

The 18th Annual Cutting Edge Wound Care Symposium

November 14, 2025

1:15 PM - 2:15 PM

Innovating Clean: Modern Strategies for Infection

Control and Wound Cleansing

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Dot has been practicing in the specialty of wound and ostomy care for over 4 decades. She has practiced in acute care, home care, and long-term care, spent 7 years in industry, and has practiced in outpatient care since 2001. She has been Board Certified by the Wound, Ostomy and Continence Nurses Certification Board since 1995 and the American Board of Wound Management since 2004. She has authored and co-authored numerous papers and consensus documents, and 14 book chapters. She is the Co-Chair of the Symposium on Advanced Wound Care, was part of the founding faculty for the Wound Certification Prep Course, is Secretary for the International Wound Infection Institute, and works as a Consultant and Educator in Holland, Michigan.



**Northeast Surgical
Wound Care**

Innovating Clean: Modern Strategies for Infection Control and Wound Cleansing



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Disclosures

- Speaker / Consultant
 - Urgo Medical North America and APAC
 - Solventum
 - Molnlycke
 - Smith & Nephew
 - ConvaTec
 - LifeNet Health
- Secretary, International Wound Infection Institute
- Co-Chair, Symposium on Advanced Wound Care
- Faculty, Wound Certification Prep Course

I am speaking independently and on my own behalf. The information presented is for informational purposes only and does not constitute medical or legal advice. The views expressed are solely mine and do not reflect the opinions of my current employer and organization.

Process Variation Leads to Unpredictable Outcomes

Wound care by the numbers:



1. Data on file Wound survey of 139 WOCNs



The highest levels of evidence have recognized these gaps in clinical practice.



National Pressure Injury Advisory Panel
International Guidelines 2019

JWC International Consensus Guidelines:
Hard-to-Heal Wounds 2020 & Wound Debridement 2024

International Wound Infection Institute:
Wound Infection in Clinical Practice 2022

Wound Repair and Regeneration:
Treatment Guidelines 2022

Wounds International Consensus Document
Use of Wound Antiseptics in Practice 2023

Multidisciplinary Expert Consensus Statement
Recommendations for Use of Hypochlorous Acid 2023

**Cleansing
anything can be
rewarding**



- Wounds are no exception
- However, it can become ritualistic and not therapeutic



Wounds are a buffet for Bacteria



Understanding Fluorescent signals



Green fluorescence shows tissue components (slough, skin, scales)



Red/blush/pink fluorescence is indicative of gram positive, negative, aerobic and anaerobic bacteria



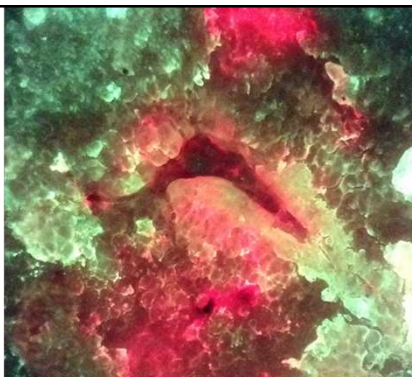
Cyan fluorescence (glowing white center with blue/green halo) is indicative of *Pseudomonas*



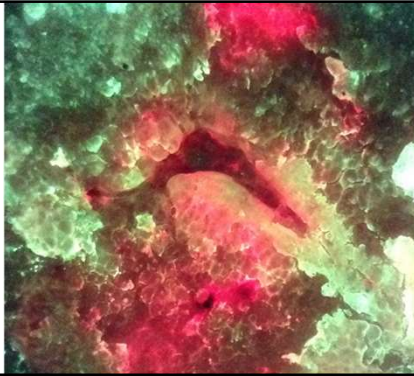
Yellow due to overlap of green/red fluorescence signals

Bacterial loads $>10^4$ CFU/g

Don't miss what you can't see



Treat what you
assume to be there



International Wound Infection Institute

Therapeutic Wound and Skin Cleansing: Clinical evidence and recommendations

<https://www.woundinfection-institute.com>

 Information with this symbol is pulled
from the 2025 Guideline document



International Wound Infection Institute

An independent international group of clinicians, scientists
and other professionals working in wound management,
dedicated to furthering the advancement of infection control
through best practice, education, training and research



International Wound
Infection Institute



Why a stand-alone document on cleansing?

- To further define and explore terms relating to wound cleansing
- To review evidence and practices and make recommendations based on evidence and clinical expertise
- To update regarding types of solutions and considerations for use
- Confusion regarding :
 - How
 - When
 - What to use
 - How to use it

Background and Methodology



International Wound Infection Institute

- 2023 face to face meeting in London with round table discussions
- Systematic literature review
- Modified Delphi for definition consensus
- Expert panel consensus and evidence to determine clinical recommendations

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Contents of the Wound Cleansing Document

- Essentials of effective wound cleansing
- Importance of periwound cleansing
- Pain related to wound cleansing
- Sequencing of wound cleansing
- Antimicrobials and antiseptics
- Definitions
- Summary tables
- Tips for practice
- Aseptic technique
- Prevention and management of wound infection



International Wound Infection Institute

Complex Wound: A Wound on a Complex Patient

Patient barriers that can be managed or at least mitigated

- Improved glucose management
- Weight loss
- Improve perfusion
- Lifestyle choices

Wound barriers are present that can be overcome

- Uncontrolled or under-addressed etiology
- Edema
- Proteases
- Unhealthy tissue
- Bacteria / biofilm
- pH



Therapeutic Wound Cleansing

Active removal of surface contaminants, loose debris, non-attached non-viable tissue, microorganisms and/or remnants of previous dressings from the wound bed and periwound.

Recommendation 1

Therapeutically cleanse all wounds when the dressing is changed or removed.

*Underpinning evidence: modified Delphi process

Page 5-6

Is there **Non-Therapeutic** Cleansing?

Emerging Evidence
says

YES!



This is **not** cleansing.



Anointing, Spritzing, Spraying



"Stop anointing wounds"
- Terry Swanson

"Clean it like you mean it"
- Dot Weir

Therapeutic Cleansing is Visible



Challenges of Obtaining a Clean Wound



"Every dressing change is an opportunity to change the trajectory of the healing of a wound."
- Terry Swanson

Addressing pain associated with Therapeutic Wound Cleansing

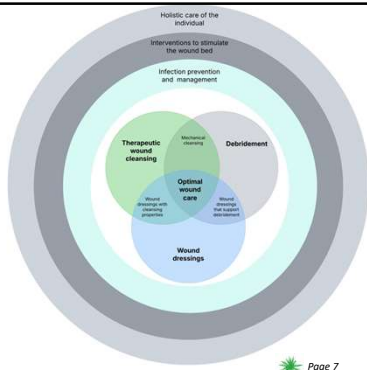
- **3 A's of Pain**
 - Anticipate
 - Administer
 - Assess
- Adjust wound cleansing techniques pain management according to the individual's pain experience
- Pain Management Strategies
 - Topical analgesia
 - Systemic analgesia
 - Distraction techniques
 - Warm solutions
 - Education and explanation
 - Appropriate cleansing technique

Optimal Wound Care

WHY does a wound need cleansing?

- Remove organic and inorganic debris
- Remove loose necrotic and non-viable tissue
- Reduce excess wound exudate
- Reduce microbial burden
- Contribute to hydration of desiccated wound bed

Goal is to rebalance the wound environment



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Therapeutic Wound and Skin Cleansing: Solutions



Page 19

Considerations when selecting a Cleansing Solution

Recommendation 7

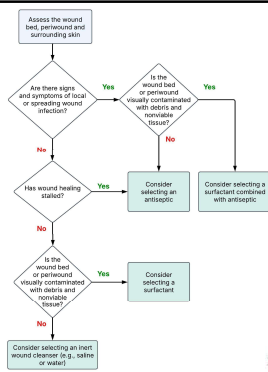
Select a wound cleansing solution based on:

- The type of wound dressing procedure and therapeutic cleansing technique that will be performed
- Characteristics of the wound
- The risk and/or presence of infection
- The abundance and profile of microorganisms in the wound (where known)
- Cytotoxicity, pH and allergenicity of the solution
- Goals of care and other individual factors (e.g., immunocompromised)
- Local policies, resources and availability



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Decision Tree: Selecting a Wound Cleansing Solution



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Considerations when selecting a Cleansing Solution

Cleansing solution*	Properties	Concentration	pH	Therapeutic Index**	Safety profile**	Mode of Action
---------------------	------------	---------------	----	---------------------	------------------	----------------

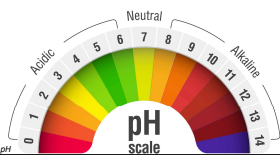
Page 23-25

pH Basics

- The pH of a wound bed is usually different from the pH of normal skin
 - The pH of the skin usually ranges between 4.0 and 5.5
 - There is evidence that chronic wounds have a higher pH of 7.4 to 8.9

The pH scale is logarithmic

- Each increase of 1 = 10x
 - An increase of 5.5 to 8.5 = 1000x



Color indicates proper wound pH

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Oxygen

- Oxygen tension strongly influenced by wound pH
- Any factor that could cause even a small change in pH of the wound may appreciably alter the available supply of oxygen to the tissues
- pH influences oxygen release to the tissues
- O₂ delivery is dependent on perfusion, as well as diffusion
 - Improving oxygenation of ischemic tissues and supporting aerobic metabolism critical for fibroblast and keratinocyte proliferation.
 - Hemoglobin releases more oxygen under acidic microenvironment due to Bohr effect
 - Lowering of pH by 0.6 units releases almost 50% more O₂
 - A pH shift by 0.9 units causes 5-fold increase in the release of oxygen

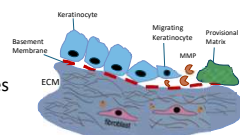
Nagiba BS et al. Acidic environment and wound healing: a review. WOUNDS 2015;27(1):5-11

Cellular Proliferation

- Fibroblast and keratinocyte activity declines in alkaline conditions
 - Result is reduced collagen production and slower wound contraction.
- Alkaline conditions above pH 7.5 impair wound closure, delaying re-epithelialization.

Proteases

- Proteolytic degradation of the ECM facilitates
 - Removal of damaged components,
 - Cell migration during wound re-epithelialization
 - Remodeling after new tissue has formed
- MMP activity is partly regulated by tissue inhibitors of metalloproteinases (TIMPs)
- Healing requires a balance between proteinase and inhibitor
 - Excessive levels of MMPs may degrade the extracellular matrix, preventing cellular migration and attachment.
 - An imbalance in the ratio of MMPs to TIMPs may also degrade growth factors and their receptors within the wound.



Proteases

- The controlled synthesis and degradation of matrix components require a tightly controlled balance between proteinase and inhibitor.
- Protease action and activity is pH dependent
- Adjusting the pH of the environment from 8 to 4 would reduce the activity of these proteases by approximately 80%.
- At an alkaline pH, proteases are more active and may degrade new granulation tissue, whereas at a pH 4 proteases are permanently inactivated.

Greener B, Hughes AA, Bannister NP, Douglass J. Proteases and pH in chronic wounds. *J Wound Care*. 2005 Feb;14(2):59-61. doi: 10.12968/jowc.2005.14.2.26739. PMID: 15739652.

Bacteria

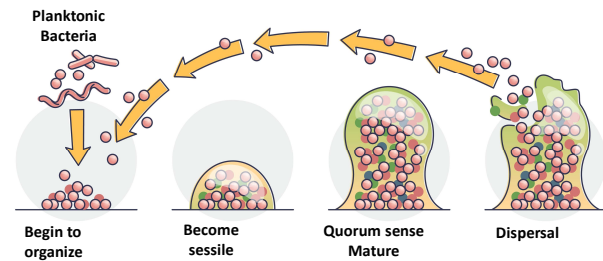
- The pH value within the wound directly and indirectly influences all biochemical reactions
- Bacteria product ammonia, which is liberated from urea by the enzyme urease
 - Results in an alkaline environment
- Most pathogenic bacteria are inhibited in a lower pH environment
- An increase in the pH of infected wounds may influence bacterial virulence, as well as bacterial growth
- Wound pH can also impact the effectiveness of antibiotics and antiseptics
- An alkaline environment favorable for bacterial growth

Bennison LR, Miller CN, Summers RJ, Minnis AMB, Sussman G, McGuinness W. The pH of wounds during healing and infection: a descriptive literature review. *Journals.cambridge.org/media.com.au/25(2)* -1

Biofilms and Wound pH

- What are Biofilms?
 - Structured communities of microorganisms (e.g., bacteria, fungi) encased in a self-produced extracellular polymeric substance (EPS)
- Microorganisms in biofilms initially attach to wound surfaces through weak interactions,
 - Alkaline pH promotes this adhesion by enhancing microbial surface hydrophobicity, allowing pathogens to firmly bind to the wound
- Biofilm maturation accelerates in alkaline pH (≥ 7.5)
- High pH promotes bacterial communication (quorum sensing), enhancing biofilm density and resistance.

Mental Model of Biofilm



Bjarnsholt T, et al. The impact of mental models on the treatment and research of chronic infections due to biofilms. *APMIS*. 2021 Oct;129(10):598-606.

International Wound Infection Institute

<https://woundinfection-institute.com/agm/>

WELCOME TO THE INTERNATIONAL WOUND INFECTION INSTITUTE

The International Wound Infection Institute is for health care professionals with an interest in wound infection

- Antiseptics – Susie Seemann
- Where does pathogenicity : : & when do we commence topical treatment? – Trish Idensohn
- Biofilm update: New or paradigms and treatments – Thomas Bjarnsholt

Begins at 1:13:01 on video

Wound Healing is Impeded by Metabolically Active Bacteria

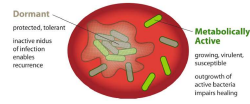
First longitudinal study characterizing presence of biofilm and rate of healing in chronic venous leg ulcers
117 patients
No correlation of healing with biofilm score or bleach tolerant bacteria
Reduced healing with bleach-susceptible (metabolically active) bacteria

Parameter	Result	p-value		PAR
		Healing slope	Healing versus non-healing	
Biofilm microscopy score	No association in any test	0.25	0.15	0.19
Total viable bacteria	Less healing in 2 of 3 tests when more bacteria were present	0.94	0.012	0.012
Bleach-tolerant bacteria	No association in any test	0.053	0.97	0.69
Bleach-susceptible bacteria	Less healing in all tests when more bleach-susceptible bacteria were present	0.003	0.0012	0.004

Stewart PS, Kim J, James G, Yi F, Stechnieller J, Weaver M, Kelly DL, Fisher S, Schultz G, Lyon D. Association of biofilm and microbial metrics with healing rate in older adults with chronic venous leg ulcers. *Wound Repair Regen*. 2024 Nov-Dec;32(6):858-871

A Paradigm Shift and New Model: The Infectious Microenvironment

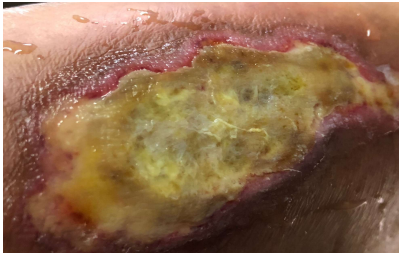
- Bacterial aggregation and Biofilm is a phenotype, not the cause of bacterial persistence
 - Aggregate size can interfere with phagocytosis
- The trajectory of infections is controlled by the metabolism of the bacteria
- To understand wound infection, we need to understand the infectious microenvironment
 - Bacterial Metabolism
 - Inflammatory response
 - The metabolic signature of bacteria and host
- The new research goal is not to grow biofilms but to mimic the microenvironment



<https://woundinfectioninstitute.com/ajgm/>

Stewart PS, Kim J, James G, Yi F, Stechtmiller J, Weaver M, Kelly DL, Fisher S, Schultz G, Lyon D. Association of biofilm and microbial metrics with healing rate in older adults with chronic venous leg ulcers. Wound Repair Regen. 2024 Nov-Dec;32(6):858-871

All that is yellow is not: Dead Biofilm



- Less than 30% of samples had visible bacterial cells or biofilm.
 - Biofilm defined as colonies $>5\mu$ in diameter



[illegible][illegible]

Saline Doesn't Have a Measurable Therapeutic Index

Antiseptic solutions were more efficacious in reducing bacteria than the non-antiseptic/surfactant solutions studied (saline and soap/water).

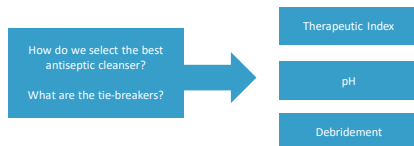
Most wounds in the saline group (62.5%) demonstrated a positive change (increase) in bacteria, by unmasking periwound bacteria.



Duggan A, Rao AG, Doherty C, Foster-Wiggan M, Holmes A. An objective comparative study of non-surgical cleansing techniques and cleanser types in bacterial burden management. Wound J. 2019;16(2):107-115. doi: 10.1016/j.wound.2018.09.005. PMID: 30522960. PMCID: PMC6260191.

Antiseptic Solutions are More Efficacious

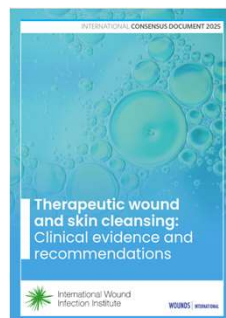
- Cleansers with antiseptic properties led to a significantly greater reduction in bacteria than non-antiseptics and surfactants (saline, soap)
- There was no statistically significant difference between antiseptic cleansers.



Duggan A, Rao AG, Doherty C, Foster-Wiggan M, Holmes A. An objective comparative study of non-surgical cleansing techniques and cleanser types in bacterial burden management. Wound J. 2019;16(2):107-115. doi: 10.1016/j.wound.2018.09.005. PMID: 30522960. PMCID: PMC6260191.

Therapeutic Wound and Skin Cleansing: Techniques

“Hard to heal wounds require more vigorous therapeutic cleansing to dislodge loose devitalized tissue, microorganisms and debris.”



Periwound

The skin and tissue immediately adjacent to the wound edge extending out 4cm and/or including any skin and tissue under the wound dressing

Wound Hygiene: When cleansing the periwound skin, concentrate on the area that is 10–20 cm away from the wound edges, or that is covered by the dressing, whichever is larger



Recommendation 3

Therapeutically cleanse the wound bed, wound edge, the periwound skin and the surrounding skin when the wound dressing is changed or removed.

Mahgoub, C., Allen, L., Stevenson, T., Tachikawa, T., Tan, H., Tague, A., et al. (2020). Wound Hygiene: Defining periwound wounds with an early evidence synthesis. *Wound Management and Practice*, 26(1), 1–10.

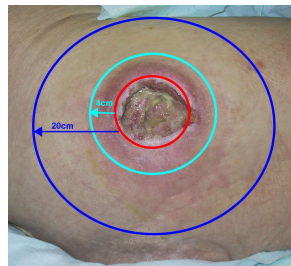
Page 10

The Three Therapeutic Cleansing Zones

Zone 1: The wound and wound edge

Zone 2: The periwound < 4cm

Zone 3: The surrounding skin 20cm from wound edge



These distances are approximate based on empirical observations and may vary.

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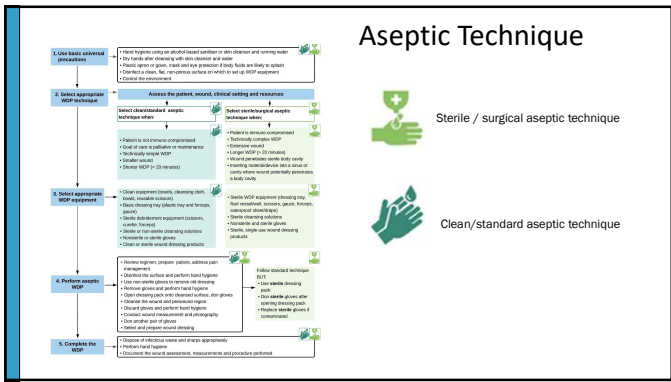
Selecting a Cleansing Technique

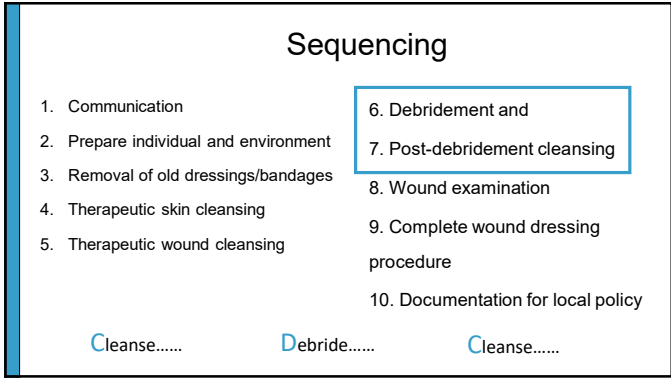
Recommendation 11

Select a wound cleansing technique based on:

- Presentation of the wound bed and wound edges, including signs and symptoms of wound infection, as outlined on the IWII Wound Infection Continuum
- Presentation of the periwound
- Presentation of the surrounding skin
- Goals of care and other individual factors (e.g., pain experience)
- Local policies and resources

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Debridement

- Clearly a fail-safe way to get a wound clean
- Clean AGAIN after debridement



Overview of Cleansing Techniques

Technique	When to use
Irrigation/flushing	• minimal exudate • without slough • minimal microbial burden
Swabbing/ Wiping	• exudate • visible debris, slough and other nonviable tissue • signs and symptoms of infection
Scrubbing/ cleansing pad/ monofilament fibre pad/ gauze pad	• exudate • visible debris, slough and other nonviable tissue • signs and symptoms of infection
Compress	• Healthy granulation or new epithelialisation with healthy or dry wound edges • Wet wound bed with macerated wound edges • loose debris or signs and symptoms of local wound infection
Soaking/bathing/ wet packing	• require increased hydration/moisture (e.g. dry healable wounds or moisture-balanced wound bed with desiccated wound edges) • Signs and symptoms of local wound infection and spreading infection • visible debris • Surrounding skin or periwound with visible debris or hyperkeratotic tissue
Instillation +/- NPWT	• small debris particles that are more difficult to dislodge, • poor wound bed integrity • need for grafting or granulation tissue formation
Hydro-responsive dressings	• devitalised tissue requiring removal • dry or moist wound bed

Irrigation / Flushing / Streaming

- Wounds with minimal exudate
- Wounds without slough
- Wounds with minimal microbial burden
- Be aware of pressures
 - Splash / aerosolization
 - Potential for propagation of bacteria deeper into wound tissues
 - Cooling of the wound bed
- Potential for pain but likely less so than other techniques

Common Myth....

NOT

This is cleansing



Adjusting for the PSI

- 35 mL and 19 gauge angiocath delivered 8 psi; 20 mL syringe and 18 gauge angiocath delivered 12 psi
- Larger syringe, lower pressures; larger angiocath, higher pressures



Figure 1. Experimental assessment of pressure generated

Syringe mLs	Needle/Angio Gauge	PSI
35	25	4
35	21	6
35	19	8
20	18	12
12	22	13
12	19	20
6	19	30

Shetty R, et al. *Indian J Plast Surg.* 2012;45(3):590-591.

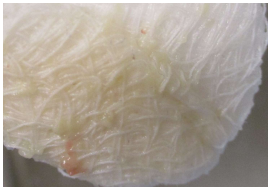
Swabbing / Wiping

- Wounds with exudate
- Wounds visible debris, slough and other non-viable tissue
- Wounds with signs and symptoms of infection
- May re-distributes bacteria within the wound bed, or spread contaminants from the periwound to the wound bed
 - Change cloth / gauze frequently
- May damage newly granulating tissue

Scrubbing/cleansing pad/ monofilament fiber pad or gauze

- Wounds with exudate
- Wounds with visible debris, slough and other non-viable tissue
- Wounds with signs and symptoms of infection
- Implement infection control strategies.
- Use a new pad/gauze used for different wounds and parts of the body
- Cleansing pad must be rinsed when it is saturated with wound debris
- Apply pressure in a circular motion
- If using gauze, do not reuse the same gauze for multiple applications do to adherence of microbes to the gauze weave

Using Gauze...

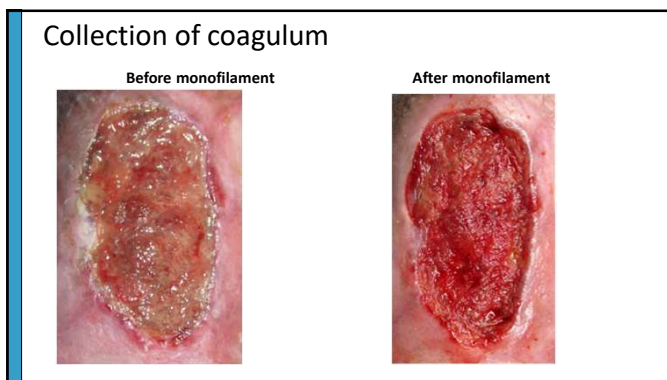


Transfer of Bacteria Change your gauze!

- Bacterial transfer can occur inadvertently, risking recontamination of the wound bed





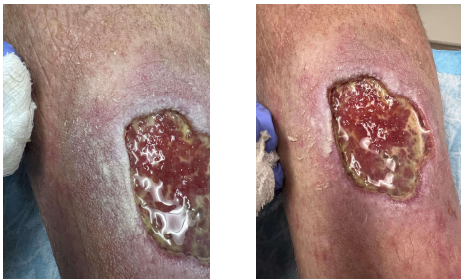


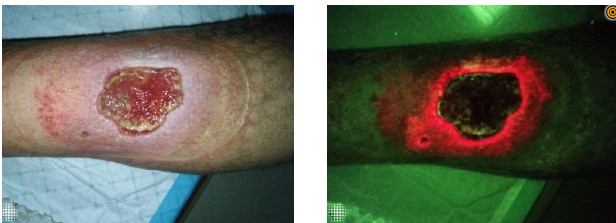
Compress

- Healthy wounds with granulation or new epithelialization with healthy or dry wound edges
- Wet wound beds with macerated wound edges
- Wounds with:
 - Loose debris
 - Signs and symptoms of local wound infection

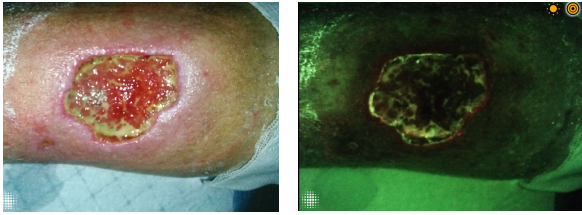
- Ensure all fluid is removed from the wound bed following compress to enable wound bed visualization
- Consider moistened ribbon cloth for cavities or tunneling
- May be better tolerated by individuals with greater pain

Periwound Treatment Residue and Hyperkeratotic Tissue

Carefully Examine Periwound Skin

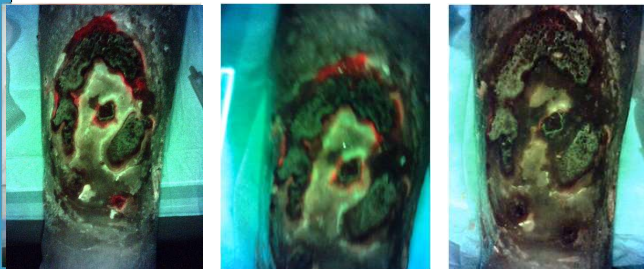
Before Therapeutic Cleansing

After Therapeutic Cleansing



Looks Can Be Deceiving

Before cleansing



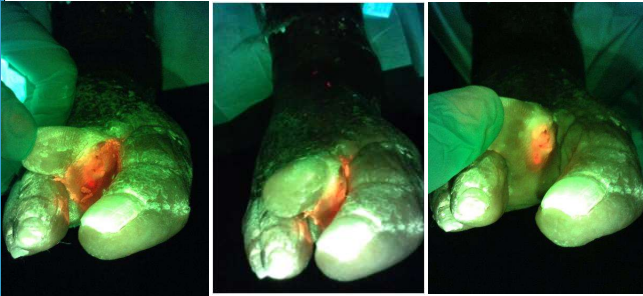
After cleansing



“Toe Flossing”

The action of cleaning and drying between the toes, usually with moistened gauze, cloth or a device designed for the purpose.

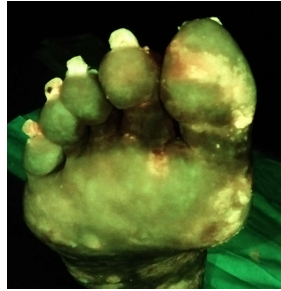
Toe “flossing”



Toe Flossing – Soaking Only



Toe Flossing – Soaking Only



Limb Hygiene

The cleansing and drying of the affected limb to achieve and maintain skin integrity.

- Essential to maintain health and integrity of the skin
- Gentle cleansing daily
 - If compression used cleanse at each wrap change
- pH balanced skin cleanser and moisturizer
- Include feet and toes



Wolcott K et al. Best practice recommendations for the prevention and management of skin tears in aged skin. Wounds International 2018

Case: Dense Hyperkeratotic Skin Changes



Soak a Kerlix roll with antiseptic cleanser for about 10 min or as long as possible

Dense Hyperkeratotic Skin Changes



Before soak



After soak

Who likes to remove scales?



Scales notably have 4 different looks

Tree Bark
(small and large)



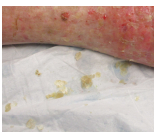
Dry flaky



Plaque: Dry, thick and
attached



Waxy

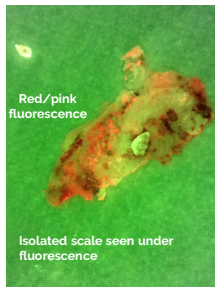
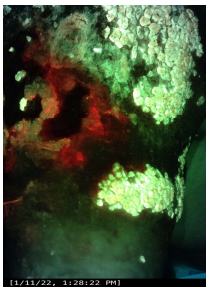


"His legs are dirty"



Standard Image

Fluorescence Image



Scales



Scales

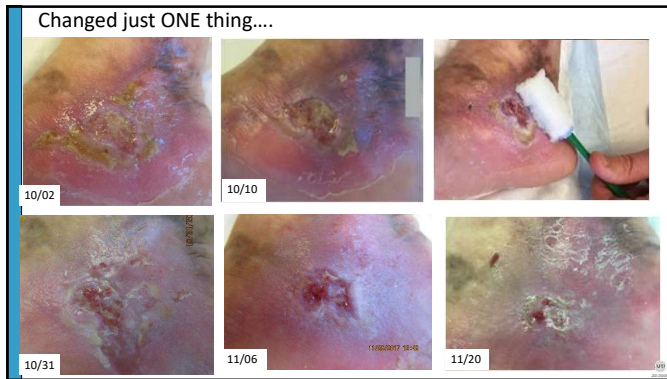


Two weeks apart



Summary of
Recommendations

1. Therapeutically cleanse of wounds when the wound dressing is changed or removed.
2. Therapeutically cleanse the wound bed and wound edge and the periwound skin with an antiseptic solution prior to covering a wound or tissue sample for microscopy, culture and sensitivity.
3. Therapeutically cleanse the wound bed and wound edge, the periwound skin and the surrounding skin when the wound dressing is changed or removed.
4. Select either standard/debridement technique or moist/dressment technique when performing a wound dressing procedure. Consider the assessment that contains the individual, the wound and environmental considerations to guide technique selection.
5. Implement universal precautions when conducting a wound dressing procedure.
6. Assess the individual, the wound and the environment to determine whether it is appropriate to cleanse in postoperative or hard-to-reach wound in a prone.
7. Select a wound cleansing solution based on:
 - The type of wound dressing procedure and therapeutic cleansing technique that will be performed
 - Characteristics of the wound
 - The risk and/or presence of infection
 - The abundance and profile of microorganisms in the wound (where known)
 - Characteristics, pH and allergenicity of the solution
 - Risk of new and/or existing factors (e.g. immunosuppression)
 - Local policies, resources and availability
8. Use a wound cleansing solution with antimicrobial properties as part of a comprehensive wound infection management plan when wound infection is confirmed or suspected.
9. Do not use a solution to treat wound or skin cleansing solution.
10. Therapeutically cleanse the skin using a mild skin cleanser with a pH close to normal skin.
11. Select a wound cleansing technique based on the following:
 - Presentation of the wound bed and wound edge, including signs and symptoms of wound infection, as outlined on the Wound Infection Continuum
 - Presentation of the periwound skin
 - Presentation of the surrounding skin
 - Risk of new and/or existing factors (e.g. pain experience)
 - Local policies and resources
12. Therapeutically cleanse the surrounding skin and periwound bed.
13. Therapeutically cleanse the wound bed from the most vulnerable to least vulnerable regions based on assessment of the wound.
14. Adjust wound cleansing techniques and implement post-management strategies according to the individual's pain experience.



Summary of Therapeutic Wound Cleansing

- Therapeutically cleanse at every dressing change
- Select solutions that have an acidic pH and high therapeutic index
- Use therapeutic techniques best for the wound, patient and setting
- Every dressing change is an opportunity to change the trajectory of a wound – ensure all clinicians/caregivers are empowered to deliver therapeutic cleansing

Thank You! Questions?
