WOUND DRESSING IN DIABETIC FOOT ULCER WITH LIMITED RESOURCES

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SAWADEEKAAP
MOISTURE: DRY VS MOIST WOUND HEALING

Moist Wound Healing

- Wound Dressing
- Moist Exudate
- Wound Bed

Dry Wound Healing

- Scab/Crust
- Dry Dermis

Epithelial Cells
Transitional and Germinating Layers
TRIANGLE OF WOUND ASSESSMENT
TRIANGLE OF WOUND ASSESSMENT

### TRIANGLE OF WOUND ASSESSMENT – WOUND BED

<table>
<thead>
<tr>
<th>Tissue Type</th>
<th>Exudate</th>
<th>Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woeose</td>
<td></td>
<td>Local</td>
</tr>
<tr>
<td>Crusty</td>
<td>T-Ind</td>
<td>Specifying/系统的</td>
</tr>
<tr>
<td>Granulating</td>
<td>Exudate</td>
<td></td>
</tr>
<tr>
<td>Epithelising</td>
<td>Infection</td>
<td></td>
</tr>
</tbody>
</table>

**Record tissue types and % of tissue visible in the wound bed**

**Tissue type**
- Woeose
- Crusty
- Granulating
- Epithelising

**Please tick**

- %

**Please tick all △ that apply**

- Type

**Exudate**
- Level
  - Dry
  - Wet
  - Medium
  - High

**Infection**
- Local
  - Pain or new onset
  - Lymphoma
  - Edema
  - Local warmth
  - Erythema
  - Abscesses/Cysts
  - Abscess breakdown
  - Cellulitis
  - General malaise
  - Raised CRP, WCC
  - Lymphangitis

- Systemic
  - As for local plus

**Record level and type (e.g., consistency and colour)**

- T-Ind
- Exudate

**Record signs and symptoms. These may be aetiology-specific**

- Pain to remove non-viable tissue (e.g., reduce infection risk)
- Protect and promote new tissue growth
- Aim to treat cause (e.g., compression therapy and manage moisture balance (exception: dry gangrene)
- Aim to identify infection
- Manage biofilm to treat infection/contol odour

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WOUND BED PREPARATION

Debridement → Bacterial Balance → Exudate Management

Dr. Gary Sibbald, et al
‘Preparing the wound bed for healing – debridement, bacterial balance & moisture balance’
Ostomy/ wound management 2000, 46(1)
WOUND ASSESSMENT

SIZE
- measure wound surface area (length, width, depth)

*T.I.M.E

SURROUNDING SKIN
- assess for signs of infection/ischaemia, maceration, crepitus
### TRIANGLE OF WOUND ASSESSMENT – WOUND EDGE

<table>
<thead>
<tr>
<th>Maceration</th>
<th>Dehydration</th>
<th>Undermining</th>
<th>Rolled edges</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="maceration.png" alt="Image" /></td>
<td><img src="dehydration.png" alt="Image" /></td>
<td><img src="undermining.png" alt="Image" /></td>
<td><img src="rolled_edges.png" alt="Image" /></td>
</tr>
</tbody>
</table>

Please tick all △ that apply

<table>
<thead>
<tr>
<th>Maceration</th>
<th>Dehydration</th>
<th>Undermining</th>
<th>Rolled edges</th>
</tr>
</thead>
<tbody>
<tr>
<td>△</td>
<td>△</td>
<td>△ extent ___ cm</td>
<td>△</td>
</tr>
</tbody>
</table>

- **Assess edge of the wound for moisture level**
- **Assess edge of the wound for moisture level**
- **Use clock positions to record position**
  - Record extent of undermining
- **Assess amount of rolling (may be associated with thickening)**

- **Aim to establish cause and correct**
  - Address patient concerns
  - Refer to specialist
- **Aim to establish cause and correct**
  - (e.g. rehydrate)
  - Refer to specialist
- **Aim to reduce the amount of undermining/allow the edge to reattach**
  - (e.g. stimulate granulation)
- **Aim to return the wound edge to a condition that will permit epithelial advancement**

TRIANGLE OF WOUND ASSESSMENT – PERIWOUND SKIN

MIGRATION FOR HEALTHY SKIN

Option to use these both.. One here, one at the end of slides as closing?

https://incem.rwth-aachen.de/beneficiaries.html
Accurate and timely wound assessment is important to ensure correct diagnosis and for developing a plan of care to address patient, wound and skin problems that impact on healing.

Identify treatment goal, e.g. 100% granulation tissue/healed wound. If no signs of improvement after 2–4 weeks, review treatment plan/refer to specialist.

TYPE OF DRESSINGS
DRESSING - PURPOSE

- Protect wound from
  - trauma
  - microbial contamination
- Reduce pain
- Maintain temperature & moisture of wound
- Absorb drainage & debride wound
- Control & Prevent haemorrhage (pressure dressing)
- Provide psychological comfort
DRESSING CATEGORIES

- Traditional
- Conventional
- Advanced
  - Advanced/environmental dressings are more expensive
  - can leave in situ for several days
DRESSING CATEGORIES

• **Traditional**
  • spider web (1346 AD)
  • poultices
  • leaves & herbs
  • honey
Honey dressing
CASE – HONEY DRESSING – PH - INCISION WOUND ON THE ABDOMEN

8.10.13
Case Study -honey ( Diabetic Foot, Streptococcus B, E.Coli )

Case studies done by: Dr Harikrishna K.R.Nair, MD; Wound Care Clinic, Hospital Kuala Lumpur, Malaysia

45 yrs old woman, T2D, referred for amputation but she insisted NO

Prior to the treatment in Diabetic Foot Clinic, the wound was dressed with; hydrogel (Intrasite gel), alginate (Kaltostat), film dressing (Melolin), and paraffin gauze (Jelonet). Patient presented the wound at the DFC on 26/11/08 as we can see pic 1 and 2, prior treatment has had No Effect.
Due to the treatment with honey-based ointment, amputation of the 2nd toe of this Diabetic Type 2 patient was avoided.

The 2 wounds on the left foot of this 45 yrs woman, healed successfully in 43 days, no adverse effect was observed.

The Streptococcus B group and E.Coli infections were successfully managed without the use of antibiotics.
Wound Healing with MEDICATED HONEY

1. Antimicrobial
2. Debriding
3. Anti-inflammatory
4. Reduces Malodour
5. Stimulates healing
IN-VITRO STUDY (TRITICUM, 2003)

Within 48 hours (!) all microorganisms are dead.

(Source: 2003 - Chemiphar, Eur.Ph. IV 5.1.3)
DRESSING CATEGORIES

• Conventional
  • Gauze
  • Gamgee
  • Melolin
  • Primapore
  • Opsite post Op
PROBLEMS - SOME DRESSINGS

- Adherence to wound
- Dehydration of wound
- Fiber shed
- ‘Strikethrough’
IDEAL/OPTIMUM DRESSING

- Remove excess exudate
- Maintain moist wound healing environment
- Allows gaseous exchange if appropriate
- Provide barrier to pathogens
- Provide thermal insulation
- Waterproof
- Trauma protection
- Non adherent
- Safe & easy to use

- Theory of moist healing
  “a moist environment created beneath a semi permeable membrane allows optimal conditions for the re-epithelization of wounds”
  - (Winter 1962)
DRESSING CATEGORIES

• Advanced
  • Films - e.g. Opsite, Tegaderm, Suprasorb F
  • Hydrogels - e.g. Duoderm Gel, Intrasite Gel, Suprasorb G, Purilon Gel
  • Hydrocolloids - e.g. Duoderm CGF, Extra thin, Comfeel, Suprasorb H, Cutinova Hydro
  • Alginate - e.g. Kaltostat, Suprasorb A, Algisite, Seasorb
  • Foams - e.g. Allevyn, Tielle, Suprasorb F, Mepilex, Biatain
  • Charcoals - e.g. CarboFlex, Actisorb Plus
  • Silver - e.g. Aquacel Ag, Biatain Ag, Acticoat, Polymem Silver, Seasorb Ag
  • Polymer – gold dust
  • Collagen – stimulen, suprasorb C
  • Polymeric membrane dressings – Polymem
  • Honey – medihoney, algivon, altivon
  • Iodine based dressings- iodosorb, inadine
The 5 “A” of Dressing Choice!

Dr. Harikrishna K.R. Nair

- Availability
- Accessibility
- Affordability
- Applicable
- Advantages
# Modern/Advanced/Active Dressings

<table>
<thead>
<tr>
<th>DRESSINGS</th>
<th>PURPOSE</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
<th>PRACTICAL USAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Film</td>
<td>Protect against contamination and friction</td>
<td>Adherent</td>
<td>Fluid collection</td>
<td>Apply the film over the site making sure there is no air under it</td>
</tr>
<tr>
<td></td>
<td>Maintain moist surface</td>
<td>Transparent with measurement grid</td>
<td>Possibility of stripping away newly formed epithelium on removal</td>
<td>To remove the film, stretch the film and pull slowly from the edges</td>
</tr>
<tr>
<td></td>
<td>Prevent evaporation</td>
<td>Bacterial barrier</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facilitate assessment</td>
<td>Waterproof</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Breathable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frequency of dressing change: 2-5 days depending on the wound</td>
<td></td>
</tr>
<tr>
<td>Hydrogel</td>
<td>Rehydrate, debride and deslough the wound</td>
<td>Comfortable</td>
<td>Need secondary dressing</td>
<td>Apply the hydrogel on the wound bed as a primary dressing</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------</td>
<td>-------------</td>
<td>-------------------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Rehydrate eschar</td>
<td>Promote moist healing</td>
<td>Maceration of the skin around the wound</td>
<td>Frequency of dressing change: 2-3 days</td>
</tr>
<tr>
<td></td>
<td>Cavity filling</td>
<td>Desloughing agent Promotes granulation</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
AUTOLYTIC DEBRIDEMENT

1. After 2 days
2. After 2 days
3. After 4 days
* As a selective type of debridement, autolysis removes only necrotic tissue
MODE OF ACTION – HYDROGEL

Contains:

- Cross-linked carboxymethylcellulose 2.3%
- Propylene Glycol USP 20.0%
- Purified Water 77.7%

- Gently rehydrates dry necrotic tissue
- Provides moist wound healing environment
- Softens necrotic tissue
<table>
<thead>
<tr>
<th>Hydro-colloid</th>
<th>Provide moist environment</th>
<th>Cleans and debrides by autolysis</th>
<th>Unpleasant odour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absorb exudates</td>
<td>Easy to use</td>
<td>Forms a yellow liquid gel</td>
</tr>
<tr>
<td></td>
<td>Bacterial barrier</td>
<td>Cost effective</td>
<td>Difficult to use in cavities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Promotes granulation tissue</td>
<td>Maceration of skin around wound</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Effective for low to moderate exuding wounds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waterproof</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

- Apply the adhesive side onto the wound without touching the wound bed
- A yellow liquid is seen after the dressing is left in situ which needs to be cleansed
- Frequency of dressing change: 2 to 5 days
HYDROCOLLOID DRESSING
<table>
<thead>
<tr>
<th>Calcium Alginate</th>
<th>Absorb wound exudates and maintain moisture</th>
<th>Economical and easy to apply</th>
<th>Not helpful for dry wounds</th>
<th>Available in sheet or rope form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biodegradable</td>
<td></td>
<td>Need secondary dressing</td>
<td>Effective to stop bleeding</td>
</tr>
<tr>
<td></td>
<td>Haemostatic properties</td>
<td></td>
<td></td>
<td>The residue of the biodegradable product has to be washed off during the cleansing process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Frequency of dressing change: 2 to 5 days</td>
</tr>
</tbody>
</table>
CALCIUM ALGINATE
<table>
<thead>
<tr>
<th>Foams</th>
<th>Absorbent Cushioning</th>
<th>Conforms to body contours</th>
<th>Can adhere to wounds if exudates dries out</th>
<th>Foam dressing is used as a secondary dressing or as cavity fillers. Frequency of dressing change: 2 to 3 days or longer if for offloading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Designed for cavity wounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Highly absorbent</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provides protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacterial and waterproof</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CASE – SS, 68 year old male
Product Use: Foam

1st visit: 12/3/15
2\textsuperscript{nd} visit : 16/3/15

3\textsuperscript{rd} visit : 23/3/15
Discharge
Clinical Case

BKA-(Below Knee Amputation) dressed with foam with silicone

Foam with silicone vertical absorbent helps to minimize maceration
<table>
<thead>
<tr>
<th>Hydrofibre</th>
<th>Manage heavy exuding wounds</th>
<th>Longer wear time</th>
<th>Not helpful for dry wounds</th>
<th>The hydrofibre will become gel-like layer which can be easily removed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maintains moist healing environment</td>
<td>Comfortable and non traumatic upon removal</td>
<td>Needs secondary dressings</td>
<td>Frequency of dressing change: 2 to 5 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduce risk of maceration</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can be use on infected wounds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reduce risk of maceration
Can be use on infected wounds
Not helpful for dry wounds
Needs secondary dressings
The hydrofibre will become gel-like layer which can be easily removed
Frequency of dressing change: 2 to 5 days
CASE - Planned for Ray Amputation Of Lt Toe
On probing

Incised & Calcium Alginate applied
Severe Skin Maceration. Hydrofiber applied
Before Removal Of Biofilm

After Removal Of Biofilm

Biofilm

Before Removal Of Biofilm

After Removal Of Biofilm
Probing & Inspecting Wound
Wound Healing Progress
Ulcer Healed & Saved From Amputation
| Charcoal | Odour absorbent | Reduces odour | Needs secondary dressing | Frequency of dressing change: 2 days |
CARBON DRESSINGS
<table>
<thead>
<tr>
<th>Silver</th>
<th>To reduce bacterial bioburden in infected wounds</th>
<th>Locally acting</th>
<th>Some silver dressings do discolour the wound</th>
<th>Place the dressing with the side with silver facing the wound bed</th>
<th>Frequency of dressing change: 2 to 3 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Locally acting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bactericidal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No known resistance</td>
<td></td>
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</tbody>
</table>
• A 63 year old Indian lady had a history of right breast carcinoma. She went for right mastectomy in 2002 and completed chemoradiotherapy. Currently she is having a right infected wound. Sought treatment at Dermatology Ward, HKL but problem is still not resolved. On discharge was referred to the Wound Care Unit.

• On assessment, right breast wound with granulation with thick biofilm and moderate yellowish exudate.

19 December 2013

3 April 2014
TRI-IONIC COMPLEX SILVER DRESSING AND SUPER ABSORBENT POLYMER IN THE MANAGEMENT OF CHRONIC COMPLEX WOUND
CASE - RIGHT DORSAL ASPECT DIABETIC FOOT ULCER – TREATED WITH FOAM AG

• 29 Oct 2014 (Day 1)  

• 2 Dec 2014 (Day 35)
<table>
<thead>
<tr>
<th>Multi-function dressing (Polymeric membrane dressing)</th>
<th>To manage moisture imbalance (from dry to moderate)</th>
<th>Antiseptic property</th>
<th>Not for heavily exudative wounds.</th>
<th>Frequency of dressing change: 2 to 5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Has surfactant which helps to cleanse the wound when it is applied</td>
<td>Offloading property</td>
<td></td>
</tr>
<tr>
<td>Composite dressing (combination of 2 or more dressing materials)</td>
<td>According to components of the materials</td>
<td>multifunction</td>
<td>Same as individual components listed above</td>
<td>Frequency of dressing change: 2 to 5 days</td>
</tr>
<tr>
<td>---</td>
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<tr>
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<td></td>
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</tr>
</tbody>
</table>
• 30 years old, Male
• Post-MVA, developed a huge hematoma as patient was on warfarin due to valvular heart disease
• The wound was over the left thigh
• Size: 16.5cm x 15cm
• Assessment date: 12th January 2015
• Dressing used previously includes: honey gel, collagen, foam
• Highly exudative
• Biofilm noted
DURAFIBER AG 1ST VISIT – 16 MARCH 2015

- Size – 9.5cm x 6.5cm
- Exudate level: High
- Biofilm suspected
DURAFIBER AG 13TH – 27 APRIL 2015

- Size – 7.5cm x 2.5cm
- Exudate level : Low
- Study in progress
| Other advanced dressings | Not widely used – some may be used in specialised center e.g Collagen, matrix and regenerative dressings, cultured epidermis, growth factors, stem cells |
Efficacy Of Collagen And Glycerine Based Lotion In Treating Diabetic Skin Disorders In Two Wound Care Units

* Harikrishna K. R. Nair FMSWCP
** R. Norainiah MBBS
* K. Vijayakumar AMO
* Y. H. Muh SRN DRM
* BMMA Intan Syuhada SRN

* Wound Care Unit, Dept of Internal Medicine, Kuala Lumpur Hospital
** Wound Care Unit, Presint 8, Putra Jaya Hospital

Presented at:

International Wound Conference 2013
Organized by Malaysian Society of Wound Care Professionals
18-20 October, 2013 - Royale Chulan Hotel, Kuala Lumpur
## Treatment of Diabetic Skin Disorders

<table>
<thead>
<tr>
<th>Condition</th>
<th>Before</th>
<th>After 3 weeks</th>
<th>After 4 months</th>
<th>After 3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyper-pigmentation</td>
<td><img src="image1" alt="Hyper-pigmentation Before" /></td>
<td><img src="image2" alt="Hyper-pigmentation After 3 weeks" /></td>
<td><img src="image3" alt="Hyper-pigmentation After 4 months" /></td>
<td><img src="image4" alt="Hyper-pigmentation After 3 months" /></td>
</tr>
<tr>
<td>Cracked Heels</td>
<td><img src="image5" alt="Cracked Heels Before" /></td>
<td><img src="image6" alt="Cracked Heels After 3 weeks" /></td>
<td><img src="image7" alt="Cracked Heels After 4 months" /></td>
<td><img src="image8" alt="Cracked Heels After 3 months" /></td>
</tr>
<tr>
<td>Dry Skin</td>
<td><img src="image9" alt="Dry Skin Before" /></td>
<td><img src="image10" alt="Dry Skin After 3 weeks" /></td>
<td><img src="image11" alt="Dry Skin After 4 months" /></td>
<td>N/A</td>
</tr>
<tr>
<td>Scaly Dry Skin</td>
<td><img src="image12" alt="Scaly Dry Skin Before" /></td>
<td><img src="image13" alt="Scaly Dry Skin After 2 months" /></td>
<td><img src="image14" alt="Scaly Dry Skin After 3 weeks" /></td>
<td><img src="image15" alt="Scaly Dry Skin After 2 months" /></td>
</tr>
<tr>
<td>Callous</td>
<td><img src="image16" alt="Callous Before" /></td>
<td><img src="image17" alt="Callous After 2 months" /></td>
<td><img src="image18" alt="Callous After 2 months" /></td>
<td><img src="image19" alt="Callous After 2 months" /></td>
</tr>
</tbody>
</table>

**Product used:** Stimulan Lotion
USE OF A COLLAGEN AND GLYCERINE-BASED GEL FOR HEALING OF DIABETIC FOOT ULCERS

Dr. Harikrishna K.R. Nair MD, FMSWCP
Diabetic Foot Care Unit, Kuala Lumpur Hospital, Malaysia

Presented at SAWC and WHS 2013
Speedy Wound Closure

Before | After 1 week | Before | After 2 weeks
---|---|---|---

Before | After 1 month | Before | After 1 month
---|---|---|---

Before | After 1.5 months | Before | After 2 months
---|---|---|---
58 years old male
1.5 months old Accident / Comatose patient with Pressure Ulcer

23.4.13 - BEFORE
Started Gold Dust daily dressing for 3 days then alternate days
NOTE:
Heavily exudating, sloughy, very bad odour (mixed with feces)

History:
Duoderm Gel, Purilon, Aquacel AG

27.4.13 - After 5 days
Mild odour, less slough. Mild exudate
Good tissue growth and granulation

Started Stimulen Gel plus Gold Dust

29.4.13 - After 7 days
Nicely granulating, no odour. Mild exudate

Continued Stimulen Gel & Gold Dust
(sloughy area only)

27.5.13 – After 34 days
Gold Dust: Starts Apr 23; Ends May 5 (12 days)
Stimulen Gel: Starts Apr 27; Ongoing

13.5.13 – After 20 days
HOME CARE BY PATIENT’S WIFE

- Discharged after 1 month in hospital
- Used Stimulen Gel daily dressing at home

58 years old male
1.5 months old Accident / Comatose patient with Sacral Ulcer

23.4.2013
27.5.2013 (34 days)
18.9.2013 (5 months)

Patient discharged home
Given Stimulen Gel
Daily dressing

Patient still bed-ridden
22 years old male
1.5 years old Fournier’s Gangrene
(Necrotising Fasciitis)

Before

After 2 Application of Gold Dust
4 days
47 years old male
1.5 mths old Necrotising Fasciitis

Before Stimulen Gel

After 21 days of Stimulen Gel
7 applications
Patient READY for Skin Graft
WOUNDS MALAYSIA: KUALA LUMPUR INTERNATIONAL CONFERENCE 2017
ROYALE CHULAN KUALA LUMPUR
29TH SEPTEMBER - 1ST OCTOBER 2017
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