

Developed by the BC Provincial Nursing Skin and Wound Committee in collaboration with Wound Clinicians from:



**TITLE**

**Guideline: Maggot Debridement Therapy (MDT) in Adults & Children <sup>1</sup>**

**Practice Level**

- Maggot debridement therapy (MDT) is a *restricted activity* according to the Nurse's (Registered) and Nurse Practitioner Regulation <sup>2</sup>. CRNBC states that registered nurses must successfully complete additional education before *directing* <sup>3</sup> MDT.
- Registered nurses must demonstrate competence and follow an established decision support tool when carrying out maggot debridement therapy. Agency / health authority policy and standards must be in place to support this practice.
- Clients undergoing maggot debridement therapy require an inter-professional approach to provide comprehensive, evidence-based assessment and treatment. This clinical practice guideline focuses solely on the role of the nurse, as one member of the inter-professional team providing care to these clients.

**Background**

- MDT is the therapeutic use of sterile, live, medical grade maggots (fly larvae) for cleaning / debriding moist necrotic tissue and slough from healing and non healing wounds.
- The fly larvae most often used for this purpose are from "green blow flies" and the species used is the *Lucilia (Phaenicia) Sericata*.
- Medicinal maggots act by (1) debriding wounds and biofilms by dissolving and ingesting necrotic and infected tissue; (2) disinfecting the wound by killing bacteria; and (3) speeding healing by stimulating the growth of granulation tissue.
- Maggots require moisture to effectively debride, therefore dry exudate and eschar must be softened prior to using MDT.
- Medical grade maggots must be ordered by the physician through Health Canada Special Access Program and are transported in a sterile container with gauze impregnated with soy bean and / or brewers yeast.
- Prior to initiating MDT, the client's condition must be optimized, e.g. pressure offloading, adequate arterial perfusion, optimal lymph and venous drainage and good pain control.
- In the event of death, the maggot dressing must be removed from the client immediately. The maggot dressing is also removed if the death is a coroner's case, however the dressing removal must be communicated to the coroner's office when the death is reported.
- If it is suspected that one or more maggots have escaped, remove all the bedding and call housekeeping (acute & residential care) to do a terminal clean of the area.
- The client or family must give verbal consent prior to initiating maggot therapy and must be able to comprehend, participate in and adhere to the MDT treatment plan.

**Indications /  
 Precautions /  
 Contraindications**

**Indications**

- Pressure ulcers, malignant wounds, diabetic ulcers, traumatic wounds, arterial and venous wounds, burns and wounds needing surgical closure which are needing debridement of moist necrotic tissue/slough or soft, boggy eschar.
- Wounds that are colonized or infected, e.g. MRSA; may be used in conjunction with antibiotic therapy if needed.
- Wounds where Conservative Sharp Wound Debridement is not possible due to the difficulty in differentiating viable from non-viable tissue.
- For clients who are unable to go for surgical debridement due to their medical condition.

<sup>1</sup> Clients are considered to be children if they are 18 years of age and under.

<sup>2</sup> College of Registered Nurses of British Columbia. (2010). Scope of practice for registered nurses: Standards, limits and conditions. Vancouver: Author.

<sup>3</sup> According to the Nurse's (Registered) and Nurse Practitioner Regulation, registered nurses cannot give orders to other registered nurses but can provide direction to initiate an activity such as maggot debridement therapy.

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	<ul style="list-style-type: none"> <li>• May be used for a wound that has limited blood supply and a goal of healing of “To Maintain” in order to achieve a clean wound bed.</li> </ul> <p><b>Precautions</b></p> <ul style="list-style-type: none"> <li>• Must be able to totally offload the wound, especially over the sacrococcygeal area as any pressure over the dressing will destroy the maggots.</li> <li>• Wounds infected with <i>Pseudomonas aeruginosa</i> may not be controlled with maggot use alone; consult a physician prior to treatment.</li> <li>• Clients with natural or medication-induced coagulopathy are at increased risk of bleeding with MDT and require close supervision if it is used.</li> <li>• Wounds which are very painful.</li> <li>• Not indicated as the primary treatment with infected bones (osteomyelitis) or tendons.</li> <li>• Deep tracking and deep joint wounds; consult a physician prior to treatment.</li> </ul> <p><b>Contraindications</b></p> <ul style="list-style-type: none"> <li>• Clients who are allergic to brewer’s yeast and / or soy bean products.</li> <li>• Necrotic wounds that are dry or covered with eschar.</li> <li>• Life or limb threatening infection or rapidly advancing infection that requires frequent inspection.</li> <li>• Wounds with inadequate blood supply unless wound healing is not the goal.</li> <li>• Fistulae or wounds that connect with the abdominal cavity; should not be placed into any sterile body cavity.</li> <li>• Wounds close to major blood vessels or nerves.</li> <li>• Wounds not directly exposed to the outside.</li> <li>• The client refuses MDT or is not able to comprehend, participate in or adhere to the MDT treatment plan.</li> </ul>
<p><b>Definitions</b></p>	<p><b>Debridement</b> –The removal of non-viable tissue from the wound to support healing. This includes autolytic, enzymatic, mechanical, sharp and surgical debridement, in addition to MDT.</p> <p><b>Eschar, dry stable</b> – Firm, dry necrotic tissue with an absence of drainage, edema, erythema, fluctuance or separation from the wound edge. It may be black or brown in color and is attached to the wound edges and wound base.</p> <p><b>Eschar, soft boggy</b> – Soft necrotic tissue which may be black, brown, grey, or tan in color. It may be firmly or loosely attached to the wound edges and wound base. Fluctuance and drainage may be present.</p> <p><b>Larva</b> – Distinct juvenile form of many insects prior to metamorphosis (becoming an adult).</p> <p><b>Maggot</b> – Larva of the fly <i>Lucilia (Phaenicia) Sericata</i>.</p> <p><b>Slough</b> – Soft, moist necrotic tissue; brown, tan, yellow or green in colour; may be thin or thick and the consistency may be fibrous, stringy or mucinous; may be firmly or loosely attached to the wound edges and base.</p>
<p><b>Related Documents</b></p>	<p>Guideline: Wound Bed Prep Procedure: Maggot Debridement Therapy in Adults &amp; Children</p>

## Assessment & Determination of Treatment Goals

### Assessment

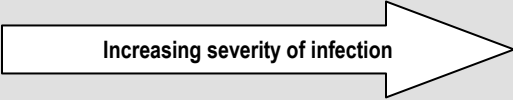
1. Client Concerns
  - a. Emotional concerns including anxiety, mental health concerns, cognitive problems, and behavioural issues that would preclude use of maggot debridement therapy.
  - b. Impact of client’s current environment on client care.
  - c. Client / family consent for maggot debridement therapy.
  - d. Client / family ability and motivation to comprehend, participate in and adhere to the treatment plan.

2. Risk Factors for Wound Healability:
  - a. Impaired nutritional status
    - i. Low body weight, obesity, unplanned weight loss, appetite changes, cachexia & dehydration, edema.
    - ii. Adequacy of nutritional intake including % of intake at meals, protein / calorie intake <sup>4</sup> and fluid intake.
    - iii. Possible causes of poor intake, e.g. difficulty swallowing or poor dentition.
    - iv. Assess renal function if increased protein intake is indicated for the client.
  - b. Medical conditions, e.g. diabetes, spinal cord injury, neuromuscular diseases, CVA, conditions that result in reduced blood flow, autoimmune diseases, renal disease, cancer or chronic illnesses in palliative / end of life stage, localized or generalized edema and peripheral vascular disease.
  - c. Oxygenation status of the skin and underlying tissue, e.g. COPD, HF, anemia.
  - d. Lifestyle factors such as smoking history (& motivation to quit), substance use, and activity / exercise routines.
  - e. Advanced age.
  - f. Medications that interfere with wound healing, e.g. NSAIDS, antineoplastics, systemic corticosteroids, anticoagulants, vasopressors.
  - g. Ability to maintain off loading of the wound at all times during therapy.
  
3. Pain Assessment
  - a. Type, location, frequency and quality of pain occurring in the wound or as a result of maggot movement and / or increased size.
  - b. Pain severity using client self report, observation of non verbal cues and/or a pain scale, e.g. Wong Baker FACES Scale, Visual Analog Scale.
  - c. Onset & duration of pain, and precipitating / alleviating factors.
  - d. Impact of pain on function, sleep, mood.
  - e. Client concerns about wound pain.
  - f. Autonomic dysreflexia and/or increased spasticity in clients with a spinal cord injury.
  - g. Analgesic regimen and effectiveness.
  
4. Lower extremity assessment according to the Lower Limb DST (LINK) if there is a wound on the lower extremity:
  - a. Skin colour of both legs and feet (in elevated and dependent positions).
  - b. Peripheral pulses: posterior tibial & dorsalis pedis.
  - c. Capillary refill on the dorsum of the foot and the toes (normal capillary refill is  $\leq 4$  seconds).
  
5. Wound Assessment
  - a. History of current & previous ulcers.
  - b. Date of onset.
  - c. Location of wound(s)
  - d. Wound measurements and check for undermining, tunnelling or sinus tracts.
  - e. Wound probing to bone.
  - f. Appearance of wound bed, noting percentage of tissue type.
  - g. Amount & type of exudate.
  - h. Presence of odour, after cleansing.
  - i. Description of wound edge and peri-wound skin.
  - j. Evidence of bleeding.

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<sup>4</sup> Wound healing is impaired in clients with an albumin of < 35 g/l or a pre-albumin of < 180 mg / L (female) or < 215 mg / L (male).

6. Wound Infection

Clinical Signs and Symptoms of Wound Infection		
		
Increased Bacterial Bioburden	Localized Infection	Systemic Infection
Non-healing (minimal change in wound measurements after 3 weeks of care)	Onset of wound pain or increasing pain	General malaise (predominantly in clients who are elderly, immunocompromised & children)
Non-granulation tissue (pink to bright red non-pebbly tissue)	Peri wound induration ≥ 2cm	Fever (may be muted in clients who are elderly or immunocompromised)
Friable or hyper granulation tissue	Peri wound erythema ≥ 2cm	Rigor / chills
New areas of necrotic slough	Increased peri wound warmth	Change in behaviour or cognition (especially in elderly clients)
Increased amount of exudate	Increased wound size and / or the development of sinus tracts and / or satellite wounds	Unexplained high blood sugar (in clients who are diabetic)
Change in characteristics of exudate from watery and serous to purulent	Purulent exudate	Septic shock potentially leading to multi organ failure
Odour after wound cleansing	Increased dysreflexia / spasticity in clients with spinal cord injury	
	Wound that probes to bone	
<b>3 or more of the preceding S &amp; S are sufficient for a clinical diagnosis of potential or actual wound infection.</b>		

Adapted from:

1. Sibbald, G., et al. (2006). Increased bacterial burden and infection: The story of NERDS and STONES. *Advances in Skin and Wound Care*, 19(8):158.
2. Woo, K., et al. (2009). A cross-sectional validation study using NERDS and STONEES to assess bacterial burden. *Ostomy Wound Management*. 55(8): 40 – 48.

- a. For clients with diabetes and/or arterial compromise, visible evidence of localized infection may be muted or non-existent due to compromised arterial blood flow, blunting of the inflammatory process, and diminished sensation.
- b. If 3 or more signs and symptoms of an infection are evident and the infection is not currently being treated, take a swab for C & S (Link to Wound Culture DST).<sup>40</sup>
- c. Notify the physician / NP if C & S results are abnormal.

7. Investigations

- a. Measure ABI<sup>5</sup> or refer to a wound care clinician for same if the client has a foot ulcer or has signs and symptoms of arterial compromise (link to Lower Limb DST).
- b. Refer for appropriate blood work if nutritional concerns are present and recent blood work is not available.
- c. Refer for appropriate blood work if the client has diabetes and recent blood work is not available.
- d. Radiology studies to r/o osteomyelitis if the wound probes to bone.

<sup>5</sup> Registered nurses must successfully complete additional education before carrying out ankle brachial pressure index testing. Agency / health authority policy and standards should be in place to support practice.

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## Determine Treatment Goal

1. The treatment goal is determined based on:
  - a. The client and family willingness and ability to participate in and adhere to the care plan.
  - b. Overall assessment findings.
  - c. A clear indication that MDT is the treatment of choice.
  - d. Available resources and supplies.
  - e. If sign and symptoms of arterial compromise / venous insufficiency are evident, refer client to a physician / NP/ wound clinician (Link to Lower Limb DST)
    - i. Hard dry stable eschar **must not be** debrided if circulation is impaired. (Link to Lower Limb DST)
    - ii. MDT is recommended for weeping or draining vascular wounds when the goal is healing but may also be used to reduce bacterial burden or reduce odour or drainage in non-healing wounds if recommended by a physician / NP or wound clinician

## Interventions

### Client Care Management

1. Client Concerns
  - a. The plan of care should take into account client / family abilities, concerns, preferences and adherence to treatment.
  - b. Refer to Social Work, if available for financial or psychosocial concerns and for emotional support and counselling as needed.
  - c. Provide additional education and support regarding MDT as needed.
2. Pain Relief
  - a. If client has wound pain or treatment-related pain as the maggots grow larger<sup>6</sup>, administer analgesic medication regularly and in the appropriate dose to control pain.
  - b. A sedative or anti anxiety medication may be needed for some clients during MDT.
  - c. If pain is not well controlled with the current analgesic regimen, remove the dressing and reassess pain levels and inform the wound clinician.
  - d. If wound pain does not resolve with dressing removal, refer to the physician / NP to determine need for topical analgesics or anaesthetics.
  - e. When appropriate, use reassurance, music, distraction, conversation, or guided imagery to reduce pain during dressing changes.
  - f. Reassess pain at regular intervals and note any increase in severity.
3. Nutritional Care
  - a. Maximize the client's nutritional status through adequate calorie intake and high protein supplements <sup>7</sup> unless contraindicated.
  - b. Encourage 1500 – 2000 mL of fluid daily (offer fluids q 2h) for all clients but especially those with dehydration, fever, vomiting, profuse sweating, diarrhea or heavily draining wounds, unless contraindicated.
  - c. Refer to a dietitian, if available to determine the need for nutritional supplements and vitamin / mineral preparations if:
    - i. Nutritional risk factors exist (weight loss or poor intake) or related blood work is abnormal.
    - ii. The client is obese, has a low body weight and/or is dehydrated.
    - iii. The client scores 2 or less on the Braden subscale "Nutrition"
  - d. Refer to the appropriate professional if client has difficulty swallowing or poor dentition.
  - e. Reassess the need for protein supplements and additional fluids as the client's condition changes.

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<sup>6</sup> Discomfort often starts 24 – 36 hours into therapy and may increase as the maggots grow larger.

<sup>7</sup> Clients with chronic wounds should receive 35 kcal / kg of energy dense foods per day including 1.5 g of protein / kg.<sup>26</sup> Assess renal function if increased protein intake is indicated.

4. Risk Factors for Wound Healability

- a. Support client to monitor pre-existing illnesses such as stroke, neuromuscular conditions, diabetes mellitus, PVD, renal disease, or cardiac disease and consult a physician / NP if changes occur.
- b. Encourage clients to take medication as prescribed.
- c. Support clients to stop smoking and discuss referral to a smoking cessation program; refer for harm reduction / substance use management if client consents.

## Wound Care Management

1. A wound clinician and / or physician / NP are always involved in care planning for clients receiving MDT and must be notified immediately if:

- a. There is little or no evidence of debridement after 1-2 treatments.
- b. The wound does not show signs of healing, after the wound is fully debrided when healing is the goal.
- c. The wound deteriorates.

2. Wound Treatment

a. Maggot Debridement Therapy

- i. Maggots should be used within 24 hours of receipt to ensure sterility and optimal viability. Refrigeration is recommended to increase the longevity of the maggots if they cannot be used the day of arrival. Maggots can be refrigerated at 5 – 8 °Celsius for up to 48 hours or longer.
- ii. The bottle of maggots is for single use only and the maggots must not be applied more than once.
- iii. MDT can be used in conjunction with systemic antibiotic therapy
- iv. In the event of client death, the maggots must be removed from the wound immediately.
- v. If eschar or dried slough is present in the wound, it must be softened prior to initiating MDT.
- vi. Wound area needs to be off-loaded as to not put pressure on the dressing which would damage the maggots.

b. Dressing Changes

- i. Adhere rigidly to hand washing during dressing changes.
- ii. Use either Sterile or No-Touch Aseptic Techniques during dressing changes but sterile gloves must be used when directly handling the maggots.
- iii. Maggot dressings should be changed every 48 hours.
- iv. Do a full wound reassessment as required by agency policy and the needs of the wound (Link to Wound Assessment).

3. Wound Infection

- a. Implement strategies to prevent infection, e.g. hand-washing, no-touch aseptic technique.
- b. Change the cover dressing as soon as exudate leaks through.

4. In the event of death:

- a. The maggot dressing must be removed from the client immediately.
- b. The maggot dressing is also removed if the death is a coroner's case, however the dressing removal must be communicated to the coroner's office when the death is reported.
- c. Dressing removal must be charted in the client's chart.

5. Notify a wound clinician or physician / NP if the following occur:

- a. The maggots are escaping or the maggot cage becomes loose.
- b. There is an acute onset of pain or increasing pain.
- c. There is evidence of significant bleeding in the wound.
- d. If signs and symptoms of increasing infection are present.

## **Client Education and Resources**

1. Teach client and/or family:
  - a. The need for strict off-loading of the area.
  - b. The benefits and possible complications of MDT.
  - c. Actions to take if any maggots escape.
  - d. The goals of treatment especially if the goal is not to heal the wound.
  - e. When to contact a wound clinician / physician.
  - f. Signs and symptoms of increasing infection and what to do if present.
  - g. Strategies for improving nutrition, especially increasing protein and fluid intake.
  - h. The benefits of smoking cessation; refer to a smoking cessation program if client consents.
  - i. Strategies for managing pain during and between dressing changes.
2. Provide any written materials that support / reinforce teaching.

## **Discharge Planning**

1. If the client's care is being transferred across sectors (acute care, community care or residential care), ensure that the receiving site / facility is capable of continuing MDT.
2. Discharge planning, when discharge is anticipated, should be started during the initial client encounter and should support timely discharge and optimal client independence.

## **Client / Family Outcomes**

1. Intended
  - a. The wound heals, if healing is the goal.
  - b. The wound is maintained and infection free if healing is not achievable.
  - c. There is no pain or manageable pain during MDT.
  - d. There is no or minimal bleeding during treatment.
  - e. The client and family understand their role in adhering to the MDT treatment plan and participate in care as directed.
2. Unintended
  - a. The wound does not heal when healing is the goal.
  - b. The wound shows sign and symptoms of increasing infection, significant bleeding or unmanageable pain.
  - c. The client and family do not understand their role in adhering to the MDT treatment plan and do not participate in care as directed.

## **Documentation**

1. Client / family consent for MDT must be documented on the client record.
2. Document initial and ongoing assessments as per agency guidelines.
3. Document dressing changes, care plans and revisions, and clinical outcomes as per agency guidelines.
4. In the event of death, document that the maggot debridement dressing has been removed.

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## **Document Creation/Review**

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