

H. Combination Methods
1. Use of two or more types of debridement to facilitate faster or more effective results based on needs of the patient
2. Ex: Hard, black eschar; use whirlpool to soften followed by conservative sharp debridement to remove tissue then followed by enzymatic debridement to continue softening and debriding necrotic tissue until following day.

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

I. Correcting Abnormal Wound Repair
1. Epiboly- wound edges become curled, impossible to heal when this exists
a. How to treat or correct
(1) Clean area thoroughly.
(2) Explain to patient that the procedure may burn slightly if they have sensation in the area.
(3) Protect wound by placing saline moistened gauze in the wound bed
(4) Protect periwound area using Vaseline or other topical product that will prevent silver nitrate damaging it.
(5) Tissue that is going to be treated must be moist.
(6) Roll silver nitrate stick along area of epiboly. This will turn epiboly tissue into necrotic tissue.
(7) Leave silver nitrate in contact with the tissue for up to 2 minutes.
(8) Rinse area thoroughly with normal saline to deactivate silver nitrate.
(9) When done with procedure, apply same dressing as was previously covering wound.
(10) Remove necrotic tissue during next treatment session.
(11) Repeat procedure until wound edges are flat again.

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

2. Hypergranulation
a. Overgrowth or hypertrophy of granulation tissue behind the wound margins .
b. Impedes re-epithialization and wound closure
c. How to treat and correct
(1) One method is the use of foam dressings. Simply apply foam to hypergranulated area, pushing hypergranulated
tissue into wound bed, and wrapping with kerlex.
(2) Second method is the use of silver nitrate in much the same manner used to treat epiboly.
(3) Cleanse wound and explain to patient that procedure may burn slightly.
(4) Roll silver nitrate stick over hypergranulated area.
(5) Tissue will turn grey and white.
(6) When done with procedure, apply same dressing as was previously done.
(7) Debride tissue during next treatment session.
(8) Repeat as needed until granulation tissue is even with the wound edges.

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

J. Documenting the Debridement Session
1. Note description of wound before and after session
a. Location = note using anatomical landmarks; be specific
b. Measurement
(1) Length X width X depth
i. Length = 12:00 to 6:00 (head to toe)
ii. Width = 3:00 to 9:00 (side to side)
iii. Depth =distance from the visible surface to the deepest area of the wound
(2) Options
i. Linear = using paper ruler or measuring device. Recommended method is Head to toe (length) and Side to Side (width) at perpendicular angle.
ii. Tracing = provides 2-dimensional record of wound; helpful if photography prohibited
iii. Photography
- Very specific
- Requires consent/release form (example in appendix)
- Must ensure that lighting, angle and focal length are consistent
- Lay paper ruler next to wound with first initial, last name of patient, date and time photograph was taken, for every photograph.
- Controversial
c. Wound Bed Description
(1) Types of tissue present
(2) Color of tissues: Most common descriptors are red, yellow, black, pink, gray and white
(3) Adherence of tissues
(4) Other structures: note presence of tendon, muscle, bone, sutures, staples, etc

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

J. Documenting the Debridement Session
d. Surrounding Tissue
(1) Must note the condition of periwound area: healthy, macerated, callus, ecchymosis, erythema, etc
e. Drainage/exudate
(1) Types
i. Serous - clear
ii. Sanguineous - red, bloody, fresh bleeding
iii. Serosanguineous - pink, clear and bloody
iv. Purulent - yellow, brown, or green, containing pus
(2) Amount
i. None = dry wound bed
ii. Scant = wound bed moist; no measurable exudate on dressing
iii. Minimal/small =wound tissue moist; <25% of dressing
iv. Moderate =wound tissue very moist; 50-75% of dressing
v. Copious = wound tissue filled with fluid; >75% of dressing
f. Signs and symptoms of or absence of infection
(1) IFEE signs: (induration, fever, edema, and erythema)
(2) Streaking, pain, increased exudate, delayed healing, odor (abnormal or foul)
g. Miscellaneous
(1) Tunneling - channeling or passageway, extends in any direction, results in dead space
(2) Sinus tract - drainage passageway from a deep focus of acute infection to surface opening
(3) Undermining - destruction of tissue or erosion along the wound margins beneath intact skin

III. Sharp Debridement

VII. PRACTICAL APPLICATIONS OF CONSERVATIVE SHARP DEBRIDEMENT

J. Documenting the Debridement Session
2. Tools used
a. Be specific of the types of tools used during the session
b. Medicare prefers "Excisional extraction"
3. Amount and type of tissue debrided
4. Dressing (sterile) applied after treatment

III. Sharp Debridement

VIII. PERFORMING SHARP DEBRIDEMENT

K. Sterile Field Preparation
1. Used when sharp debridement is performed; a form of surgical asepsis designed to keep the area free from pathogens.

III. Sharp Debridement

VIII. PERFORMING SHARP DEBRIDEMENT

2. Procedure
   a. A nonabsorbent sterile towel, or the outer cover or wrapping of a package is used as a base for the sterile field. Open the package, folding the topmost part of the packaging away from your body. Next, open the next layer of wrapper to the sides. The last layer of wrapper is opened toward you to avoid reaching over the sterile field.
   b. Sterile objects may be added to the field carefully by peeling back the top layer of the outer package, and dropping the sterile item on the sterile field.
   c. Only take out the objects that have been specifically sterilized or sterile packaged can be considered sterile.

3. 4 Rules of Asepsis:
   a. Know which items are sterile
   b. Know which items are not sterile
   c. Separate sterile items from non-sterile items
   d. If a sterile item becomes contaminated, the situation must be remedied immediately. Contamination occurs any time a sterile item physically contacts a non-sterile item. It may be necessary to re-establish the sterile field.

III. Sharp Debridement

VIII. PERFORMING SHARPE DEBRIDEMENT

4. Guidelines for Maintaining a sterile field
   a. Do not talk, sneeze, cough or reach across a sterile field.
   b. Do not turn your back to a sterile field.
   c. Do not allow a non-sterile object to come in contact with a sterile object.
   d. Do not leave sterile field unattended, even if covered with a sterile towel.
   e. A 1-inch border at the edges of the field is considered to be non-sterile.
   f. The only sterile protective clothing that you wear is the gloves, the front of the gown above the waist, and both sleeves of the gown.
   g. When tools are stored in a disinfectant, they should be handles with the tip downward, so the fluid will not flow to a non-sterile area, and then back down.
   h. The field must remain dry, as moisture is a source of contamination.
   I. Try to position the tools in the order that they will be used and closest to you.
   J. Any item that falls or is located below the sterile field is considered contaminated.
   k. General cleanliness and proper hand-washing techniques should be practiced at all times!!!!

III. Sharp Debridement

VIII. Performing Sharp Debridement

L. Applying sterile gloves
   1. Grasp edge of folded cuff
   2. Lift and hold glove with fingers down
   3. Pull first glove on with cuff folded
   4. Slide fingers of gloved hand under cuff of second glove
   5. Insert hand with cuff folded
   6. Adjust gloves on both hands

M. Removing contaminated gloves
   1. Invert glove as it is removed
   2. Hold contaminated glove that was just removed in other gloved hand
   3. Slide ungloved fingers under / inside gloved hand
   4. Remove second glove onto other glove, inside out.

III. Sharp Debridement

VIII. Performing Sharp Debridement

N. Utensil Techniques
   1. Pick-Ups
      a. Hold instrument between index finger and thumb, like a pencil
      b. Hold pick-up in the palm of hand utilizing index finger palm, and thumb
   2. Scalpel
      a. Pencil hold
         (1) Between index finger and thumb like a pencil.
      b. Palmar Technique (less control)
         (1) Handle of scalpel runs along the palm of the hand

III. Sharp Debridement

VIII. Performing Sharp Debridement

O. Debridement Techniques
   1. Paring or Shaving
      a. Typically used with removal of callus or eschar caps
      b. Clinician uses scalpel, usually in conjunction with a forceps to cut thin layers of devitalized tissue from a wound
      c. This is not "scraping"
   2. Cross Hatching or Scoring
      a. Used to prepare eschar for enzymatic agents or hydrogel
      b. Clinician cuts a "checkerboard" pattern on eschar using scalpel
         (1) Increases the surface area of eschar
         (2) "Checkerboard" squares should be approx. ¼ inch in size
   3. Debridement
      a. Removal of necrotic tissue from wound using scalpels, scissors and/or forceps.
      b. Clinician usually removing extensive amounts of necrotic tissue utilizing different instrument techniques being careful to not harm viable tissue
   4. Demonstration of sharp debridement techniques (see Competency Checklist form)
   5. Return demonstration with check off

Clinical Decision Making Scenarios

Clinical Decision Making Scenarios

PATIENT SCENARIO #1

History

Patient is an 86 y.o. female who has resided in nursing home for several years and has recently developed a wound on her left LE. PMH includes atherosclerosis, HTN, venous insufficiency, right CVA with hemiplegia of left lower extremity and left upper extremity. Current medications include blood thinners, anti-hypertensives, and a diuretic. Edema noted in bilateral LE's. Pt. uses wheelchair for mobility; able to pivot transfer with assist.

Wound Assessment

Full thickness venous stasis ulcer on medial aspect of left lower leg measuring 6.7cm x 6.1cm x 0.4cm. Wound base is 75% yellow adherent slough and 25% pale red granulation tissue. No undermining noted. Large serosanguinous drainage. No s/s of infection. No c/o pain. Attending physician's orders are for whirlpool followed by gauze and ABD pad dressing bid. Patient to have ace wraps applied to bilateral lower extremities.

Discussion Questions

Is current treatment appropriate

Concerns?

What other options could be considered?

Debridement?

Dressings?

Other?

Clinical Decision Making Scenarios

Clinical Decision Making Scenarios

PATIENT SCENARIO #2

History

68 y.o male admitted with wound on plantar aspect of right foot under the heel. PMH significant for 100M, obesity, COPD and myocardial infarction approximately 2 years ago; Patient states currently taking meds for high cholesterol and HTN. Patient works part-time at Wal-mart. Semmes-Weinstein is negative on entire plantar aspect of foot. Pt. referred with eval and treat orders. Current wound treatment daily whirlpool w/t hydrocolloid dressing.

Wound Assessment

Wound measures 2.2cm x 2.9cm x 0.6cm. Wound base is 60% eschar, 50% yellow slough. Moderate amount of purulent exudate noted. Foul odor noted. Callus around the perimeter of wound with erythema beyond the callus. Charcot food bilaterally.

Discussion Questions

What type of wound is this?

What are yoru concerns regarding this patients situation/wound?

What would your treatment plan consist of?

Clinical Decision Making Scenarios

Clinical Decision Making Scenarios

PATIENT SCENARIO #3

History

87 y.o. male with multiple pressure ulcers (left trochanter, sacrum and right heel). PMH, significant for myasthenia gravis, ASHD, malnutrition, and dementia. Pt. has a history of non-cooperative behavior. Family is considering placing patient on hospice. Current treatment for all wounds is wet to dry dressings bid.

Wound Assessment

Left Trochanter: 6.6cm x 4.1cm x 2.3cm. Tunneling at 8 o'clock 6.2cm deep. Wound base is 90% granulation and 10% yellow slough. Mild foul oder noted. Minimal serous drainage.

Sacrum: 6.9cm x 7.2cm x 2.4cm. Undermining from 1-8 o'clock with depth of 3cm. Wound base is 25% eschar, 25% gray slough and 50% clean non-granular tissue. Exposed bone noted in lower right quadrant. Epiboly noted at the wound edge from 1-6 o'clock. Moderate serosaguinous drainage. Mild foul odor noted.

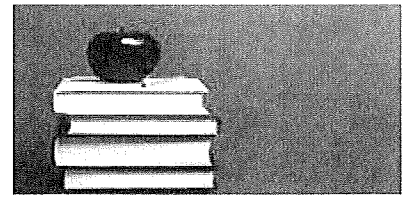
Right heel: 3.9cm x 3.7cm. Depth indeterminable secondary to necrotic tissue in wound bed. Wound base is 100% dry, black, leathery eschar. No drainage noted. Periwound skin normal and intact.

Discussion Questions

Concerns?

How would treat each ulcer?

Thank You!



XIV　陰圧閉鎖療法

講師：館　　正弘（東北大学大学院医学系研究科）

内藤亜由美（東京大学大学院医学系研究科）

高度創傷管理技術講習会

陰圧閉鎖療法

2009年5月26日

真田 弘美
内藤亜由美
東京大学医学系研究科

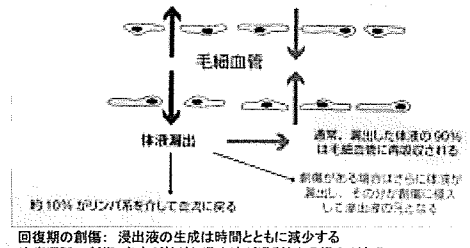
目的

- 褥瘡管理の基本としての陰圧閉鎖療法の適応を理解し安全に施行できる知識と技術を習得する。

Ⅰ．基礎

1．浸出液とは何か？

- 浸出液生成の基本的機序



回復期の創傷：浸出液の生成は時間とともに減少する
治癒遅延の創傷：炎症が持続し浸出液が過剰となる場合がある

出典
真田弘美監修：創傷浸出液およびドレッシング材の役割，
A World Union of Wound Healing Societies' ,Principles of best practice: Wound exudate and the role of dressings. A consensus document London: MEP Ltd, 2007

1．浸出液とは何か？

- 浸出液の組成
  - 水
  - 電解質
  - 栄養素
  - 炎症性メディエーター
  - 白血球
  - タンパク分解酵素
    - （タンパク質メタロプロテアーゼ：MMP）など
  - 成長因子
  - 老廃物

    など

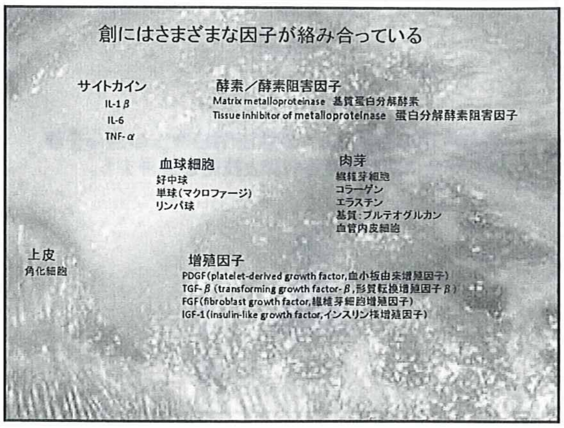
1．浸出液とは何か？

メディエーターとは

- さまざまな生体内の反応を媒介する一連の生物活性をもつ物質群の総称
- 生体内で産生される
  - 各種サイトカイン
  - 成長因子（growth factor）
  - 脂質系メディエーター（エイコサノイド）
    - プロスタグランジン
    - ロイコトリエン など
  - PAF（platelet-activating factor）接着因子
  - 血液凝固因子
  - 一酸化窒素
  - 活性酸素（NO）
  - タンパク分解酵素（MMP）
  - ヒスタミン
  - キニン
  - 神経伝達物質
  - 各種ホルモン

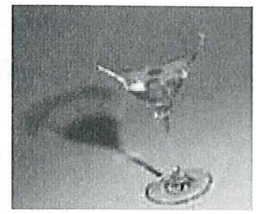
炎症性メディエーター

- 局所や全身の炎症反応を惹起促進するメディエーター
  - 炎症性サイトカイン
    - TNF
    - IL－1
    - IL－6
    - IL－8
  - 脂質系メディエーター
  - 補体：C5a、C3a など
  - タンパク分解酵素
  - ヒスタミン
  - キニン
  - 活性酸素
  - 一酸化窒素
- 複雑なカスケード、ネットワークを形成して作用する
- カスケードの末端で放出され直接組織障害に関わるメディエーターをfinal mediatorとよぶ
  - 活性酸素、MMPなど



急性創傷の浸出液は絶妙のカクテル

- 創傷を治すためには皮膚に生きる目に見えないほどの小さな細胞たちが健気にそして懸命に働いて素敵なアンサンブルをくりひろげています
- そして、創の表面にはさまざまなサイトカインや増殖因子がステアされた絶妙のレシピのカクテルが存在します



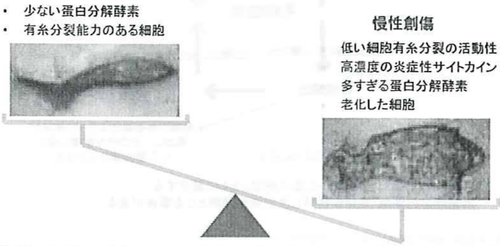
治癒する創傷と慢性創傷に関する細胞分子環境の不均衡

治癒する創傷

- 高い細胞有糸分裂の活動性
- 低濃度の炎症性サイトカイン
- 少ない蛋白分解酵素
- 有糸分裂能力のある細胞

慢性創傷

低い細胞有糸分裂の活動性
高濃度の炎症性サイトカイン
多すぎる蛋白分解酵素
老化した細胞



出典 Schultz GS,et al. : Wound bed preparation; a systematic approach to wound management.Wound Repair Regen,11(2 suppl):S7,2003 ,Fig4

2. 浸出液のアセスメント方法

①色調、②粘調度、③臭い、④量 のアセスメントを行う

色調の意義＊

特徴	考えられる原因
透明・琥珀	・漿液性滲出液。「正常」とみなされることが多いが、線維素溶解酵素産生菌（黄色ブドウ球菌等）による感染のほか、尿瘻又はリンパ瘻が原因である可能性がある
混濁、乳白色、クリーム状	・フィブリン網あり（炎症反応のひとつである線維性滲出液）または感染（白血球と細菌を含む化膿性滲出液）である可能性がある
ピンクまたは赤	・赤血球が存在するためで、毛細血管が損傷している可能性がある（血液性又は出血性滲出液）
緑	・細菌感染を示す可能性がある（緑膿菌等）
黄または茶	・スラフや腸瘻・尿瘻による物質が原因である可能性がある
灰または青	・銀含有ドレッシング材使用時に発生する場合がある

＊注 薬剤が尿を着色させる場合がある。滲出液の色調については、可能性のある原因がすべて除外された場合に、初めて薬剤の可能性を考慮すること。

出典
真田弘美監修：創傷滲出液およびドレッシング材の役割
A World Union of Wound Healing Societies' .Principles of best practice: Wound exudate and the role of dressings. A consensus document London: MEP Ltd, 2007

2. 浸出液のアセスメント方法

①色調、②粘調度、③臭い、④量 のアセスメントを行う

粘稠度の意義

粘性が高い (高粘度で時に粘着性あり)	・タンパク含量が多い。理由： －感染 －炎症 ・壊死性物質 ・腸瘻 ・一部のドレッシング材又は外用薬の残留物
粘性が低い (低粘度で流れやすい)	・タンパク含量が少ない。理由： －静脈性又はうっ血性心疾患 －栄養不良 ・尿瘻、リンパ瘻又は関節腔瘻

出典
真田弘美監修：創傷滲出液およびドレッシング材の役割
A World Union of Wound Healing Societies' .Principles of best practice: Wound exudate and the role of dressings. A consensus document London: MEP Ltd, 2007

2. 浸出液のアセスメント方法

①色調、②粘調度、③臭い、④量 のアセスメントを行う

臭いの意義＊＊

不快	・細菌増殖又は感染 ・壊死組織 ・洞／腸瘻又は尿瘻

＊＊注 ドレッシング材によっては独特の臭いが生じる（ハイドロコロイド等）。

出典
真田弘美監修：創傷滲出液およびドレッシング材の役割
A World Union of Wound Healing Societies' .Principles of best practice: Wound exudate and the role of dressings. A consensus document London: MEP Ltd, 2007

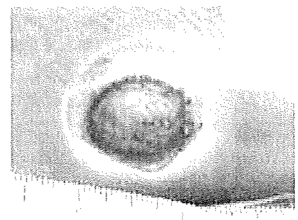
滲出液生成に影響すると思われる要素

出典
真田弘美監修:創傷滲出液およびドレッシング材の役割
A World Union of Wound Healing Societies'. Principles of best practice. Wound exudate and the role of dressings. A consensus document. London: MEP Ltd, 2007

4. 浸出液管理の方法

過剰な湿潤環境と角質層

- 角質層は3～4倍の厚さに膨潤
- 角質間脂質は乱される
- 角質細胞間に水分貯留
- 皮膚炎を生じやすくなる



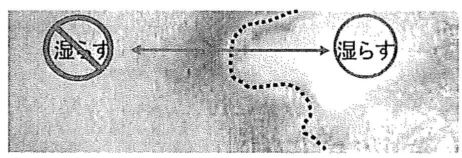
4. 浸出液管理の方法

角質の浸軟とpH

- 健康な皮膚は弱酸性：pH5.5
- 浸軟状態ではアルカリに傾く
- 中性・アルカリ性に傾くと
  - グルコシルセラミドがセラミドへ加水分解される過程が進まず、バリア機能の回復が遅れる
  - 角質剥離を司るセリンプロテアーゼ活性が上昇し、角質が剥離しやすくなる

4. 浸出液管理の方法

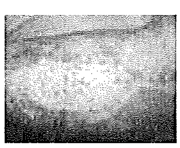
皮膚と水分

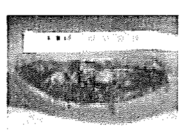


- 創周囲の皮膚
  水分過剰は皮膚バリア機能を損なう
  - 透過性亢進
  - 病原体増殖
  - 物理的刺激に対して脆弱化
- 創面
  湿潤環境が肉芽形成、上皮化を促す

4. 浸出液管理の方法

急性創傷と慢性創傷の浸出液組成の違い





炎症性サイトカイン	低濃度	高濃度
増殖因子数	多い	少ない
細胞の有糸分裂	多い	少ない
MMP濃度	低濃度	高濃度
TNF-α	低濃度	高濃度

4. 浸出液管理の方法

TIME-Principles of wound bed preparation

T: Tissue non-viable or dificient／活性のない組織または細胞

I: Infection or inflammation／感染または炎症

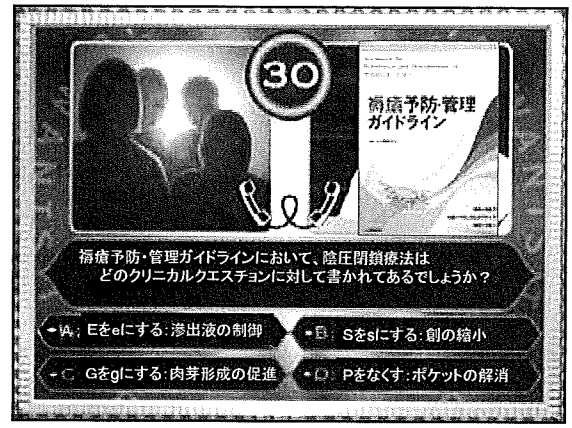
M: Moisture imbalance／湿潤のアンバランス

E: Edge of wound-non advancing or undermined／創辺縁の治癒遅延または潜蝕化（下掘れ）

TIME-Principles of wound bed preparation

M：Moisture imbalance／湿潤のアンバランス

病態生理	乾燥による表皮細胞の遊走の遅延 過剰な浸出液による創縁の浸軟
臨床的介入	適度な湿潤バランスをもたらすドレッシング材の使用 ・圧迫、陰圧、その他の方法による浸出液の除去
介入の効果	表皮細胞遊走の回復、乾燥の予防、浮腫や過剰な浸出液のコントロール、創縁の浸軟
アウトカム	湿潤バランス



4. 浸出液管理の方法

Eをeにする ： 滲出液の制御

CQ1. どのような外用薬を用いたらよいか
- 滲出液吸収作用を有するカデキソマー・ヨウ素、ポビドンヨード・シュガーを推奨する・・・推奨度B
- デキストラノマーを用いてもよい・・・推奨度C1

CQ2. どのようなドレッシング材を用いたらよいか
- ドレッシング材は滲出液を減少させる効果はない。そのため、過剰な滲出液を吸収保持し、創面の湿潤を保ち周囲皮膚の浸軟予防が可能なドレッシング材であるポリウレタンフォームを推奨する・・・推奨度B
- 機能別分類 B1、Cのキチン、ハイドロファイバー®（銀含有製材を含む）、アルギン酸塩を使用してもよい・・・推奨度C1

本ガイドラインの滲出液の制御の項には、陰圧閉鎖療法については記載なし

4. 浸出液管理の方法

ガイドラインにおける陰圧閉鎖療法

用語集 P159
- 物理療法の一法である。創部を閉鎖環境に保ち、原則的に125mmHgから150mmHgの陰圧になるように吸引する。 細菌や組織から放出される外毒素を直接排出する作用と、肉芽組織の血管新生作用や浮腫を除去する作用がある。

褥瘡局所治療の概要 物理療法について P88
- 創面全体を閉鎖ドレッシング材で覆い、創面を陰圧に保つことによって創部を管理する方法である。文献レビューならびに他のガイドラインで検討されている器具は、VAC®として製品化されたものを使用している。この場合、創面は専用のスポンジで被覆し、名圧は-125mmHgが基本となる。2008年12月現在、本邦での使用は難しい状況であり、ポリウレタンフォームを充填材として使用する方法や、チューブを直接創内に固定するなどの方法が試みられている。

4. 浸出液管理の方法

ガイドラインにおける陰圧閉鎖療法

深い褥瘡の治療
SをsにするS ： 創の縮小
CQ4 どのような物理療法がありますか？ P131
- 陰圧閉鎖療法・・・・推奨度C1
  - エビデンスレベル
    - 褥瘡を単独としたRCTの文献は1編だけであり、有効性は証明されていない。
    - エビデンスレベルⅡである。
    - コクランライブラリーのレビュー：難治性潰瘍を対象。陰圧閉鎖療法の付加効果は否定的
  - 解説
    - 海外文献はすべてVACを用いている
    - 本邦の研究では、圧、スポンジなどが異なっている
    - WOCNガイドラインでは推奨度Aと高く評価されているが、エビデンスの高い文献がないこと、EPUAPとAHCPRのガイドラインでは記載がない

⇩

推奨度C1

4. 浸出液管理の方法

ガイドラインにおける陰圧閉鎖療法

深い褥瘡の治療
PをなくすP ： ポケットの解消
CQ4 どのような物理療法がありますか？ P156
- 陰圧閉鎖療法・・・・推奨度C1
  - エビデンスレベル
    - 文献的に有効性を検討した文献は症例集積研究であり、エビデンスレベルVである
  - 解説
    - ポケットの壁を接着させる作用が期待される。
    - 標準治療として比較して有効性を検討した文献はない。
    - 壊死組織を可及的に除去されていることが望ましいが、壊死組織の自己融解も期待できる

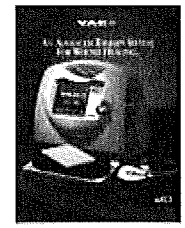
⇩

推奨度C1

Ⅱ. 陰圧閉鎖療法

1. 陰圧閉鎖療法のしくみ

- 創局所に陰圧をかけることで、慢性創傷の過剰で有害な滲出液や細菌を吸引排除し、過剰な細胞外液を減少させることで局所浮腫を軽減し、陰圧刺激で血流や肉芽形成を増加させて創傷治癒を促進する療法



2. 陰圧閉鎖療法の効果

1. 組織内の酸素分圧の上昇
2. 新生血管の増生促進
3. 組織の浮腫の軽減
4. 肉芽組織の増生促進
5. 細菌の持続的排出