



**From Skin Protection to Wound Healing:
A Case-Based Approach to
NPWT, Advanced Dressings,
and Skin Protectants**

Supported by an educational grant from Solventum, Medical Surgical Business

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Holland, MI

Faculty Disclosures

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Disclosures

- The faculty have been informed of their responsibility to disclose to the audience if they will be discussing off-label or investigational use(s) of drugs, products, and/or devices (any use not approved by the U.S. Food and Drug Administration)
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- This continuing medical education activity may include device or medicine brand names for participant clarity purposes only. No product promotion or recommendations should be inferred.

Learning Objectives

- Explore the challenges of managing wound exudate and apply evidence-based criteria to select dressings that effectively control exudate, protect periwound skin, reduce leakage and dressing change frequency, and improve patient quality of life
- Evaluate the science and clinical utility of oxidized regenerated cellulose (ORC)/collagen dressings with silver and their integration with negative pressure wound therapy (NPWT) to optimize wound bed preparation and improve healing outcomes across complex wound types
- Review advancements in NPWT, including novel peel-and-place dressings, and apply an algorithmic approach to selecting appropriate technologies based on wound characteristics, patient needs, and transitions across care settings
- Examine the role of polymer cyanoacrylate-based skin protectants for the management of skin damage and the protection of at-risk skin

Q&A

**Submit your questions at any time
via the Question Box**

Complex Wounds: Addressing the Barriers to Healing

Dot Weir, RN, CWON, CWS

Holland Hospital Wound Healing and Hyperbaric Medicine
Holland, MI



What Is a Complex Wound?

- Simply put, it's a wound on a complex patient
- Other terms
 - Chronic
 - Hard-to-heal

Hard-to-Heal Wounds: Wounds With Barriers

- Patient barriers that can be managed or at least mitigated
 - Access to the right care
 - Establish the right diagnosis
 - Improve nutrition
 - Improve glucose management
 - Improve perfusion
- Wound barriers are present that can be overcome
 - Uncontrolled or under-addressed etiology
 - Unhealthy tissue
 - Bacteria/biofilm
 - Proteases
 - Edema
 - pH



Know and Support the Etiology



Venous Ulcers: Compression



Arterial Lesions: Revascularize and Protect



Diabetic Foot Ulcers: Offload



Pressure Injuries: Offload



Atypical Wounds: Biopsy



- 63y Male, recurrent venous ulcer (3rd) left medial ankle
- Periwound skin macerated, thickened
- Proceeded with absorbent dressings, debridements, 2-layer compression system changed weekly



- Wound progressed slowly over following 4 months; continued compression and a variety of absorbent and antimicrobial dressings



- Wound surface healthy color, non-robust hypergranulation tissue
- Treatment changed to ORC/collagen/Ag
- Double-layered, continued compression



Protease sequestration
Growth factor protection
Reduce pH

1 wk later:

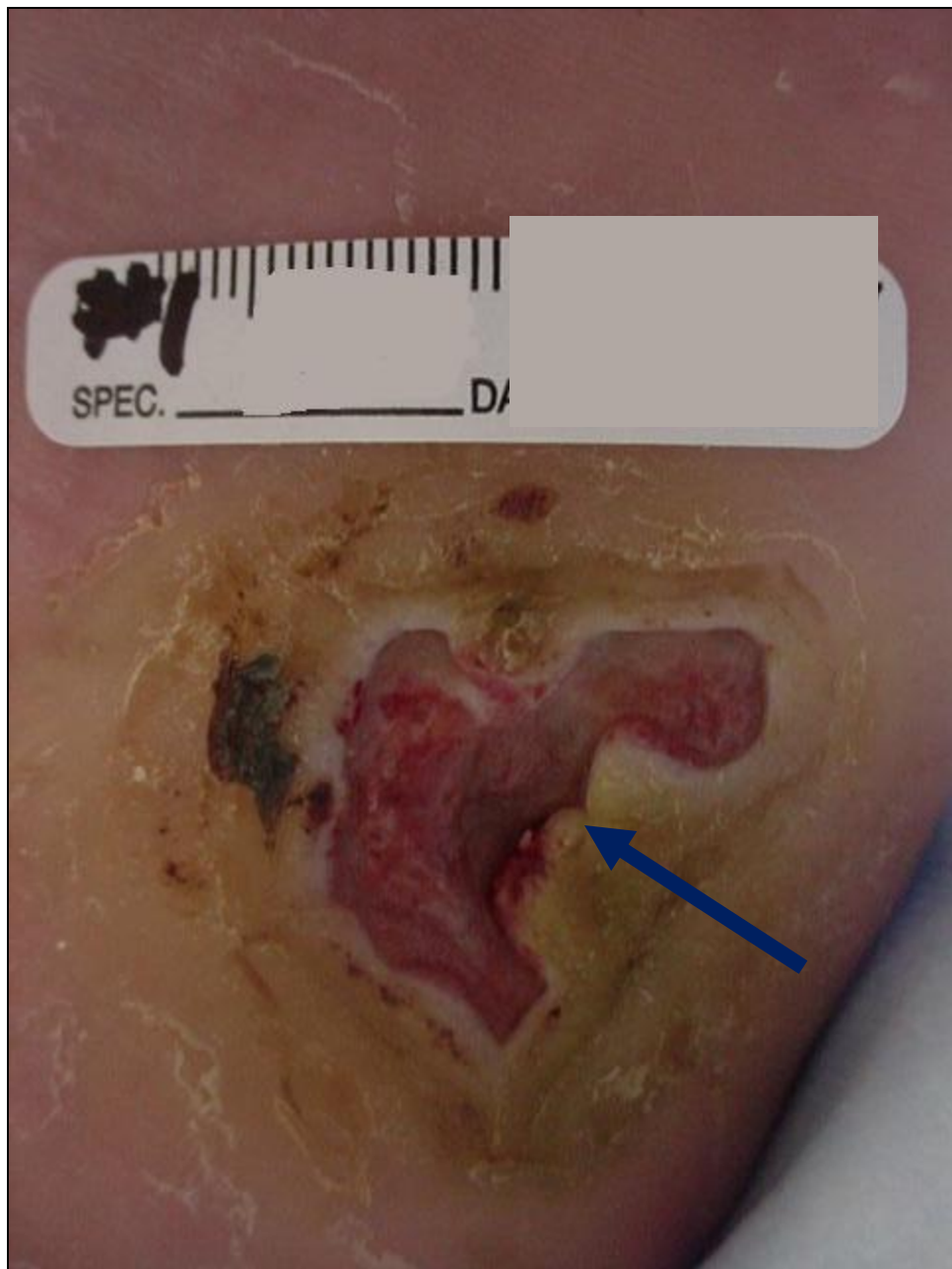
**Wound smaller, healthier, more
robust granulation tissue**

and es

Truly Chronic Diabetic Foot Ulcer

- 48y Female
- Type 1 diabetes (T1DM) since childhood
- ESRD, on hemodialysis
- Severe retinopathy
- Foot ulcer present for 6 yrs
- MRI negative for OM

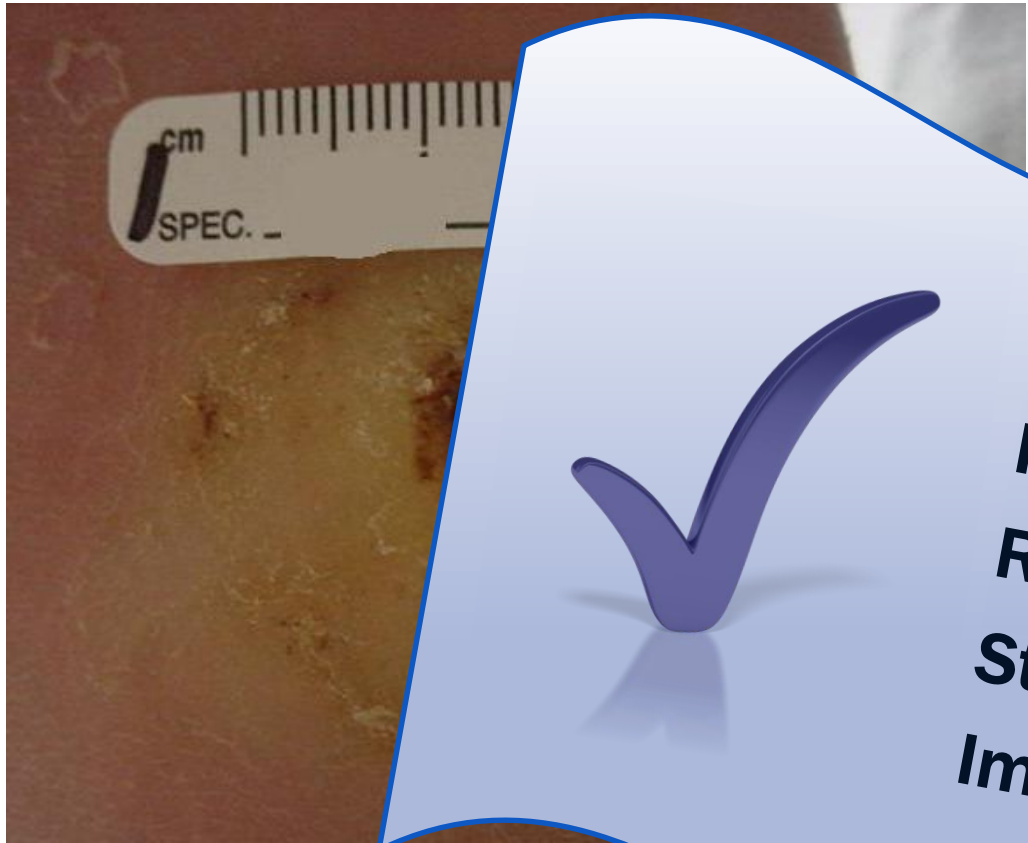




**3 wks with debridement
and local dressings**

Meeting All Support Needs



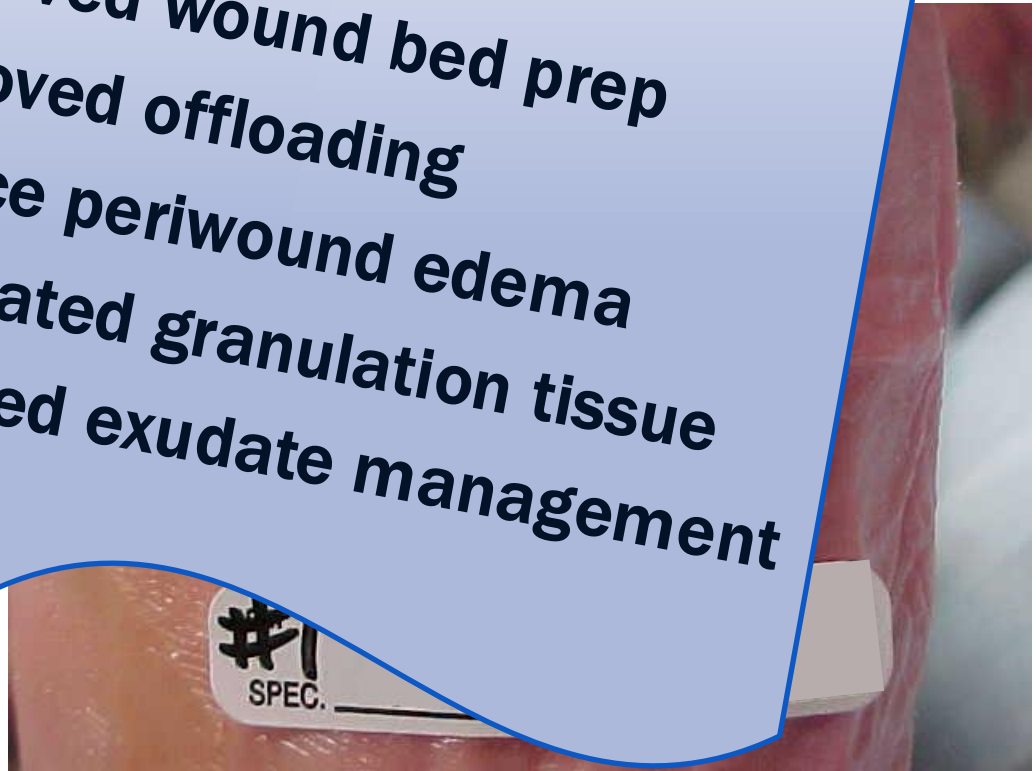


6 yrs



- Improved wound bed prep**
- Improved offloading**
- Reduce periwound edema**
- Stimulated granulation tissue**
- Improved exudate management**

3 months



Pressure Injury

- 67y Male
- Paraplegia for 44 yrs from a mechanical fall which resulted in right ATK amputation
- Prior history of rectal fistula with colostomy and sepsis from deep pressure injury (PI) with bone exposure and OM
- Ultimate surgery resulted in a right hemipelvectomy
- Began to see us for HBO/wound care
- NPWT initiated



2 wks



3 wks



**Change in position,
changed shape of ulcer**

- Based on new indications, added ORC/collagen/Ag under NPWT device

5 Wks



Fenestrated ORC/Collagen/Ag Added under Foam





75.0cm²



Protease sequestration

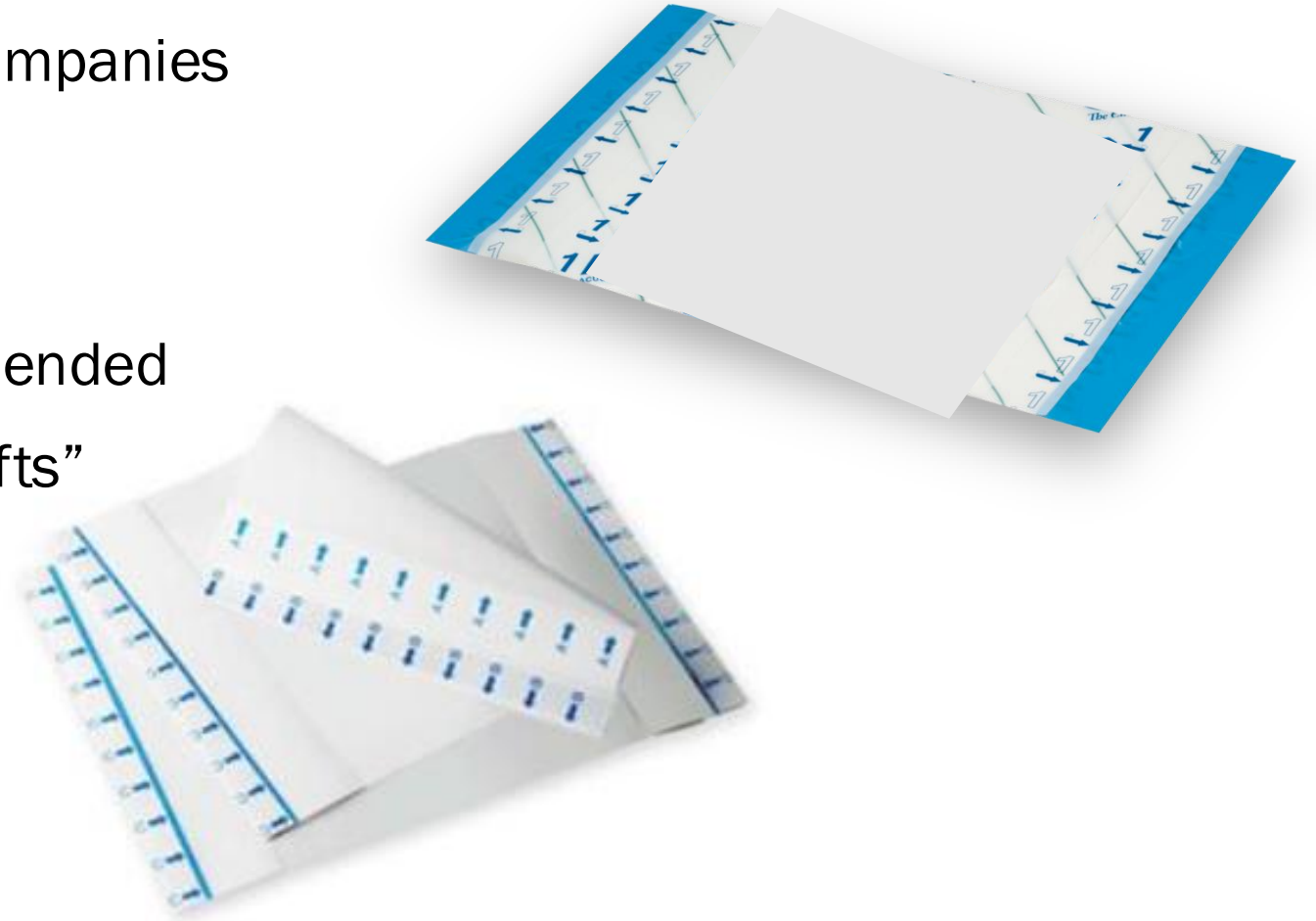
Growth factor protection

Reduce pH

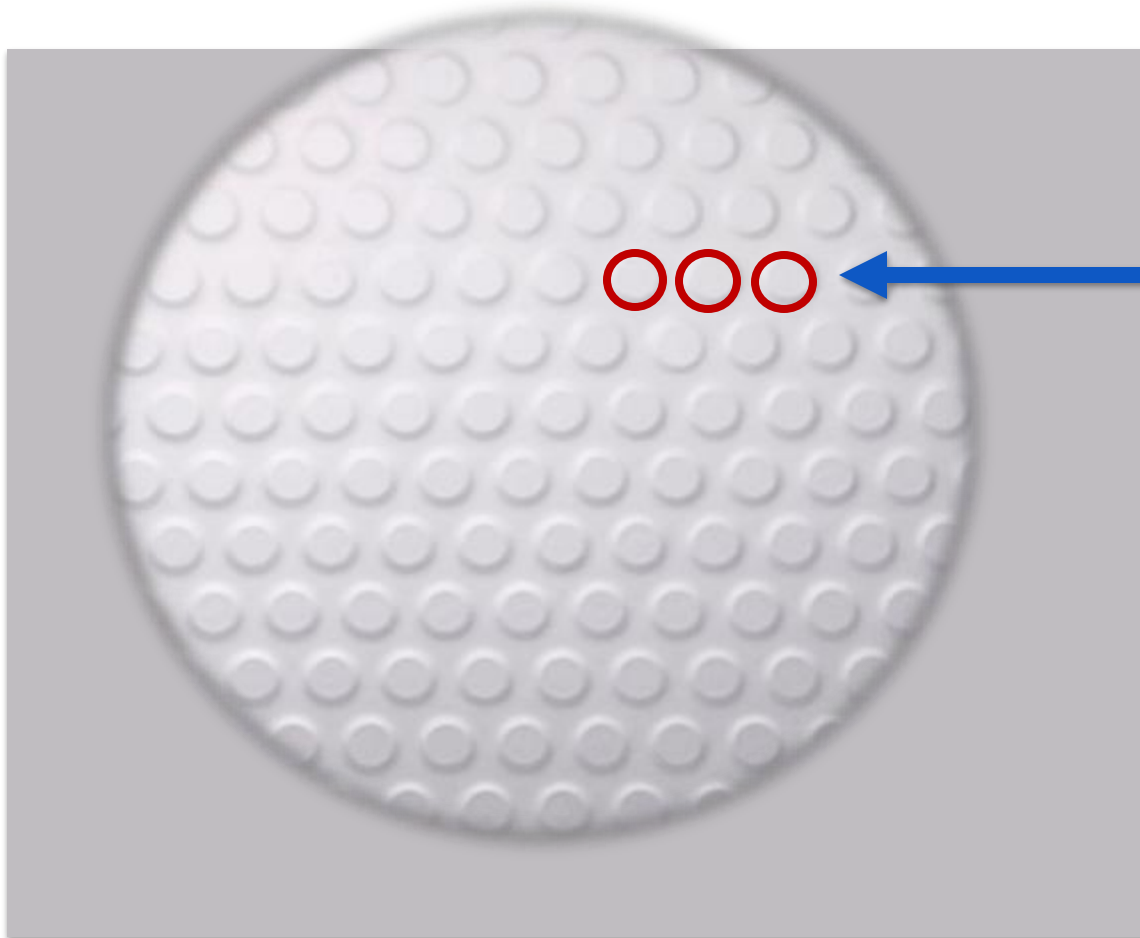
Improved fibroblast activity

Standard Acrylic Drapes Application

- Release backing per individual companies
- Often painful to remove
- Sticks to itself
- Use of skin barrier wipes recommended
- At times seems like “arts and crafts”
- Improved application requires changes in technique



Newer Hybrid Drapes Available

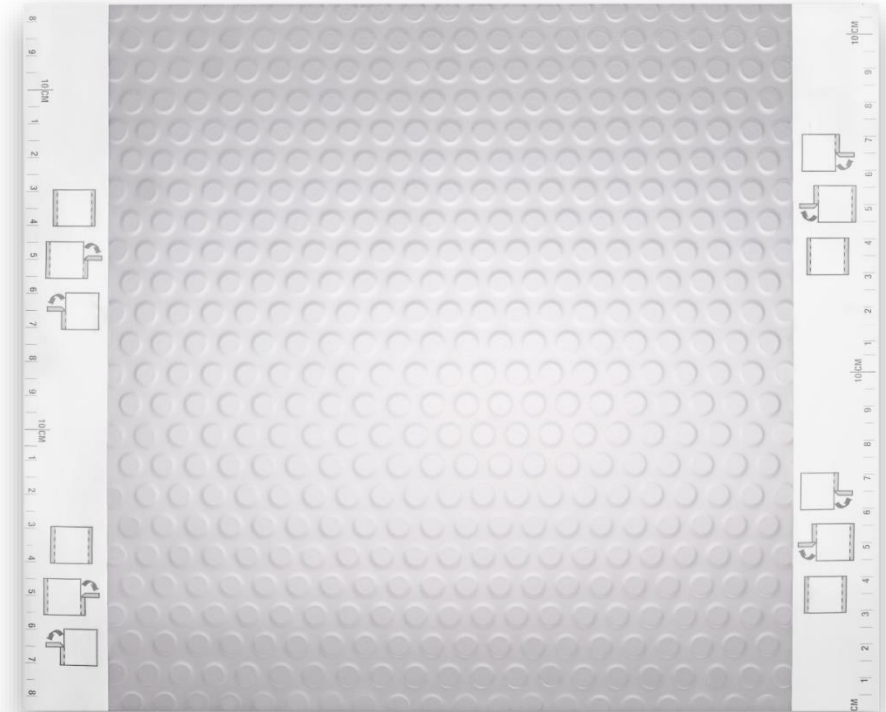


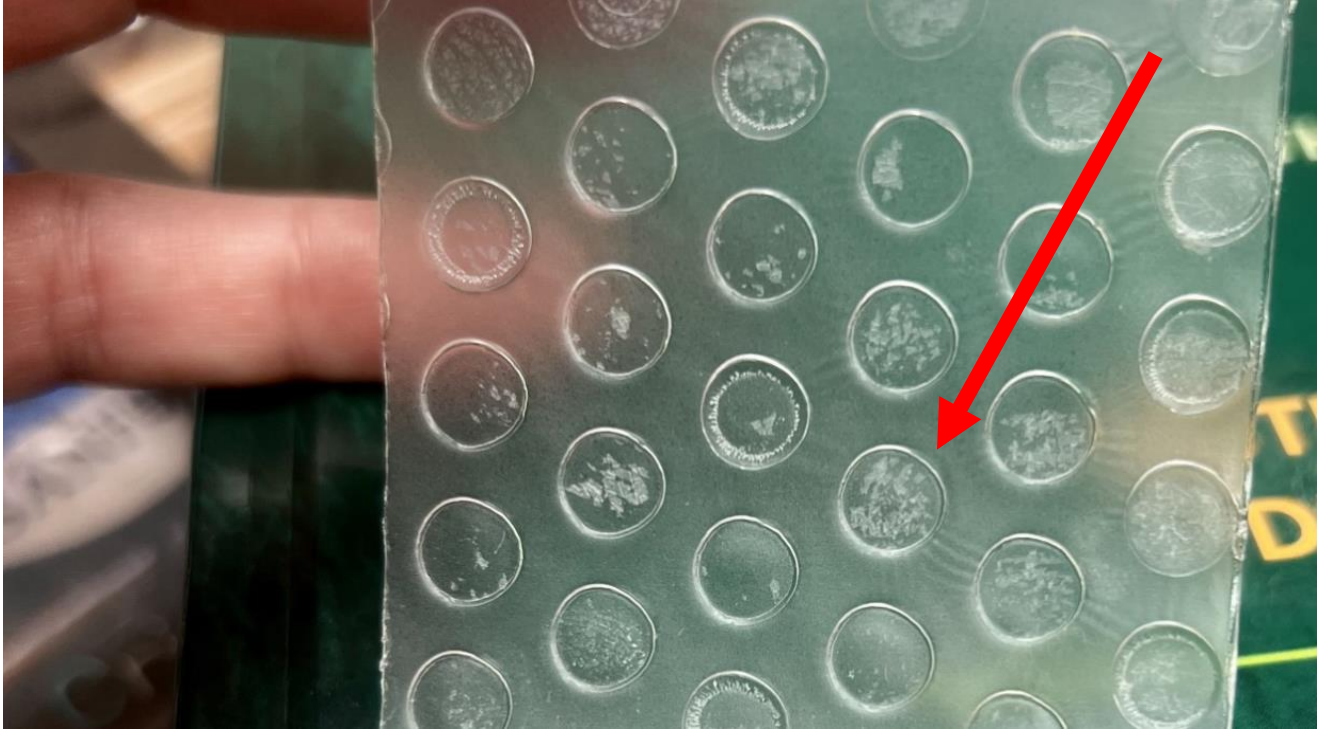
Acrylic (inside the circles)
ensures a tight seal to protect
wounds on different anatomical
locations

Silicone (outside the circles)
allows for repositioning upon
initial application and easy
handling during dressing changes

Hybrid Drape

- Ease of use
- 1 single-release liner
- Reduced need to “picture frame”
- No use of skin prep products
- Less cutting





Super Mom

- 38y obese Female, mother of 3
- VERY familiar with 3M™ V.A.C.® Therapy System (NPWT); C-sections x2 with dehiscence managed with NPWT
- S/P pilonidal cyst excision
- No other health issues; significant sensitivity to most adhesives

Super Mom



- Measurements: 2.5 x 0.6 x 7.0cm
- Undermining 5cm circumferentially
- PVA gelling fiber and superabsorbent foam



- 2 wks later, measurements 2.0 x 0.9 x 5.6cm
- Undermining 6.1cm circumferentially
- Began NPWT with hybrid drape



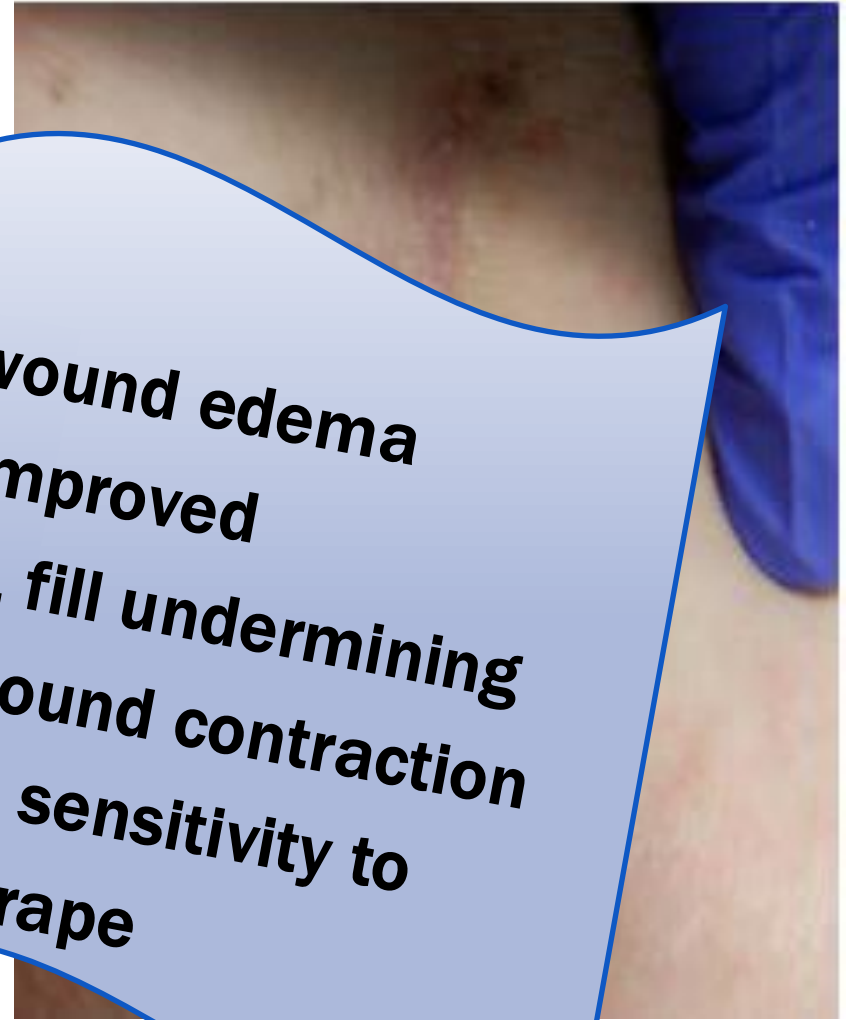
- Day 12 NPWT
- 2.0 x 0.6 x 4.0cm
- Undermining resolved



- 1.4 x 0.7 x 1.5cm
- Day 42, powered NPWT system discontinued, began mechanically-powered system



- Day 4 with disposable system
- 0.8 x 0.5 x 1.1cm



- Day 15, [wound site] discontinued
- 0.5 X 0.5 X 0.5cm



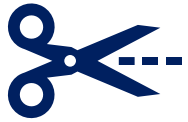
Reduce periwound edema
Microstrain; improved granulation, fill undermining
Macrostrain; wound contraction
Decreased skin sensitivity to pure acrylic drape

Addressing Challenges of NPWT Across Care Settings

- Dressing Application
 - In-depth clinical training needed for application
 - Arts and crafts required
 - Count the foam pieces placed in the wound
 - Dressing application time
 - 2–3 dressing changes per wk
- Dressing Removal
 - Risk of tissue ingrowth with reticulated open-cell foam (ROCF)
 - Potential for foam left in wound
 - Tissue disruption during dressing changes
 - Pain with dressing removal
 - Dressing removal time



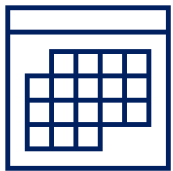
One-Piece Dressing Innovation



Integrated design:
Eliminates arts and crafts



Application time:
on average 2 min

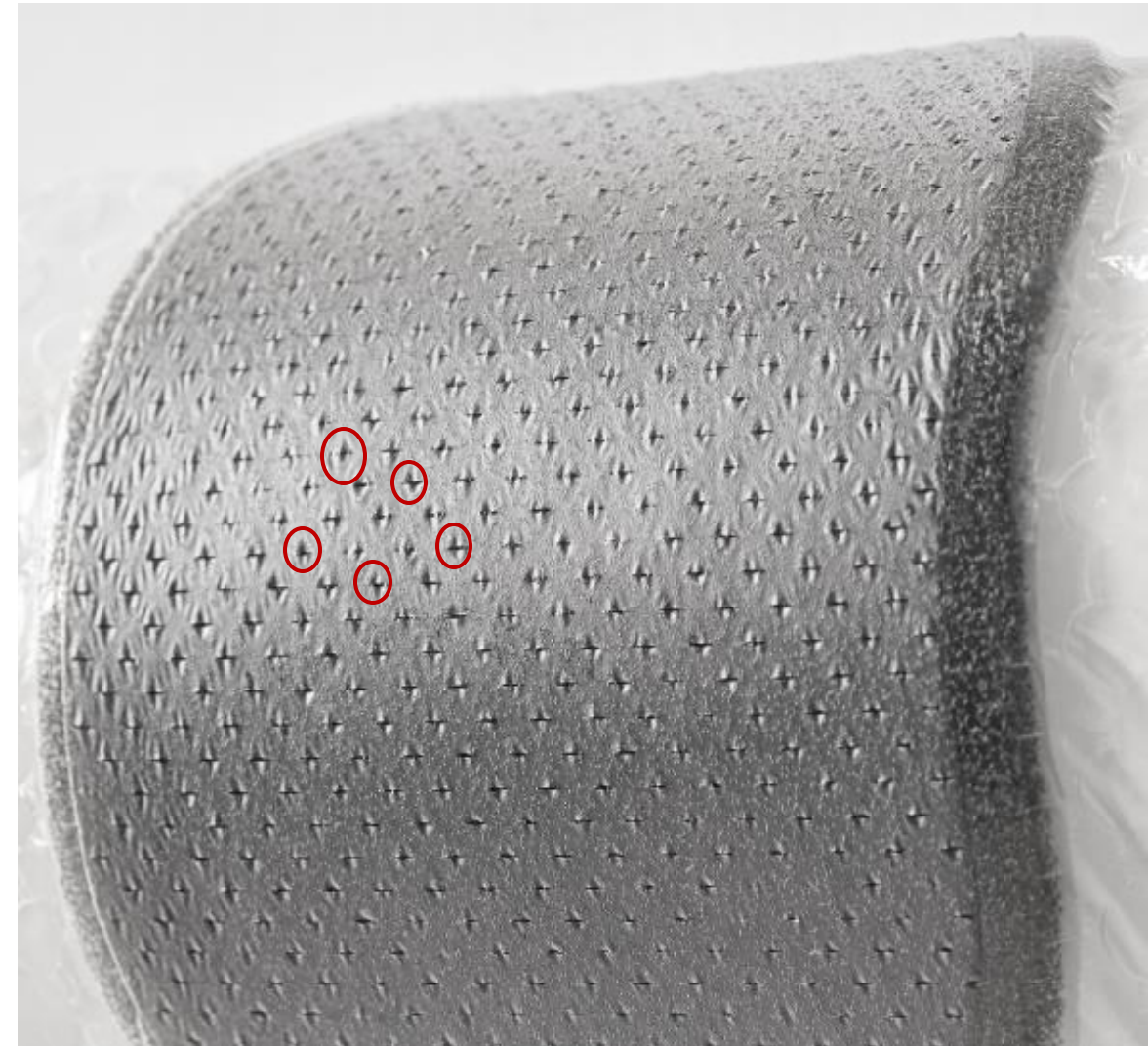


Wear time:
Up to 7 days



Perforated Polyurethane Non-Adherent Layer

- The perforated non-adherent layer was designed to
 - Provide longer wear time (up to 7 days) due to reduced risk of tissue ingrowth
 - Decrease foam adhesion to the wound bed
 - Minimize disruption of the wound bed during dressing changes
 - When used in conjunction with NPWT, it allows for removal of exudate and infectious material
 - Allows the dressing to extend onto intact periwound skin without the need to pre-drape



Example perforations circled in red

Hematoma

- 63y Male s/p fall on ice resulting in large hematoma
- No significant contributing PMH
- Hospitalized and treated for infection but was not evacuated
- Now firm and intact, not painful
- Not fully demarcated; decision to allow it to evolve



Initial presentation

Two Weeks Later



- Evolving, once fully demarcated
- Eschar removed
- Clot evacuated over next week



Three Weeks

- Hematoma almost completely evacuated
- NPWT ordered
- Dressing changes to be done in clinic; patient not homebound



NPWT Initiated

- Undermining 7 to 1 o'clock
 - Maximum depth 8cm
- White foam used in undermined areas
- Pressure at 150 mm Hg



One Week Later

- Already exhibiting improved tissue quality
- Undermining begins to resolve



One Month Later

- Discussing use of 1-piece dressing to reduce dressing changes
- Waiting for undermining to resolve enough to use



Finally! Day 0

- Day 1: 3M™ V.A.C.® Peel and Place Dressing (novel NPWT peel-and-place dressing)
- 11.2 x 6.5 x 0.2cm (72.8cm²)
- <3cm undermining
- Increased pressure to 175 mm Hg
- Maceration at skin edges where black foam was on skin
- Cyanoacrylate applied to periwound



Day 3

- Measures 11 x 6.3 x 0.1cm (69.3cm²)
- Undermining unchanged



Day 6

- Periwound skin improved
- Tissue improving



Day 16



- 10.3 x 6.0 x 0.1cm (61.8cm²)
- Undermining down to 1.5cm

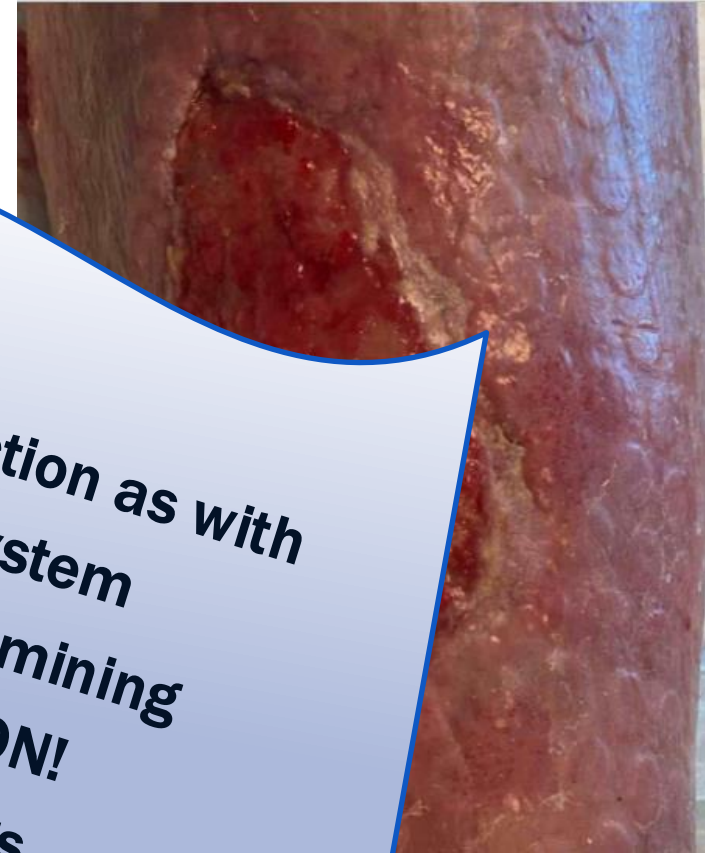
Day 23



- 9.5 x 5.5 x 0.1cm (52.5cm²)
- Undermining down to 1.0cm

Day 30

Day 37



**Granulation/contraction as with
powered system
Resolution of undermining
EPITHELIALIZATION!
Biweekly dressings
Reduced clinic visit time**

- 7.2 x 5.5 x 0.1 cm
- Undermining 0.5 cm
- New order for small dressings

1.2 x 1.2 cm (29.2cm²)
resolved
in 5 wks

Clinical Pearls

- Differentiate wound healing from wound care
- Assessing the wound barriers enables us to set appropriate goals
- Embrace technology; we can't stock everything, but we need to know what's available

What's in Your Toolbox? Choosing the Best Therapy for Hard-to-Heal Wounds

Karen L. Bauer, DNP, FNP, CWS, FAWC

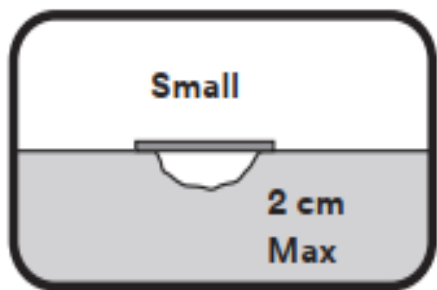
President, Society for Vascular Nursing

Board Member, AAWC

Atlanta, GA

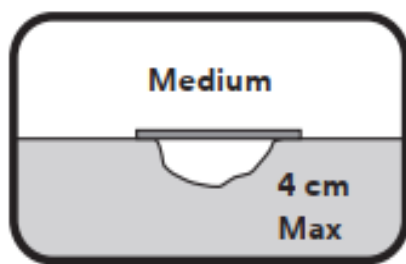
Novel NPWT Peel-and-Place Dressing Sizes

Small Dressing



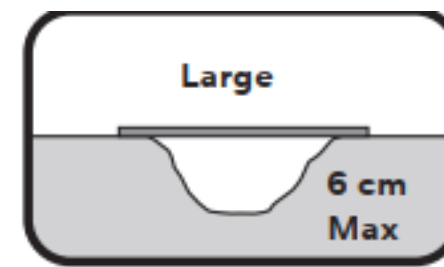
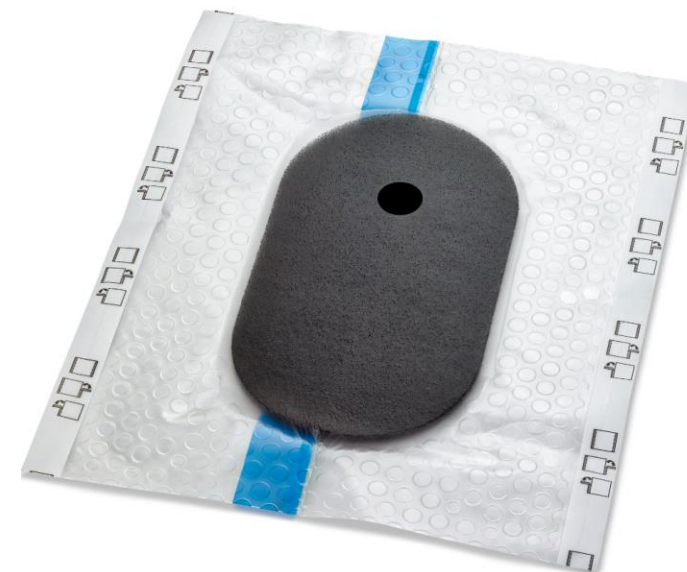
2cm

Medium Dressing



4cm

Large Dressing

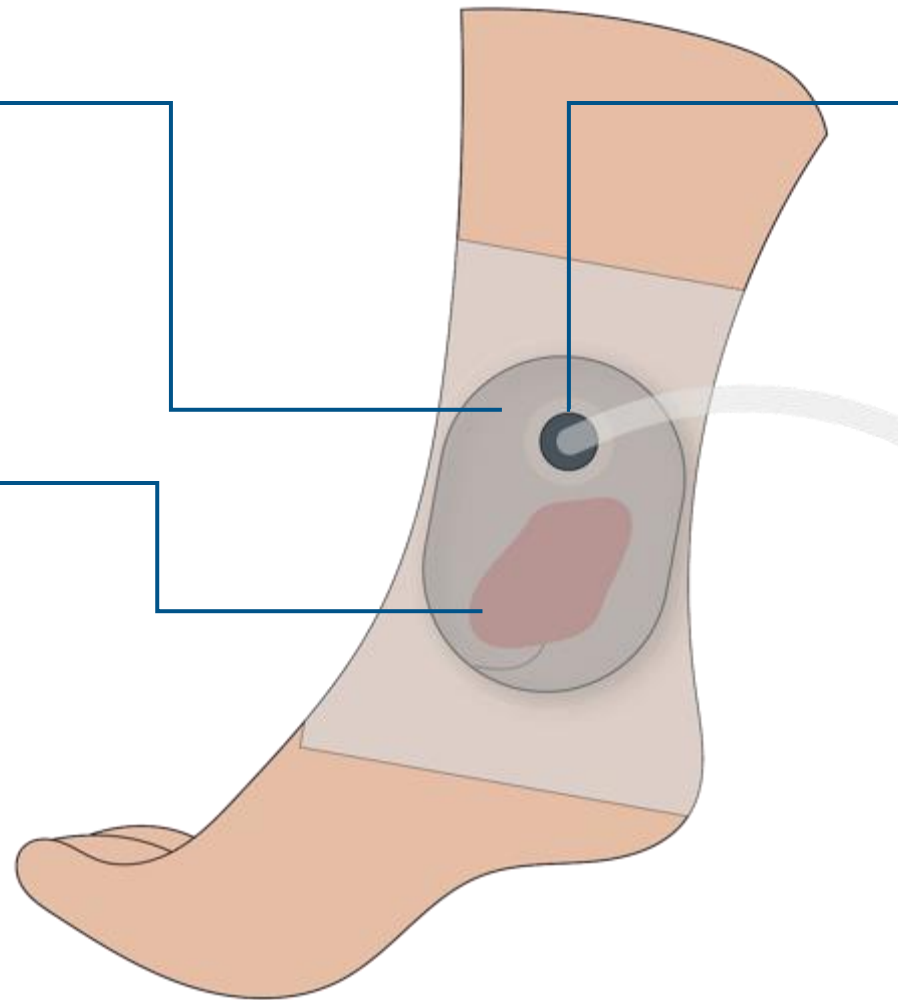
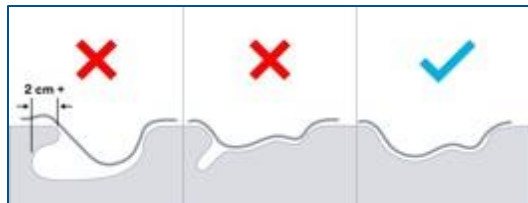


6cm

Considerations

1. Foam should extend beyond wound and touch periwound skin.

3. Undermining must be ≤ 2 cm; no tunneling can be present

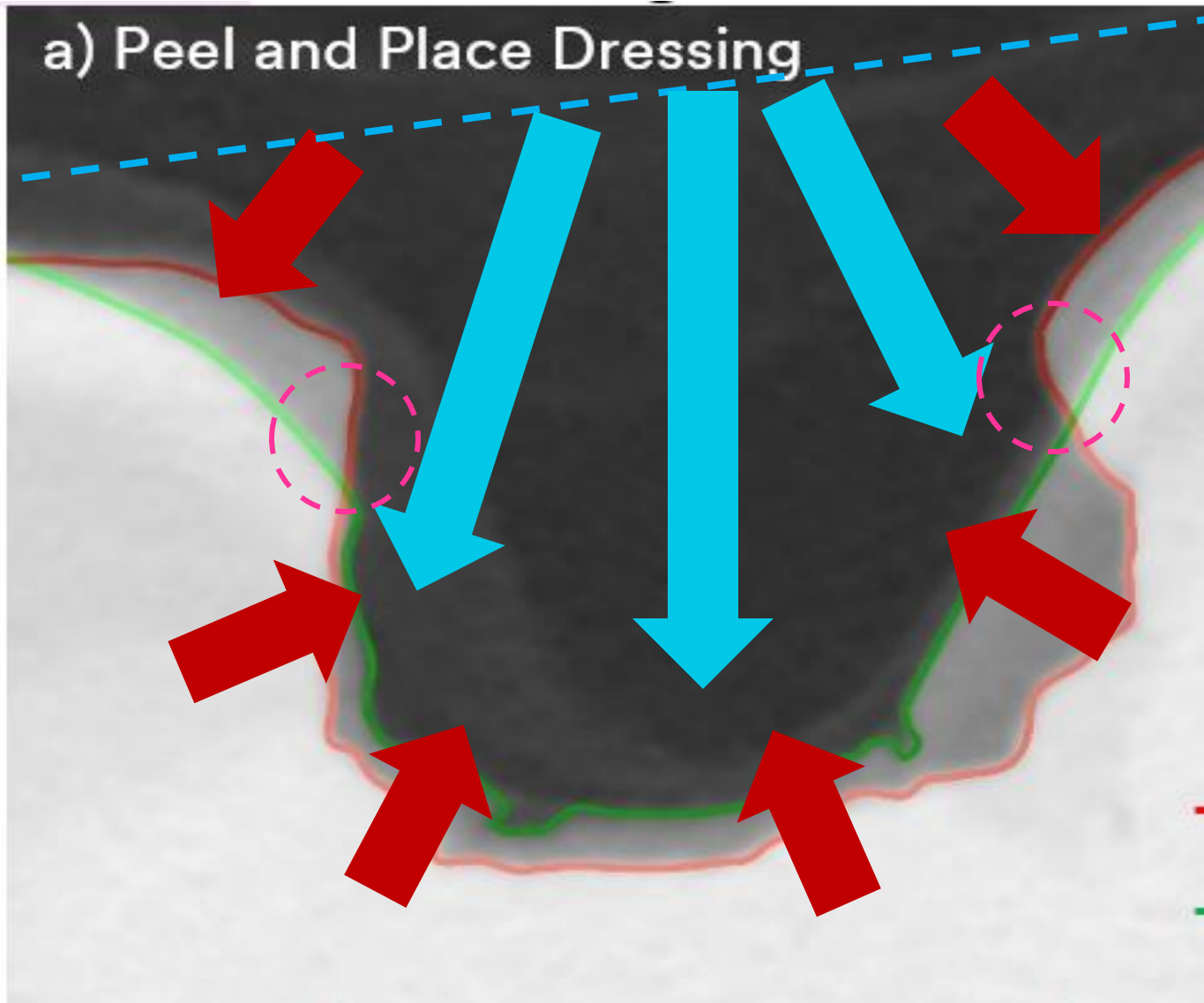


2. To offload, select the Large dressing size

4. Don't mix with other dressings. The use of additional foam fillers is prohibited.

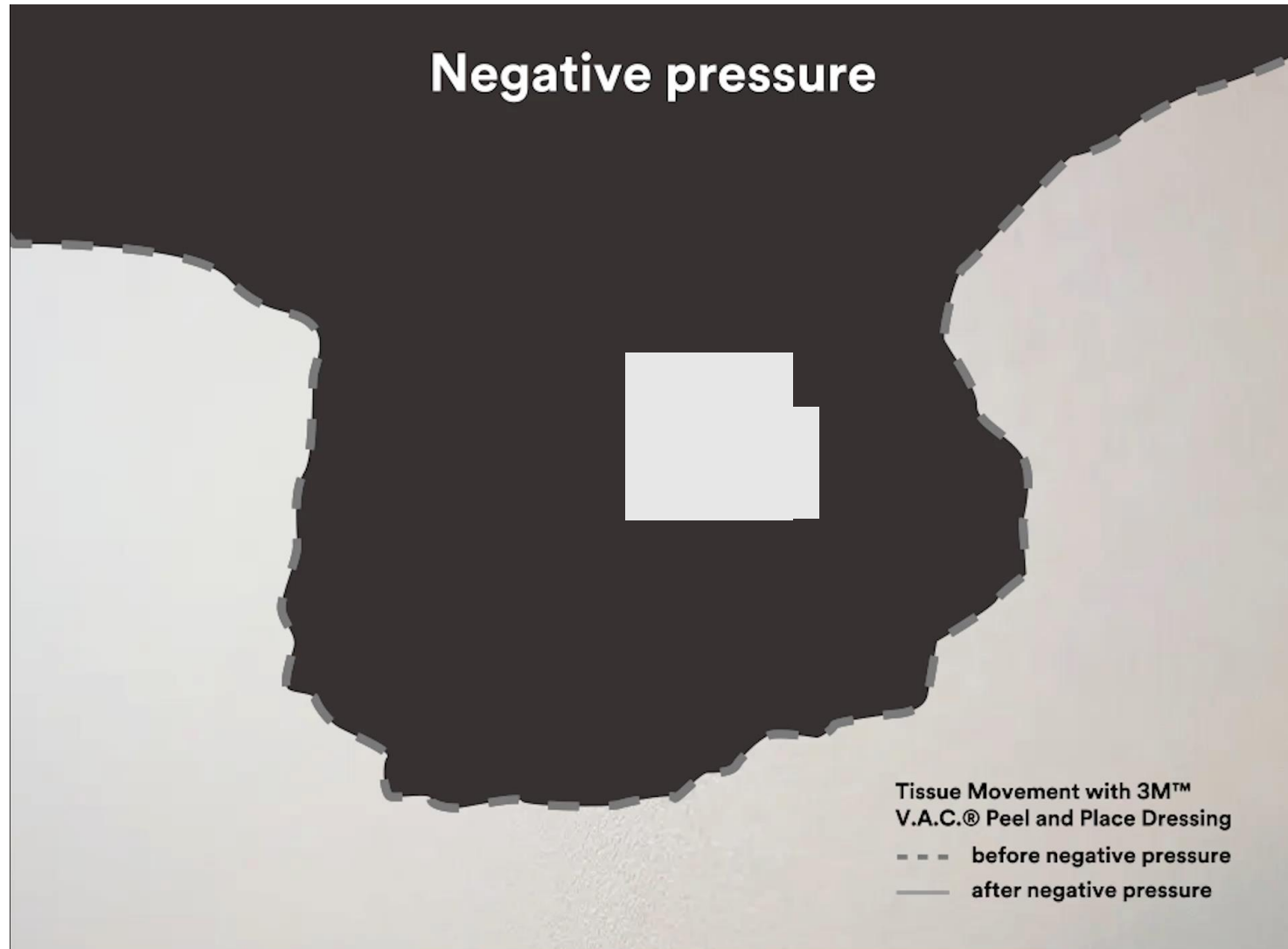


Novel NPWT Peel-and-Place Dressing Draw Down



- Superficial tissue under 0 mmHg
- Superficial tissue under -125 mmHg

Novel NPWT Peel-and-Place Dressing Draw Down



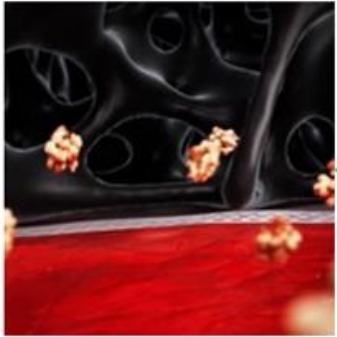
Traditional Application vs Novel NPWT Peel-and-Place Dressing



Novel NPWT Peel-and-Place Dressing Mechanism of Action

Macrostrain

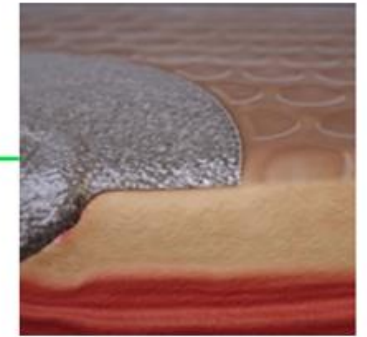
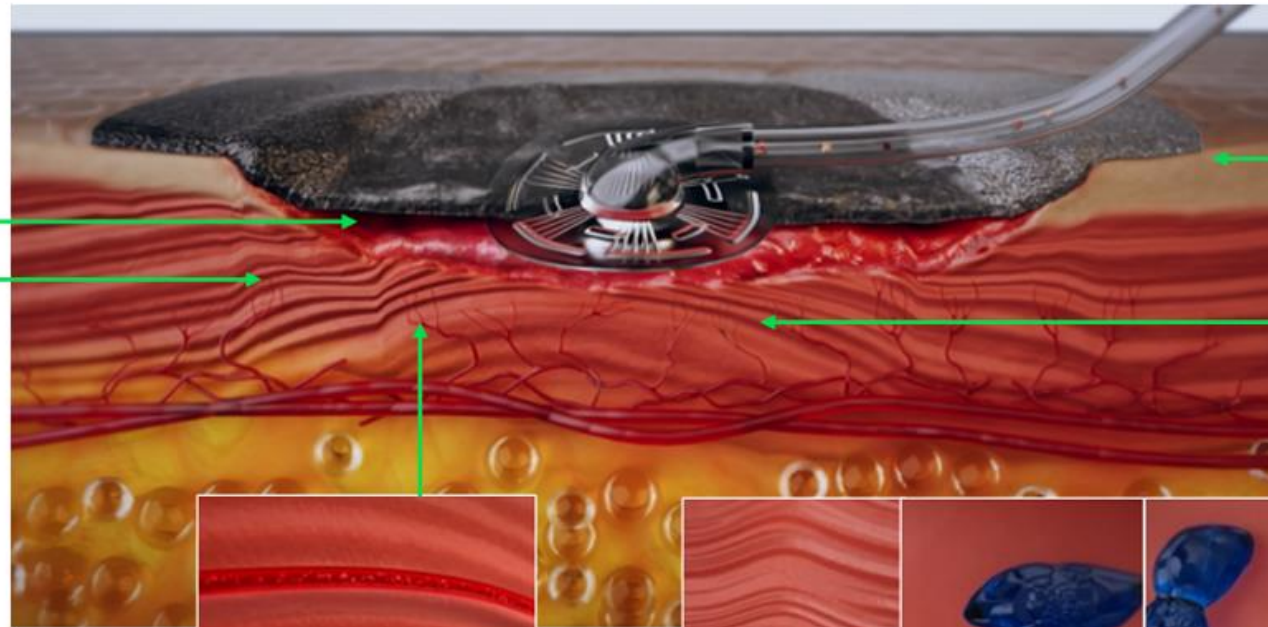
Microstrain



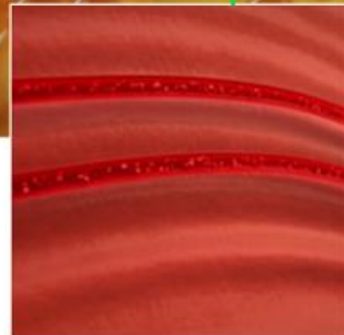
Removes exudate and infectious material



Reduces edema



Mechanical forces extend beyond the wound bed



Promotes perfusion



Deep tissue microdeformation

Stimulates cellular activity

Increase biomarkers indicative of pro-wound healing

Case 1: Multimodal

- 61y
- DM, HTN, HPL, CLTI
- s/p fem to ATA bypass with GSV
- 2nd toe amp
- Strong family support

August



Aug. 7:
Femoral to anterior
tibial bypass with
GSV harvest

No One Guideline

2023

IWGDF Guidelines on the prevention and management of diabetes-related foot disease

Practical Guidelines | 7 Guidelines | Development and methodology

IWGDF Guidelines

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Clinical Practice Guidelines

Enabling healthcare providers to select the best care for a unique individual based on patient preferences.

INTERNATIONAL CONSENSUS DOCUMENT 2025

Therapeutic wound and skin cleansing: Clinical evidence and recommendations

International Wound Infection Institute

WOUNDS INTERNATIONAL

JWCI International Consensus Document

Best practice for wound debridement

NPIAP NATIONAL PRESSURE INJURY ADVISORY PANEL

epuap

PAN PACIFIC Pressure Injury Alliance

Home 2019 Guideline CURRENT 2025 PI Guideline Stakeholders Translations News Contact Us

Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline

Clinical Infectious Diseases

IDSA GUIDELINES

IDSIA Infectious Disease Society of America hivma hiv medicine association OXFORD

IWGDF/IDSA Guidelines on the Diagnosis and Treatment of Diabetes-related Foot Infections (IWGDF/IDSA 2023)

Éric Senneville,^{1,2} Zaina Albalawi,³ Suzanne A. van Asten,⁴ Zulfigarali G. Abbas,⁵ Geneve Allison,⁶ Javier Aragón-Sánchez,⁷ John M. Embil,⁸ Lawrence A. Lavery,⁹ Majdi Alhasan,¹⁰ Orhan Oz,¹¹ Ilker Uçkay,¹² Vilma Urbanić-Rovan,¹³ Zhang-Rong Xu,¹⁴ and Edgar J. G. Peters.^{15,16,17}

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ATYPICAL WOUNDS

BEST CLINICAL PRACTICES AND CHALLENGES

JWCI

Wounds Australia

EWMA

August



Late August:

- Multiple dehiscences: edema
- Toe amputation site
- Serial sharp debridement
- Antibiotics
- Podiatry, Vascular Surgery, Wound

September



- Novel NPWT dressing started
- Increased lateral calf pain (NEG DVT), CT shows loculated fluid
- A1C from 13 → 9

- Surveillance bypass graft ultrasound with ABI
- GDMT: medication surveillance
- Labs and nutrition
- Home health coordination: extra mile!
- Staff education
- Stuff, not slough (hard for clinicians!)

October

- Improved with novel NPWT peel-and-place dressing



November



When	Type	With	Description	Tag	Open/Closed	Episode
10/17/2025	Telephone	Me			Signed	
10/16/2025	Telephone	Me			Signed	
10/16/2025	Patient Message	Me	CT scan		Open	
10/16/2025	Telephone	Me			Signed	
10/15/2025	Telephone	Me			Signed	
10/15/2025	Office Visit	Me	Leg wound, right, sub...		Signed	NP visit
10/08/2025	Office Visit	Me	Leg pain, right (Prima...		Signed	NP visit
10/01/2025	Office Visit	Me	Chronic ulcer of great...		Signed	NP visit
09/30/2025	Telephone	Me			Signed	
09/29/2025	Telephone	Me			Signed	
09/24/2025	Office Visit	Me	Localized edema (Pri...		Signed	NP visit
09/23/2025	Telephone	Me			Signed	
09/23/2025	Patient Message	Me	wound concern pleas...		Open	
09/23/2025	Telephone	Me			Signed	
09/22/2025	Appointment	Me	Canceled (Other: Sch...			
09/22/2025	Patient Message	Me	Antibiotics prescription		Open	
09/19/2025	Office Visit	Me	Localized edema (Pri...		Signed	NP visit
09/15/2025	Office Visit	Me	Cellulitis of other spe...		Signed	
08/25/2025	Telephone	Me			Signed	
08/25/2025	Office Visit	Me	Diabetic ulcer of toe o...		Signed	

Case 2: Streamlined Care Transitions

Large Abdominal Wound Post Renal Transplant

- 65y Female, T2DM with diabetic retinopathy and h/o DFUs
- HTN, CAD s/p old MI (2016) and CABG X2 (9/21/2021, LIMA to LAD and reverse SVG to OM)
- HFpEF, h/o paroxysmal atrial fibrillation
- Carotid artery stenosis s/p right carotid endarterectomy (12/13/2018)
- Secondary hyperparathyroidism and anemia of CKD
- Stage 4 oropharyngeal cancer (left tonsil)
- COPD, HPL, GERD, gout, hypothyroidism, skin melanoma s/p excision
- Osteoarthritis s/p right knee replacement (2017)
- h/o right rotator cuff tear
- Anxiety, obesity, OSA (on CPAP), h/o colon polyps, diverticulosis, h/o MRSA infection, hearing loss (left ear)
- Anesthesia problems, difficult IV access
- Dermatitis, chronic sinusitis, headaches, dental disease, h/o fecal incontinence

Surgical Progression

NPWT: The Power of Wound Specialist Persuasion
(Getting other services to buy in)

Deceased Donor
Kidney Transplant:
June 28

Incisional
Infection Washout:
July 9, July 25

Consulted July 10



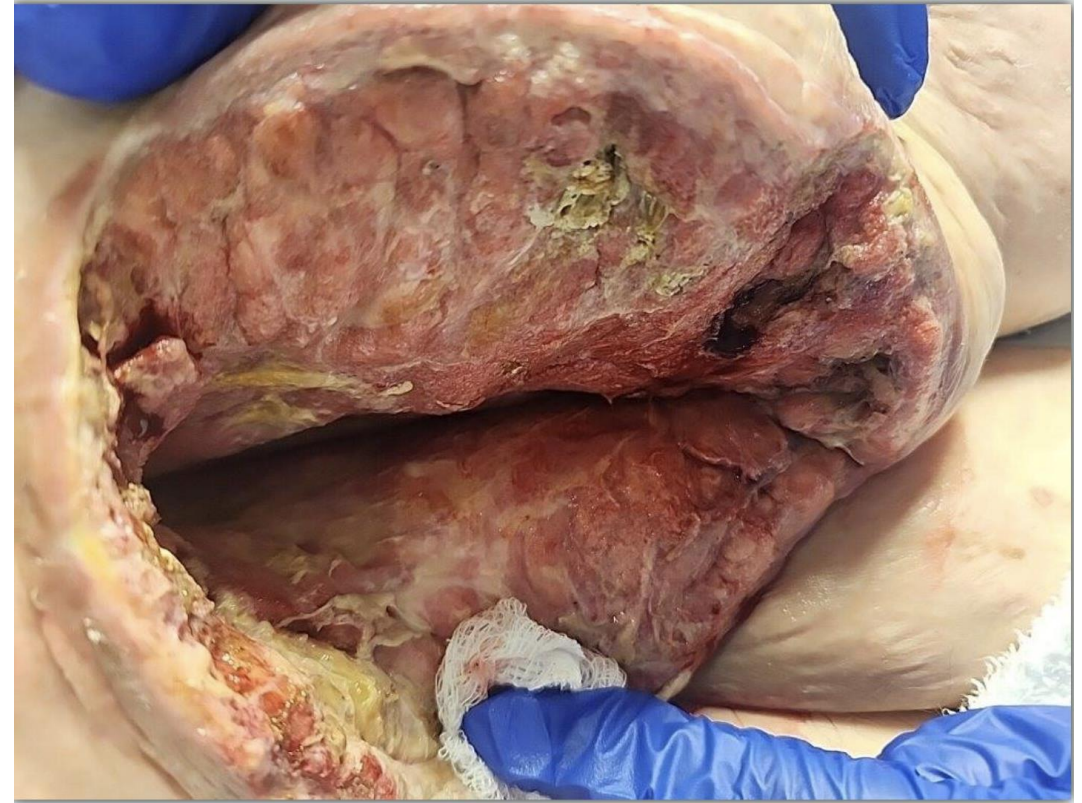
July 10



July 18

Postoperative

- S/P 7/25 wash-out
- Instill NPWT: 10min dwell time q2hrs with hypochlorous acid (HOCl), -125 mm Hg
- Multidisciplinary Care: ID, Transplant APP
- Wound/Vascular, Patient and Family



ECF Transition

Discharge to SNF: Aug. 4

➔ Portable NPWT, black foam,
-125 mm Hg

Clinic follow-up Aug. 14 ➔

Keys: Multimorbidity, immunosuppressed
Goal: Meticulous wound hygiene, HOCl, nutrition

Clinic follow-up Aug. 30 ➔

Pain at wound edge
Intervention: hydrocolloid



Transition to Home

- Discharged with home health
- Clinic follow-up Sept. 2
- Still having pain at edges, improved
- Portable NPWT continued
- Focused on diet
- **Patient frustrated: Goal is to swim**



Multiple conversations
with home health nurses



Novel NPWT Peel-and-Place Dressing

- **Oct clinic follow-up:** Started novel NPWT peel-and-place dressing
- HOCl, collagen



Indications

- Chronic wounds
- Acute wounds
- Traumatic wounds
- Subacute wounds
- Dehisced wounds
- Partial-thickness burns
- Ulcers (such as diabetic, pressure or venous insufficiency)
- Flaps
- Grafts

Warnings

Do not use on wounds with:

- Undermining greater than 2 cm
- Tunneling
- Depth greater than 6 cm



Dressing should cover the entire wound bed and extend onto intact skin.

Find the right size

Small - EZ5SML	Medium - EZ5MED	Large - EZ5LRG
Max wound size: 6.1 cm x 8.6 cm	Max wound size: 11.1 cm x 16.6 cm	Max wound size: 13.6 cm x 24.2 cm
Max Depth: 2 cm	Max Depth: 4 cm	Max Depth: 6 cm



Always read and follow the detailed Instructions for Use along with important safety information provided in the packaging.



Wear time

Dressing can remain in place for **up to 7 days**.¹



Device settings

Set the device to **-75 to -150 mmHg** on **continuous mode**.

Do not

- Cut foam.
- If skin barrier/protectant is used under the adhesive portion of the dressing, do not reposition the dressing as adhesive properties may be reduced.
- Use with other V.A.C.® Therapy Dressing Kits or foams, as they have a shorter wear time.
- Push foam portion of the dressing down. Allow the dressing to draw down and conform the wound bed as negative pressure is applied.
- Stretch dressing.

Drape Tips

- Apply loosely over the wound area.
- Leave at least a 5 cm border of drape wherever possible.
- Can reposition within 20 minutes of initial application.
- For curved anatomy, slits may be cut in the drape portion of the dressing to help reduce overlap, drape folds or remove wrinkles.

Watch how-to-apply video



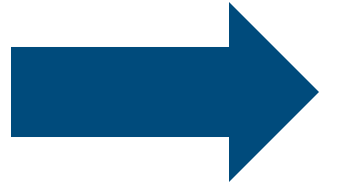
Coordination



Nov: Novel NPWT peel-and-place dressing



December: Collagen



Ulcer reportedly closed ➡ Patient had COVID ➡ Collagen re-initiated via telemed

Closed

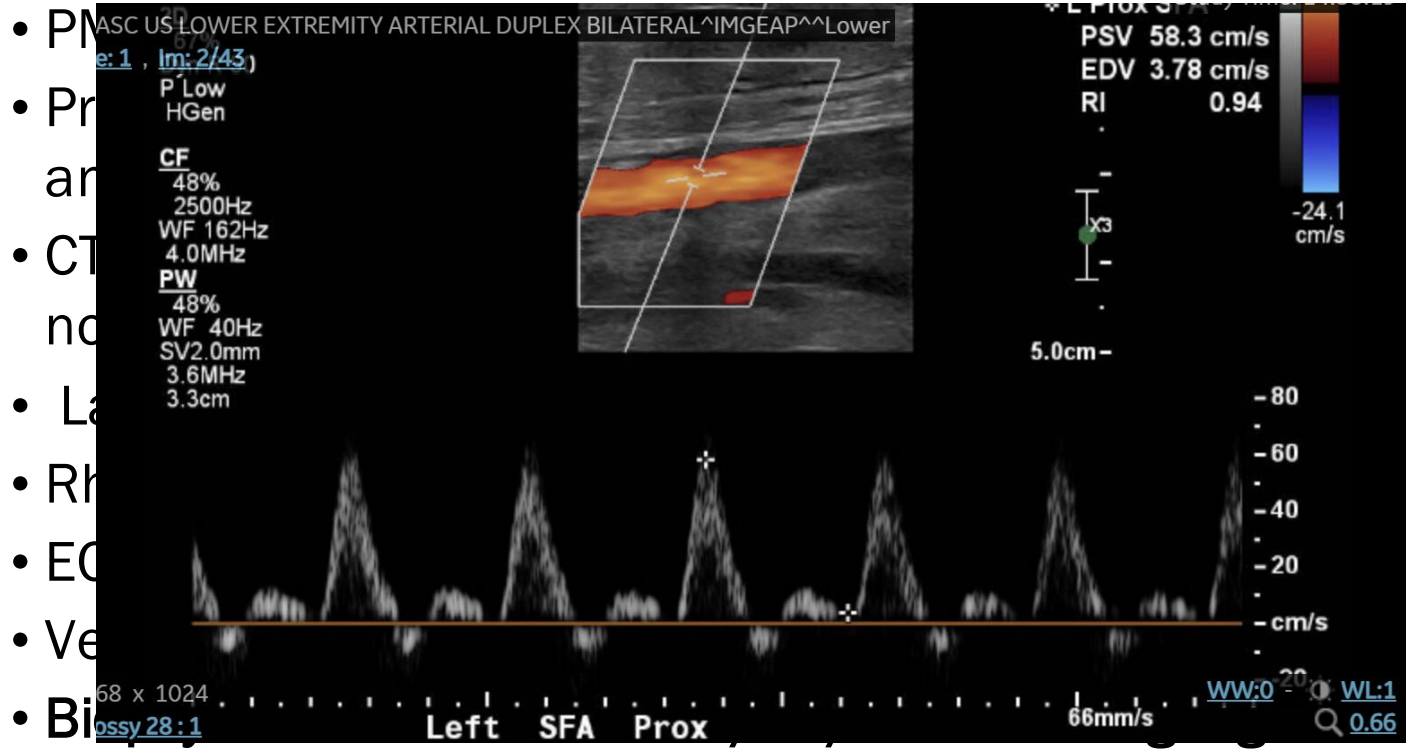


Jan. 29, 2025

Case 3: Unplanned Care Transitions and Treatment Changes

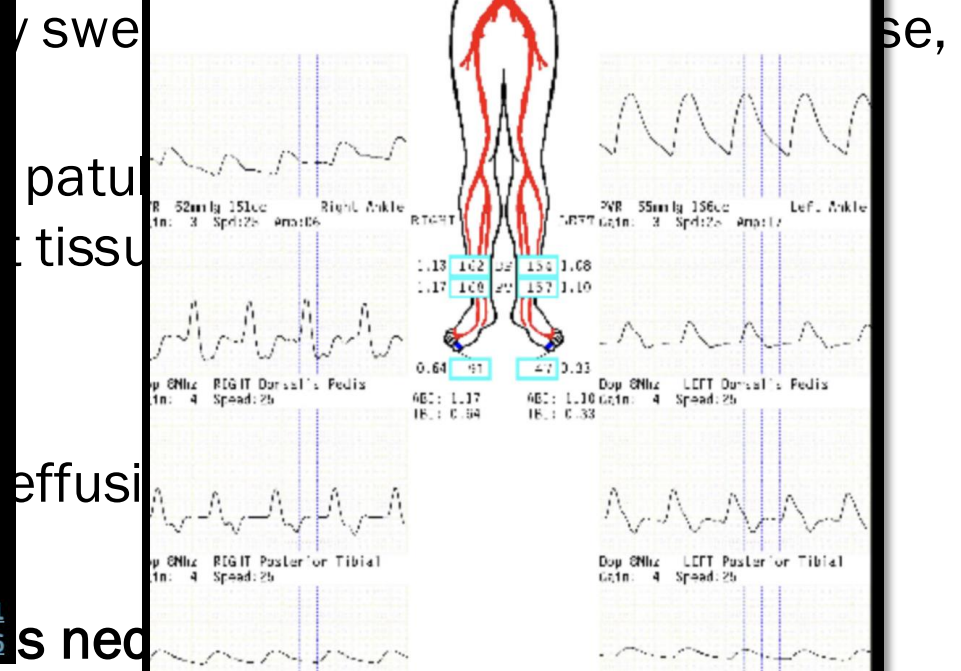
Atypical Vasculitis

- 68y Female



(dermatopathology)

- High-dose steroids with taper at discharge



ERCP = endoscopic retrograde cholangiopancreatography; DUS = duplex ultrasound; LLE = left lower extremity.



Presentation June 2025



3 wks later

NPWTi-d in OR POD 5 (7/29/24)



POD 5

NPWTi-d with HOCl


10min dwell time q2hrs at -125 mm Hg, 3x/wk

POD = postoperative day.

**Multidisciplinary Coordination:
GIM; ID; Rheumatology; Vascular**

Real-World Obstacles

Challenges

- Pain control
- Health literacy
- Isolation
- Ulcer location
- Etiology not fully delineated
- NPWT varied
- **Care transition** 

Portable NPWT with nonadherent over tendon, black foam, 75 mm Hg with titration goal 125 mm Hg, as tolerated



Aug. 2024

Interrupted NPWT: Consider Patient Factors!



Sept 10
NPWT held prior at ECF
Readmitted, started novel NPWT
peel-and-place dressing



Sept 14
Discharged on portable NPWT
Non-adherent, black foam, -75 mm Hg

Multimodal Therapy



Oct 5
CTP/wash-out booked



Oct 14
1 wk post CTP: portable NPWT
Non-adherent, black foam,
-75 mm Hg



Oct 26
Portable NPWT
Non-adherent, black foam,
-75 mm Hg

Inpatient to Outpatient Transitions Coordination



Nov. 24
Inpatient: Novel NPWT
peel-and-place dressing



Dec. 2
Portable NPWT
Non-adherent, black foam
-75 mm Hg



Feb. 12
Collagen, off dapsone

Case 4: DFU with Strong Family Involvement Care Transitions with Help!

May: Initial Presentation DFI



IDSA Guidelines

2012

Infection Severity	Clinical Manifestation
Mild	Localized to skin and subcutaneous tissue without systemic signs of infection; if erythematous, >0.5cm to ≤2cm around ulcer
Moderate	Local infection with >2cm, or involving deeper infection (abscess, osteomyelitis, fasciitis) AND without systemic signs of infection
Severe	Local infection with SIRS (2 of the following): Temperature >38C or <36C, HR >90, RR >20, WBC >12K or <4K

2023

Infection Severity	Clinical Manifestation
Mild (At least 2+)	Localized swelling or induration, erythema >0.5cm to ≤2cm around ulcer, localized tenderness/pain, localized warmth, purulent discharge
Moderate	Local infection with >2 cm from wound margin OR involving deeper infection (abscess, osteomyelitis, fasciitis) AND <u>without systemic signs of infection</u>
Severe	Local infection with SIRS (2 of the following): Temperature >38C or <36C, HR >90, RR >20, WBC >12K or <4K

Take Home: IDSA Guidelines

- Understand local resistance rates for the

UTMC <i>Pseudomonas aeruginosa</i> Susceptibility Trends							
	AMK	TOB	GEN	TZP	MEM	FEP	CIP
2018	100	94	96	80	87	84	71
2019	100	92	93	85	85	93	84
2020	100	95	99	75	83	86	68
2021	100	96	99	79	85	90	87
2022	100	99	97	73	84	86	73

University of Toledo Medical Center Diabetic Foot Infections Pocket Guide	
Diagnosis and Criteria	Recommended Therapies
<p>Mild DFI</p> <ul style="list-style-type: none"> At least two of the following: <ul style="list-style-type: none"> Localized swelling or induration Erythema > 0.5 cm to ≤ 2 cm around ulcer Localized tenderness/pain Localized warmth Purulent Discharge Usually treated with PO therapy 	<p>Probable Pathogen(s)*: MSSA, <i>Streptococcus</i> spp, or MRSA (if prior isolation or risk factors for MRSA)</p> <p>Preferred Agents^a: Cephalexin 500mg q6h, Amoxicillin-clavulanate 875mg-125mg q12h, Doxycycline 100mg q12h, Trimethoprim-sulfamethoxazole 800mg-160mg q12h</p> <p>Duration of Therapy: 1-2 weeks OR 10 days following surgical debridement</p>
<p>Moderate DFI</p> <ul style="list-style-type: none"> Local infection with > 2 cm from wound margin OR involving deeper infection (abscess, osteomyelitis, fasciitis) AND <u>without systemic signs of infection</u> 	<p>Probable Pathogen(s)*: MSSA, <i>Streptococcus</i> spp, Enterobacterales, MRSA (if prior isolation or risk factors for MRSA), ± anaerobes</p> <p>Antimicrobial Guidance Based on Presentation^a</p> <ol style="list-style-type: none"> No complicating features (foreign body, puncture wound, deep abscess, arterial/venous insufficiency, lymphedema, immunosuppression, AKI) <ul style="list-style-type: none"> Amoxicillin-clavulanate, ampicillin-sulbactam, cefuroxime, ceftriaxone, cefazolin ± metronidazole Recent antibiotics (within last 30 days) / Abscess / Bone & Joint <ul style="list-style-type: none"> Ceftriaxone + vancomycin ± metronidazole Macerated ulcer <ul style="list-style-type: none"> Piperacillin-tazobactam OR cefepime + vancomycin ± metronidazole Ischemic limb/necrosis/gas forming <ul style="list-style-type: none"> Ceftriaxone + vancomycin + metronidazole/clindamycin <p>Duration of Therapy:</p> <ul style="list-style-type: none"> Moderate/severe WITHOUT bone/joint involvement: 2-4 weeks Moderate/severe WITH bone/joint involvement <ul style="list-style-type: none"> Resected: 2-5 days Debrided (soft tissue): 1-2 weeks Positive culture of bone margins AFTER resection: 3 weeks No surgery/dead bone: 6 weeks Tailor antimicrobial therapy based on culture results and consider transitioning to oral therapy after patients have appropriate source control procedures and are clinically stable
<p>Severe DFI</p> <ul style="list-style-type: none"> Local infection AND <u>at least two</u> of the following: <ul style="list-style-type: none"> Temperature > 38°C or < 36°C HR > 90 RR > 20 WBC > 12K or < 4K <p>Do NOT empirically target <i>Pseudomonas aeruginosa</i> in temperate climates unless it has been isolated from cultures of the affected site within the previous few weeks</p>	

*MRSA risk factors: prolonged hospitalization, ICU admission, recent hospitalization, recent antibiotic use, invasive procedures, admission to nursing home, open wounds, hemodialysis, immunocompromised status, long-term CVC

^aMay require renal dose adjustment

Now What?



RIGHT FOOT
WOUND [99999]
and Right plantar
foot debridement

INTERNATIONAL CONSENSUS UPDATE 2022

International Wound Infection Institute

WOUND INFECTION IN CLINICAL PRACTICE

Principles of best practice

2022

Third Edition

Table 9: Wound cleansing solution options

Fluid type	Safety profile	Comments	Key model features
Potable tap water	Hypotonic	<ul style="list-style-type: none"> No cytotoxicity Not sterile 	<ul style="list-style-type: none"> Generally inert solution that varies in content¹⁶⁹ Effect achieved through mechanical detachment of contaminants¹⁸¹ Safe alternative when sterile solutions are not available or feasible (e.g. low resource settings or community settings)¹⁷⁷ In low resource settings with non-potable water, boiled and cooled water is an alternative⁶⁵ When using potable tap water, run the tap to remove contaminants before using the water¹⁶⁶
Sterile normal 0.9% saline	Isotonic	No cytotoxicity	<ul style="list-style-type: none"> Inert, isotonic solution with no antimicrobial properties¹⁶⁹ Effect achieved through mechanical detachment of contaminants¹⁸¹ Once opened, product is no longer sterile¹⁸²
Sterile water	Hypotonic	No cytotoxicity	<ul style="list-style-type: none"> Inert, hypotonic solution with no antimicrobial properties¹⁶⁹ Effect achieved through mechanical detachment of contaminants¹⁸¹ Once opened, product is no longer sterile¹⁸²
Surfactant wound cleansers (e.g. Poloxamer 407, undecylenamido-propyl betaine and macrogolum)	Surfactant	Low cytotoxicity to fibroblasts and keratinocytes <i>in vitro</i> ¹⁶⁰	<ul style="list-style-type: none"> Categorised based on type of chemical charge¹⁶⁸ Commonly combined with antimicrobial/antimicrobially-preserved agents including octenidine dihydrochloride (OCT) or polyhexamethylene biguanide (PHMB) Removes bacteria without damage to healing wound tissues¹⁸⁰
Super-oxidised solutions (hypochlorous acid and sodium hypochlorite are present as antimicrobial preservatives)	Hypotonic	Varies (see Table 11)	<ul style="list-style-type: none"> Contain naturally occurring hypotonic, oxidising agents¹⁸³ Antimicrobial and antibiofilm action varies (see Table 11)
Povidone iodine	<ul style="list-style-type: none"> Antiseptic Iodophor 	Dose dependent cytotoxic effect on osteoblasts, myoblasts and fibroblasts ^{184, 185}	<ul style="list-style-type: none"> Antiseptic solution Broad spectrum antimicrobial¹⁸⁵⁻¹⁸⁹ and antibiofilm¹⁸⁵⁻¹⁸⁷ action (see Table 11)
Other agents containing antimicrobials and/or active preservatives	Varies	Varies (see Table 11)	<ul style="list-style-type: none"> Range of antimicrobial/antimicrobially-preserved agents solutions, less commonly used solely as a cleansing agent (see Table 11)

ASSISTING
BONE,
WOUND VAC
PLACEMENT

NPWTi-d: LTACH to Hospital Transitions



Dec. 29



Jan. 9



Feb. 21

NPWTi-d

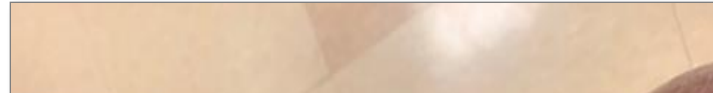
- 2021 Meta-analysis
- 13 studies 720 patient participants
- Significantly fewer OR debridements done in NPWTi-d patient group vs control group ($P=0.01$)
- NPWTi-d patient group showed reduced bacterial count 4.4x greater than control group wounds ($P=0.003$)
- Significantly shorter time treated in NPWTi-d patient group vs control group ($P=0.03$)
- Wounds in the NPWTi-d patient group were 2.39x more likely to close than control group wounds ($P=0.01$)
- LOS not significantly reduced for NPWTi-d patient participants compared to control group ($P=0.06$)

Transition to LTACH, then Home Health

New staff, different treatment modalities, varying skill levels,
difficult transfers, new specialty input



1. Frequent arterial surveillance
2. RFM/GDMT: Patient/family education, tracking as care setting changed
3. Aggressive with bedside debridement and wound hygiene
4. Frequent patient and family interaction
5. Offloading devices/shoewear combined, orthotist involvement
6. Coordination of ID care plans
7. Celebrate small victories = big wins!
8. Beg, barter, steal



Information With CPT Code

Specialty	General Anesthesia
Int	General



Keys

- TEAM
- Meticulous
- Attention

Date	Procedure	Performer
01/09/2024		
12/15/2023	12/18/2023	
11/08/2023	12/14/2023	
08/26/2023	09/13/2023	
08/26/2023	09/13/2023	
04/12/2023	04/12/2023	
04/12/2023	04/12/2023	
04/11/2023	04/11/2023	
04/11/2023	04/11/2023	
04/11/2023	04/11/2023	
02/17/2023	02/22/2023	
02/17/2023	02/22/2023	
01/18/2023	01/19/2023	
01/16/2023	01/17/2023	
01/13/2023	01/14/2023	
01/13/2023	01/13/2023	
01/13/2023	01/13/2023	
01/13/2023	01/13/2023	
01/12/2023	01/12/2023	



Clinical Pearls

- Manage the patient first
- Zoom in and zoom out... details and big picture are important in decision making
- Frequent evaluation and flexibility
- Don't let perfect be the enemy of good, but aim for great
- Celebrate small wins — they lead to big victories

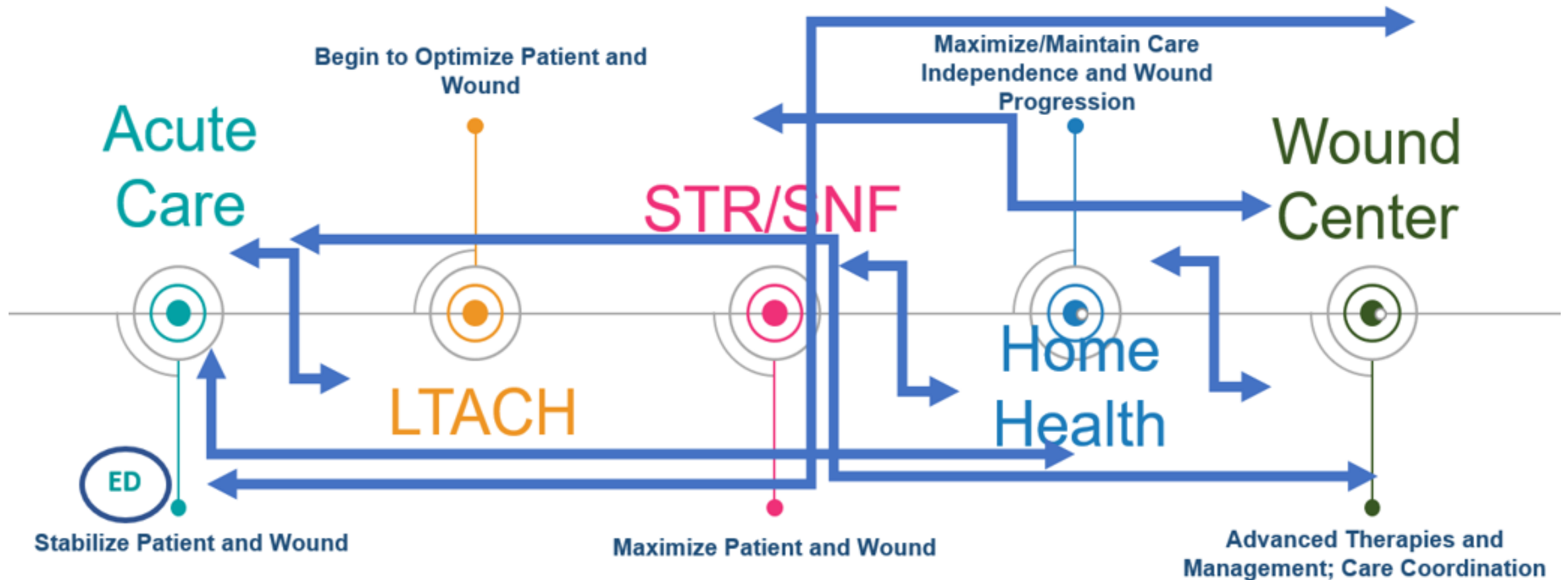
Clinical Decision Making at the Bedside

Catherine T. Milne, MSN, APRN, CWOCN-AP, WOCNF

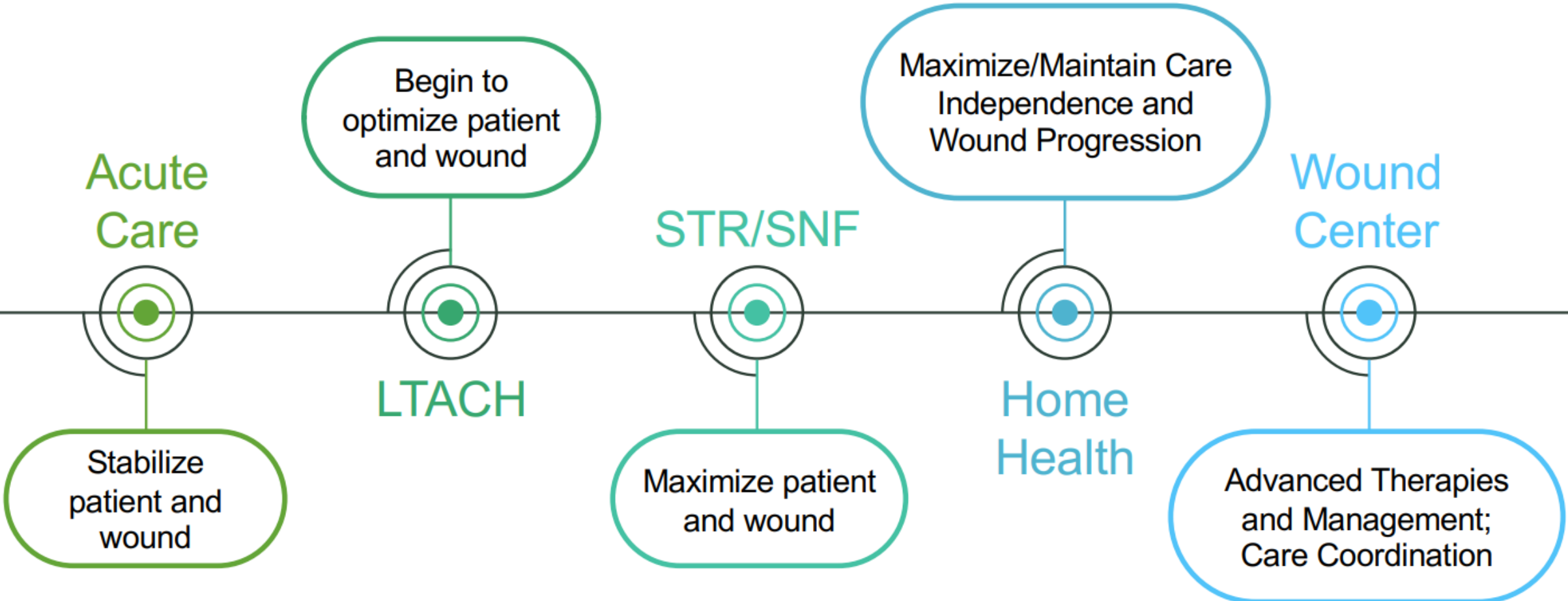
Connecticut Clinical Nursing Associates

Bristol, CT

Wounds Do Not Happen by Setting, They Follow the Patient



Care Occurs across Many Settings



What Is Clinical Decision Making?

A structured approach to making informed decisions about patient care – encompassing diagnosis, assessment, and management – while considering evidence, patient context, and available resources



Clinical Decision Making Is also Complicated by...

Patient satisfaction

Communicating with other providers

Pay for performance – value-based health care

Patients sicker

Staffing and other regulations

Environmental threats

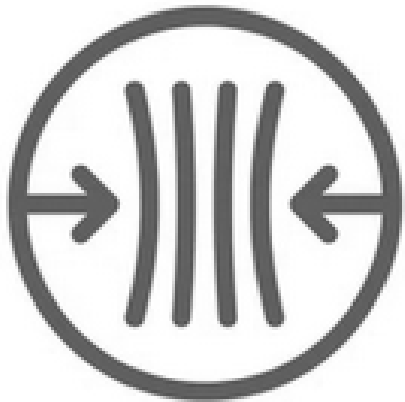
Competency of staff

Supply chain

Managed care contracts

Reimbursement

Controlling costs



Who Said This Job Was Easy?



What Are We Trying to Achieve?

Ultimate Goal

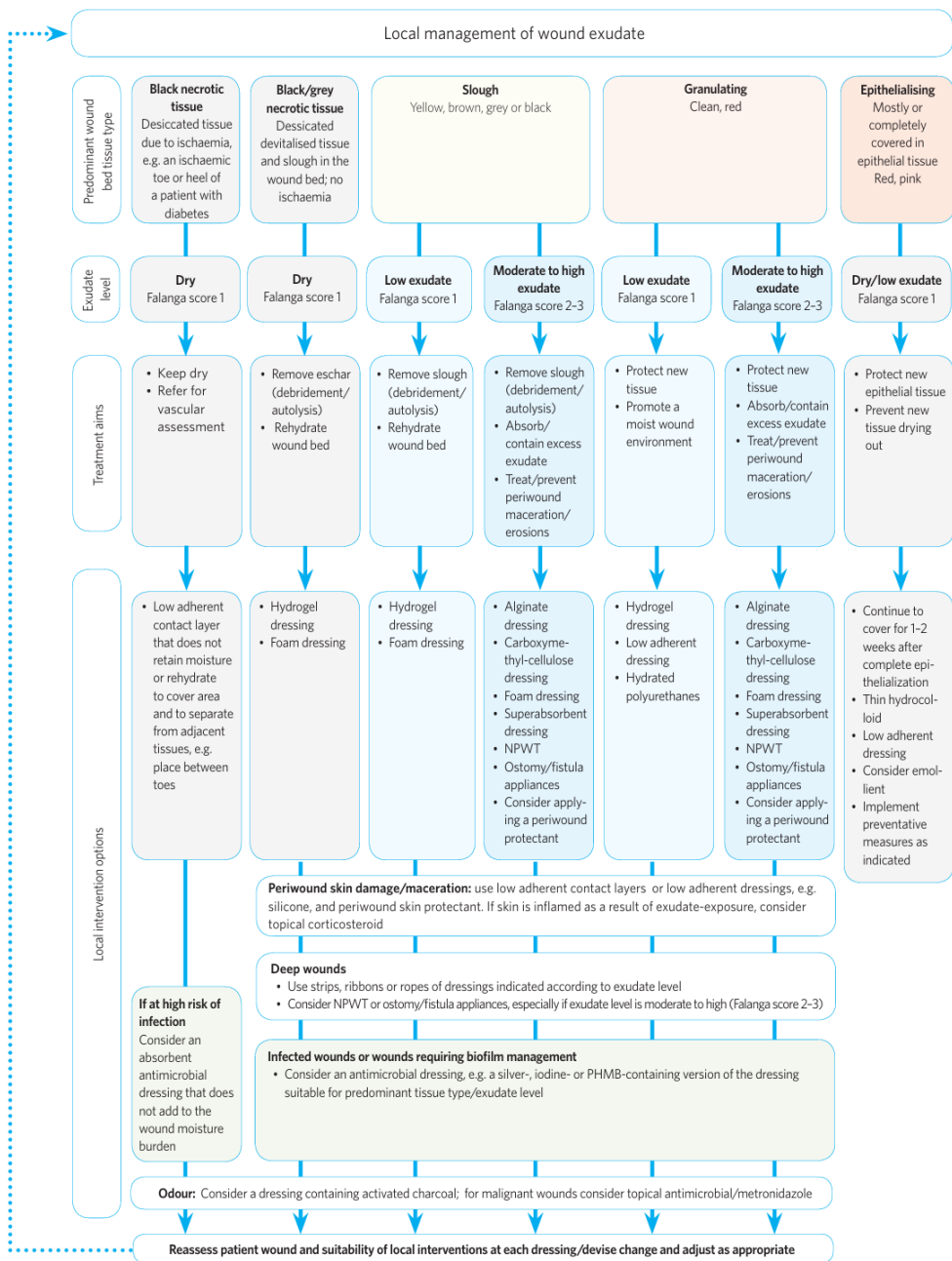
Reduce healing time while simultaneously improving quality of life

Method

Using evidence-based advanced wound therapies targeting the physiological disruption in the wound bed



Figure 5: Local management of wound exudate

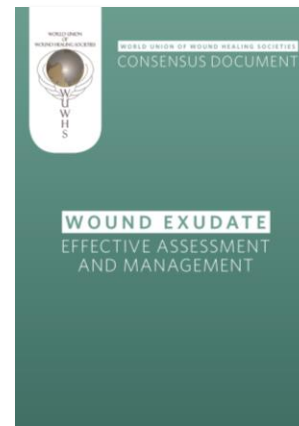


Plenty of Dressing Algorithms Around...

World Union of Wound Healing Societies (WUWHS) Consensus Document. Wound exudate: effective assessment and management. *Wounds Int.* 2019.

Available at:

<https://wounds-me.com/wp-content/uploads/2023/02/836aed9753c3d8e3d8694bcaee336395.pdf>



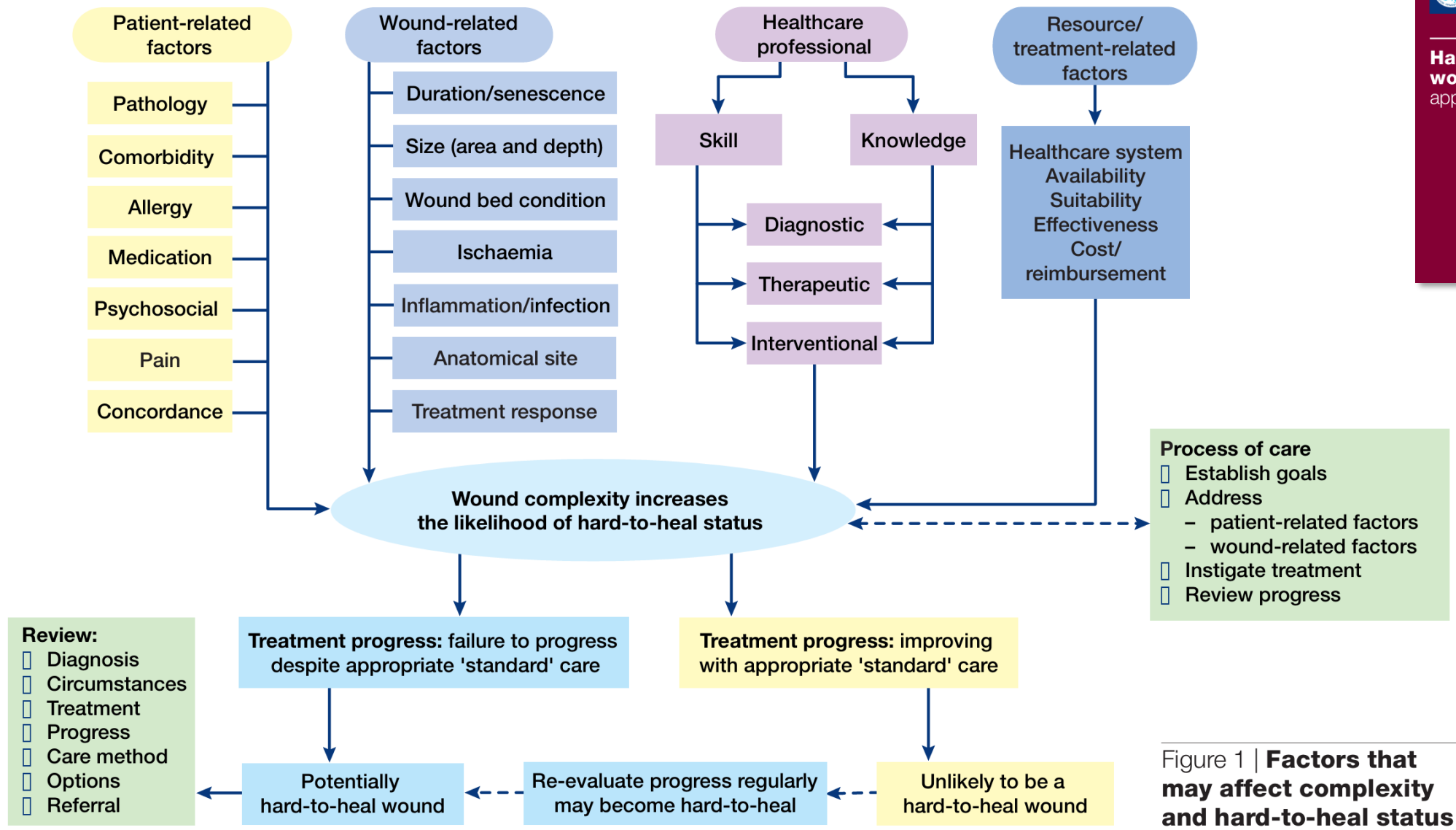
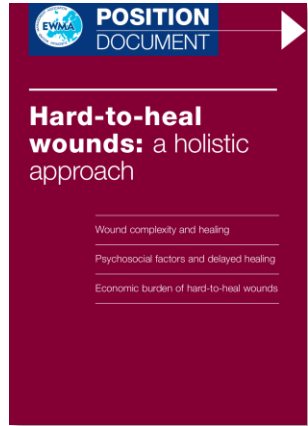


Figure 1 | **Factors that may affect complexity and hard-to-heal status**

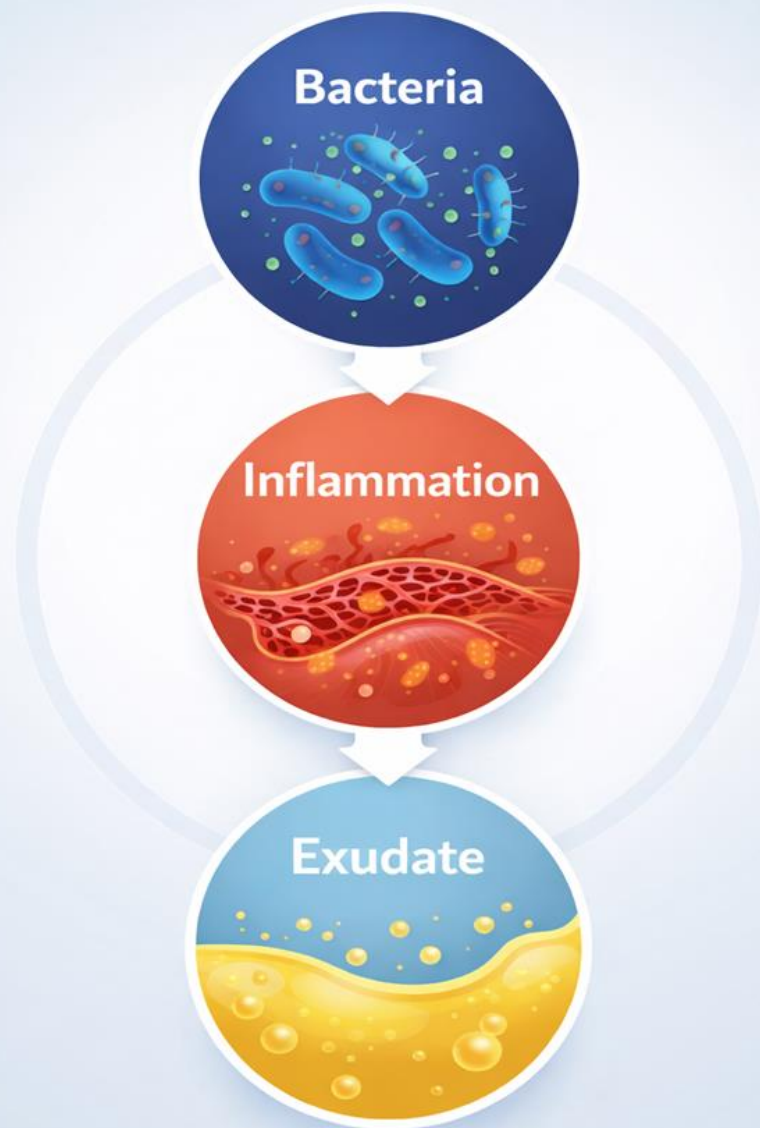
Clinical Decision Making in Wound Management



What's going on
physiologically
right now?

What can I do
NOW to improve

Our Clinical Challenges



The Hard-to-Heal Wound: What We SEE



Is All Exudate the Same?

Chronic Wound Exudate

- Higher levels of bacteria
- Increased matrix metalloproteinases (MMPs) and inflammation
- Increased cytokines
- Degradation of growth factors and extracellular matrix (ECM)
- Decreased cellular proliferation



Local Infection

Inflammation

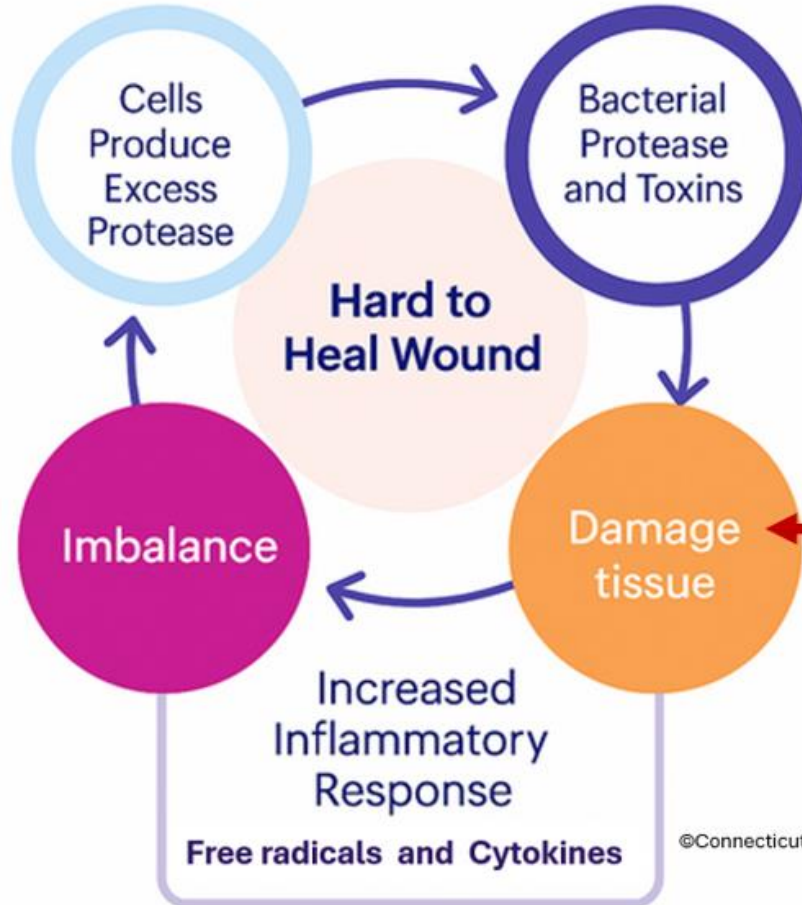
Exudate

What Happens When You Don't Control Exudate?

- Increased potential for infection
- Slower closure rates
- More costs incurred with dressing changes
- Increasing *bioburden* and *inflammation*
 - Translates clinically to increased **exudate**



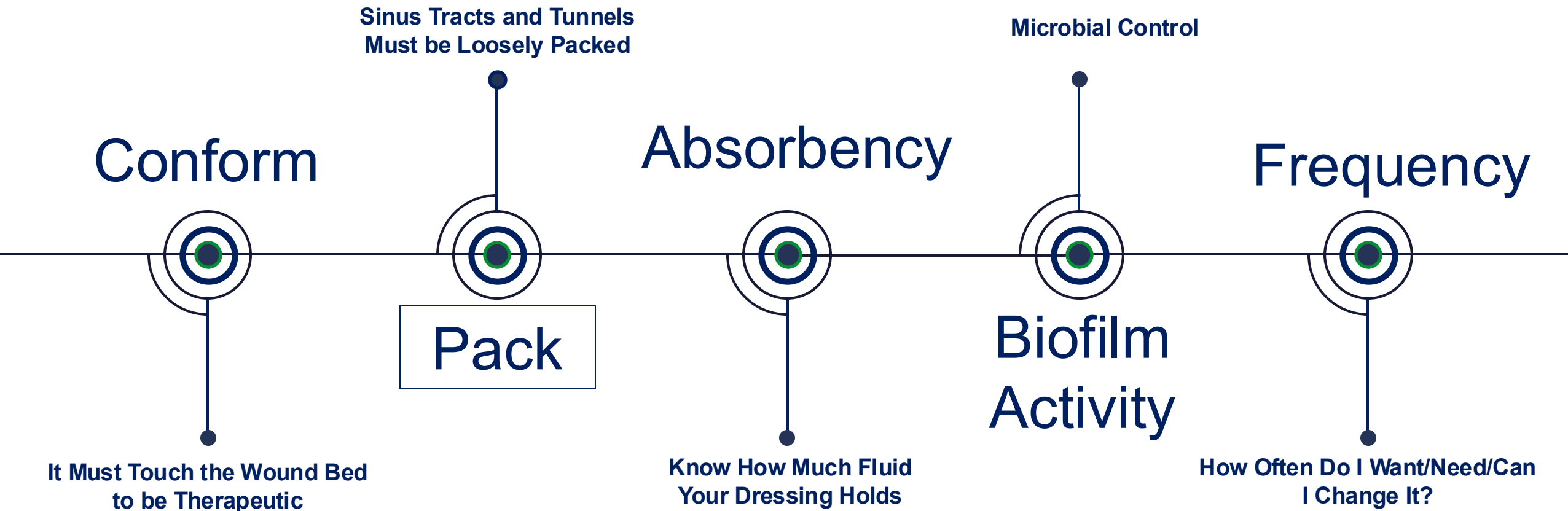
The Hard-to-Heal Wound... Physiologically



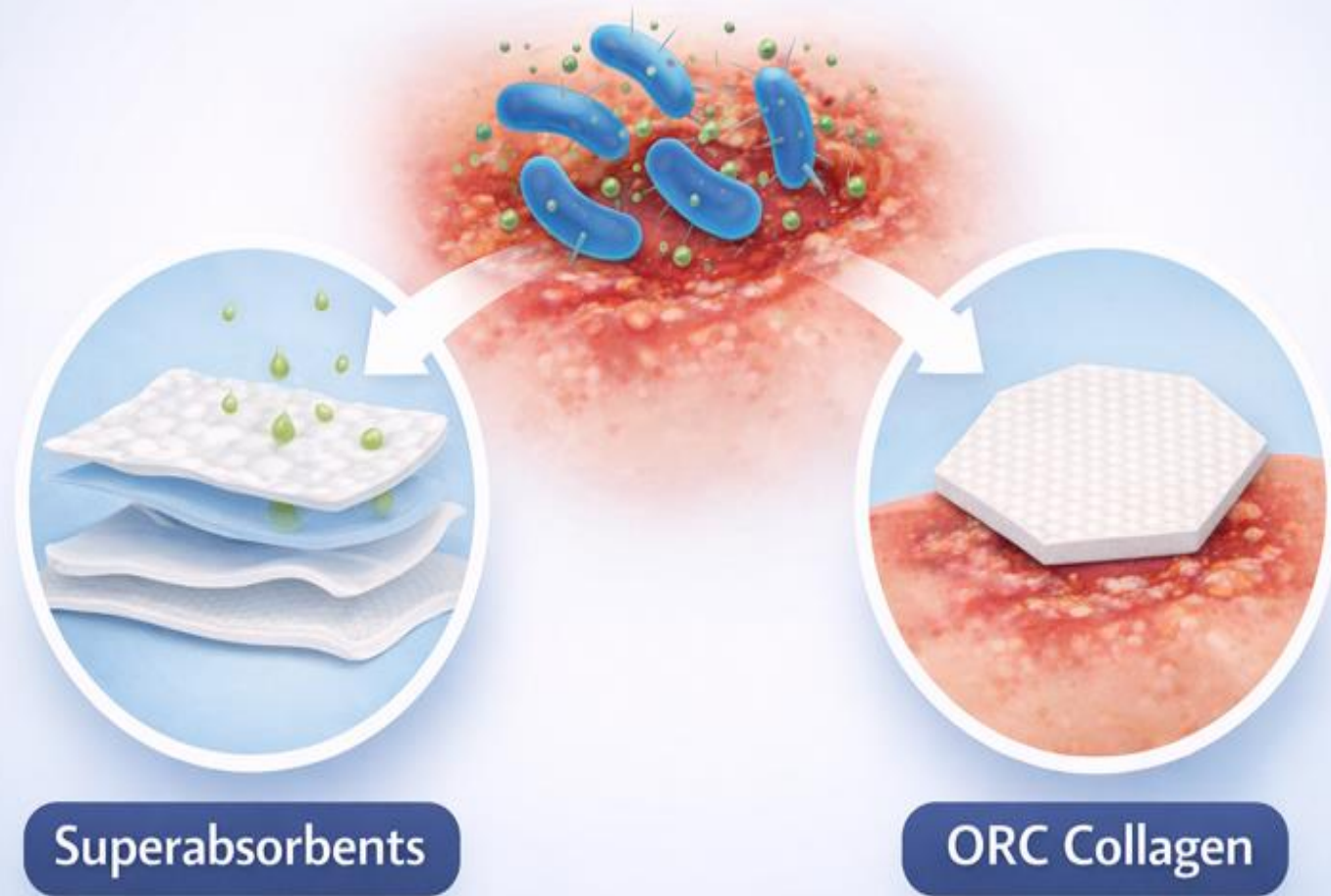
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Topical Dressing Principles for Wound Management

“Time is Tissue”



Controlling Inflammation and Bioburden



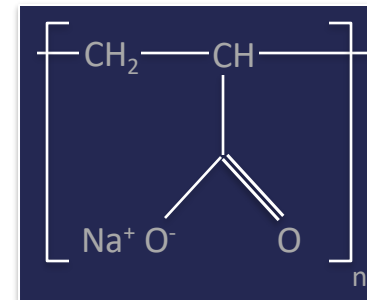
Superabsorbents



Superabsorbents Are Better at Exudate Management

Performance Characteristic	Superabsorbent A	Foam A	Foam B	Foam C
Absorbency (oz)	2.97	1.24	1.09	1.19
Fluid retention on compression	84%	68%	72%	67%
Rate of fluid uptake(s)	<1	44	<1	374
Absorption during compression (oz)	1.52	0.73	0.78	0.86

- Absorb more than foam dressings
- Retain more than foam dressings
- Absorb more than foam dressings during compression
- Super-absorbent core:
Creates chemical bond with exudate



Sodium Polyacrylate

Comparison of Superabsorbent Dressings and Traditional Foam Dressings

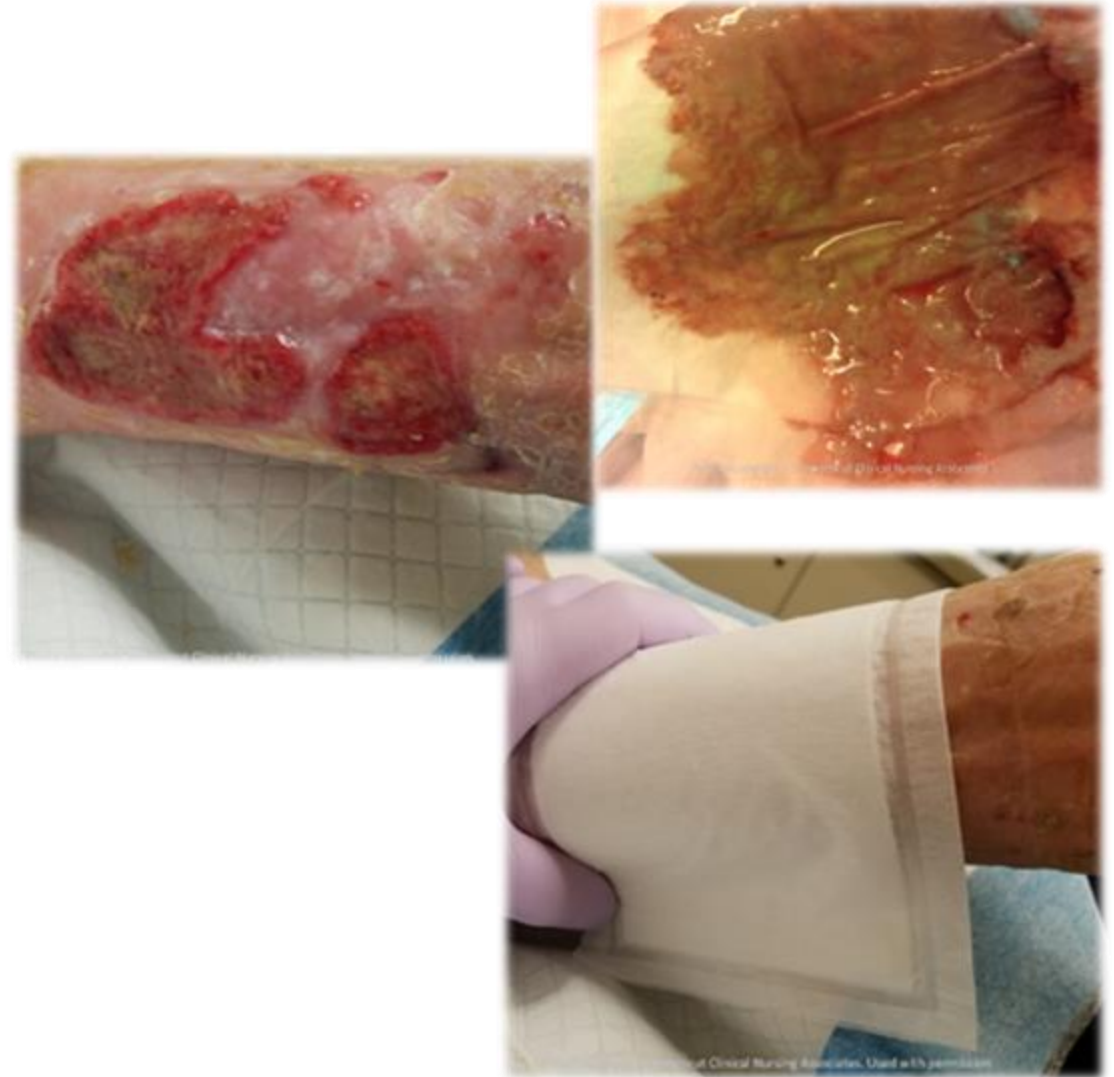
Feature	Superabsorbent Dressings	Foam Dressings
Absorption capacity	Very high	Moderate to high
Ideal wound type	Heavily exuding wounds	Moderately exuding wounds
Exudate retention	Excellent; locks in fluid even under pressure	Good, but may leak under pressure
Structure	Multilayer with superabsorbent polymer core	Usually polyurethane foam with semi-permeable backing
Moisture control	Excellent; minimizes risk of maceration	Good; can oversaturate if exudate is excessive
Use under compression	Yes; ideal for use with compression therapy	Limited; may not retain exudate well under compression
Conformability	Less flexible; bulkier	Softer and more conformable
Comfort	Less cushioning	Offers cushioning; good for pressure relief
Odor control	Often better (due to exudate lock-in)	Moderate
Frequency of dressing change	Less frequent; depends on exudate levels	Every 1-3 days, as needed

Superabsorbent Dressings for Moderate to Highly Exuding Wounds



Tips for Using Superabsorbent Dressings

- Can be a primary or secondary dressing
- Can be folded – not cut
- Can have an adhesive border
- May have a special absorption side
- Most can be left in place for up to 7 days
 - Can be changed daily under Medicare Surgical Dressing Policy
- May be used under compression, but exudate capacity and mm Hg compression may be altered
- Products differ in absorbency, bacterial, and MMP sequestration



Clinical Tip

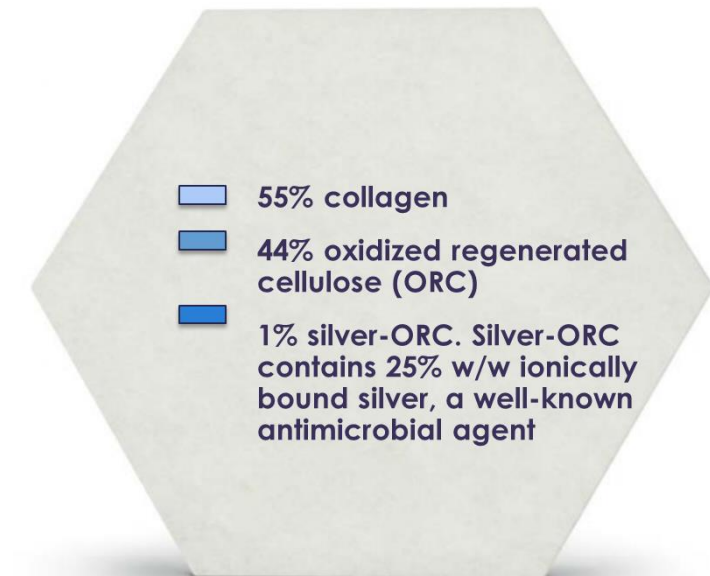


Oxidized Regenerated Cellulose (ORC): How Does It Work?

Cellulose is a major component of all plants. Once oxidized, ORC is completely bioresorbable and readily degrades through fluid absorption and subsequent gelling.

In vitro studies¹ have shown that ORC

- ▶ Degrades to glucose and glucuronic acid, which lowers pH
 - Low pH helps control bacteria
 - Bacteriostatic properties
- ▶ Stimulates cell migration and growth
- ▶ Reduces protease activity levels, specifically elastase
- ▶ Scavenges free radicals and binds excess metal ions



ORC/Collagen: Systematic Review and Meta-Analysis

- Methods

- Systematic review/meta-analysis evaluated the performance of ORC/collagen dressings vs standard dressings
- Published studies and conference abstracts were assessed between 1 January 1996 and 27 July 2020
- Comparative studies included were in English and completed by 31 December 2019 with a study population ≥ 10
- 20 studies were included following removal of duplicates and those not meeting criteria

- Results

- Statistically significant effect in favor of ORC/collagen dressings for wound closure rates ($P=0.027$) and
- Statistically significant effect in favor of percent wound area reduction ($P=0.006$)
- Inconclusive evidence or limited reporting prevented assessment of time to complete healing, days of therapy, number of dressing applications, pain, matrix metalloproteinase, elastase, plasmin, and gelatinase concentration

- Conclusion

- Increased wound closure rates and percent wound area reduction were statistically significantly when patients received ORC/collagen dressings'

One More Thing: Protect the Periwound



Sprays



Wipes



Wands

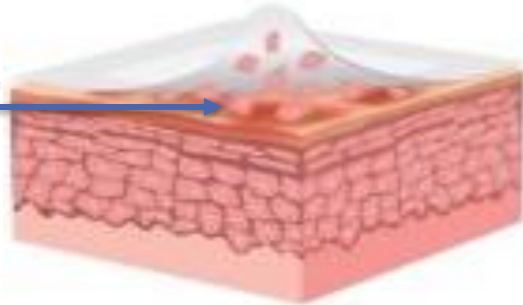
Barrier Film – Protection

Protection from Adhesive Products

Without Barrier Film

Medical Tape or Dressing

Skin Cells Removed

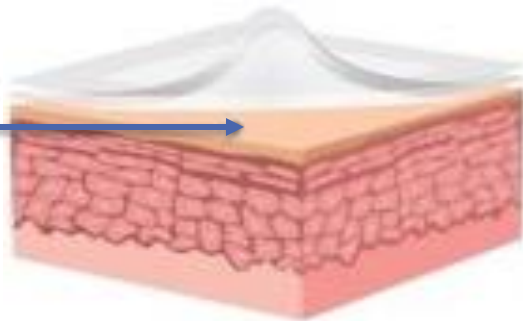


With Barrier Film

Medical Tape or Dressing

Barrier Film

Barrier Film is removed instead of skin cells

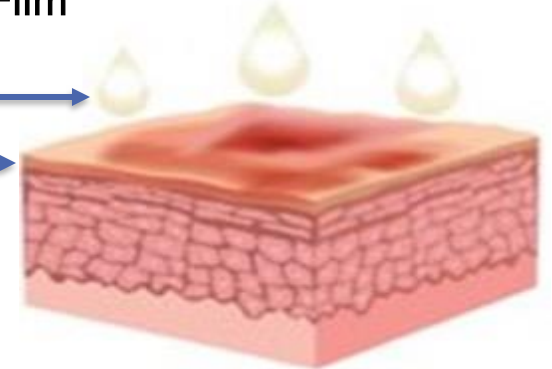


Protection from Moisture/Irritants

Without Barrier Film

Urine/Stool, Body Fluids, Wound Exudate

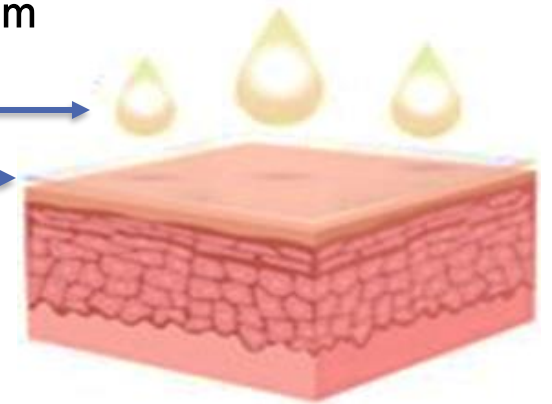
Damaged Skin



With Barrier Film

Urine/Stool, Body Fluids, Wound Exudate

Barrier Film



Protects skin from body fluids, adhesives, and friction

Protect the Periwound!

- Alcohol-free barrier films preferred
- Polymers create protective film coating
 - All polymers are not created equal
 - Some have plasticizer that allows the film to flex and bend without cracking
- Liquid solvent system delivers polymers
 - May or may not have alcohol
 - Non-sting available



Advanced Skin Protectants

Highly durable barrier

Attaches to wet, weepy, damaged skin

Eliminates need for crusting

Protects high-risk patients and manages existing skin breakdown

Size matters!!



*2.7ml applicator = 100 in² approx.
coverage*



*0.7ml applicator = 25 in² approx.
coverage*

Key Advantage of Advanced Skin Protectants: Enhances Periwound Skin Assessment

- Macerated, damaged, wet skin surface
- Forms a highly durable, protective, transparent, breathable coating on skin
- Capabilities
 - Easy to apply, no removal needed
 - Breathable
 - Transparent, allowing skin assessment through barrier film



Problem: Severe Incontinence-Associated Dermatitis

- Patient in severe pain
- Pathophysiology
 - Erosion of dermis into epidermis from stool, leading to inflammatory response
 - Loss of epidermal barrier
 - Increased transepidermal water loss

8/8



3 applications over 10 days



8/17



Problem: Peristomal Weeping (Peristomal MASD)

- From poorly applied skin barrier around stoma
- Ostomy appliance will not stick
- Pathophysiology
 - Erosion of dermis into epidermis from stool leading to inflammatory response

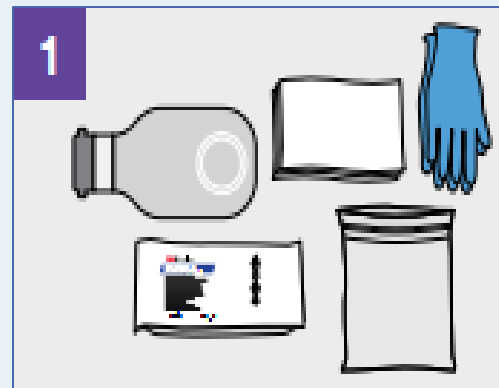


What Can I Do Now?
Cyanoacrylate application to bind proteins and dry exudate



Application around a stoma or fistula

Set up your supplies on a clean surface with convenient access to the patient.



- ✓ Exam gloves
- ✓ Ostomy pouch and supplies (eg, ostomy paste, barrier strips)
- ✓ Plastic bag or container for waste disposal biofilm

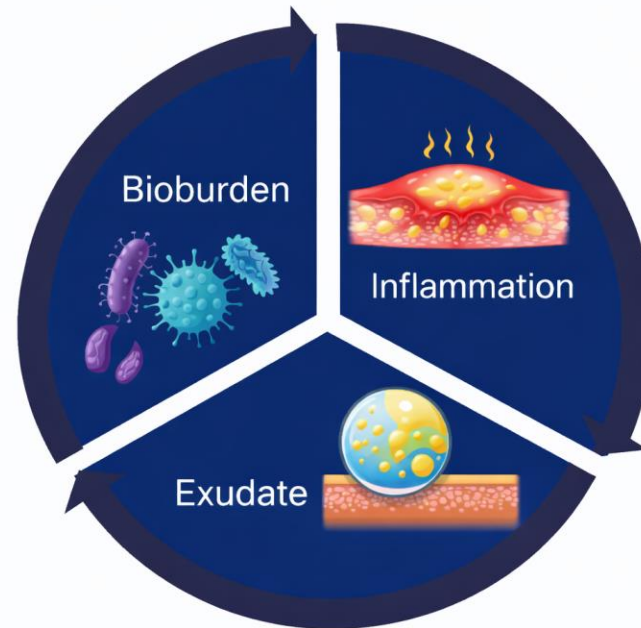
Prepare ostomy products

- Non-linting soft cloths moistened with warm water; extra cloths to wick stool/urine
- Apply advanced skin protectant

Also good for advanced skin protectant for skin protection around a tube, drain, or device!

Problem: Stage 4 Pressure Injury

- High exudate levels with periwound deterioration compounded by Type 7 stool fecal incontinence; dressings lose integrity, often exacerbating bioburden levels
- Pathophysiology
 - High protease and bioburden levels in wound
 - Erosion of dermis into epidermis from stool and exudate leading to inflammatory response



MASD Management Example: Using an Advanced Skin Protectant, Collagen Matrix with ORC and Silver, and a Superabsorbent Dressing

Specific problems in this case

- Pain
- Controlling wound contamination
- Loss of periwound skin integrity
- Uncontrolled inflammation



Collagen Matrix with ORC and Silver into the Wound

**Exudate management from the
wound with a superabsorbent
dressing with a border**



Photo copyright Connecticut Clinical Nursing Associates. Used with permission

Controlling Bioburden and Inflammation



Clinical Pearls

Advanced dressings and modalities

- Are not a replacement for poor wound bed preparation
- Are not a replacement for poor patient optimization
- Can and should be used as early as possible
- Can and should be matched to meet the needs of the patient and the wound
- Can be paired with each other to address several cellular and metabolic needs of the wound and support clinical decision making



Thank You

**Please submit questions
via the Question Box**

The background of the slide is a deep blue gradient. It features several glowing, wavy lines of light blue and white particles that create a sense of motion and depth, resembling a digital or scientific visualization. The lines are composed of small dots connected by thin lines, and they curve and flow across the frame.