

#### Wound debridement, autolytic and enzymatic, home care

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## Introduction

Wound debridement is a critical element of wound care in which accumulated necrotic tissue, exudate, and bacteria are removed from the wound bed in preparation for healing. (See <u>A closer look at necrotic tissue</u>.) After debridement of a wound, fibroblasts deposit collagen, which fills in the wound with scar tissue as long as the wound has a good blood supply with adequate oxygen and nutrients.

#### A CLOSER LOOK AT NECROTIC TISSUE

Necrotic tissue (shown below) may be moist or dry. Moist necrotic tissue, or slough, is soft yellow or gray stringy material that's loosely attached to the wound. Dry necrotic tissue, or eschar, is hard, black, leathery material that's more firmly attached to the wound. Many wounds have both types of necrotic tissue. If removal of this material does not occur, the wound remains in the inflammatory phase of wound healing, which can result in local infection of surrounding tissues, systemic infection, amputation, and even death.



Various methods of wound debridement exist. The choice of wound debridement method depends on multiple factors, including the type of necrotic tissue, the wound location, existing comorbidities, patient preference, the care setting, and the practitioner's expertise. (See <u>Methods of wound debridement</u>.) Autolytic debridement and enzymatic debridement are conservative treatments that are commonly used in the home because they are safe, produce less discomfort than other methods, and may be performed by a nurse, the patient, or another caregiver. However, these debridement methods require frequent and ongoing care and can result in infection due to the long duration of treatment needed. They may be used individually or in combination. Debridement may be discontinued when necrotic tissue no longer remains and only viable granulation tissue is visible in the wound bed.

#### METHODS OF WOUND DEBRIDEMENT

Methods of wound debridement include surgical debridement, conservative sharp wound debridement, autolytic debridement, enzymatic debridement, biologic debridement, and mechanical debridement. This table explains each method, including indications and special considerations.  $\boxed{1}$ 

Method	Indications	Special considerations
Surgical debridement—necrotic and some	Urgent need for wound	Contraindicated in patients

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healthy tissue is excised, converting a chronic wound into an acute wound	debridement, such as wound infection and sepsis; extensive necrosis	<ul> <li>with bleeding diatheses, ischemia, malignant wounds, or immunosuppression and in patients on anticoagulant therapy</li> <li>Provides immediate results</li> <li>Allows highly selective tissue removal</li> <li>Requires a surgeon, an operating room, and anesthesia</li> <li>Commonly results in postoperative patient pain</li> <li>Is more expensive than other debridement methods</li> </ul>
Conservative sharp wound debridement —necrotic tissue is excised using a sharp instrument, such as a sterile scissors or scalpel	Urgent need for wound debridement when surgical debridement is contraindicated or not feasible	<ul> <li>Contraindicated when unable to distinguish the interface between viable and nonviable tissue, with extensive undermining or tunneling, and with excessive or unexpected bleeding</li> <li>Requires caution in wounds with exposed bone, ligament, or tendon; in patients who are immunosuppressed; and in patients who are on anticoagulant therapy or have a bleeding disorder</li> <li>Provides faster results than other methods of debridement</li> <li>Can be used with other debridement methods</li> <li>Requires a skilled practitioner</li> <li>May require multiple procedures under sterile conditions</li> <li>May cause patient pain</li> </ul>
<b>Biologic debridement</b> —sterile green bottle fly ( <i>Lucilia sericata</i> ) larvae are applied topically to the wound to dissolve and digest necrotic tissue while avoiding healthy tissue; process uses enzymes produced by the larvae; stimulates healing chemically and mechanically	Most wounds, including infected wounds, when surgical debridement is contraindicated or not feasible	<ul> <li>Contraindicated in patients with deep or tunneling wounds, bleeding diatheses, or allergies</li> <li>Provides rapid results</li> <li>Is typically a safe procedure</li> <li>Decreases bacterial load in the wound</li> </ul>

		<ul> <li>May cause discomfort</li> </ul>
		Isn't readily accessible
		<ul> <li>May cause psychological distress</li> </ul>
Mechanical debridement—pulsed lavage uses water pressure applied directly to the wound to loosen necrotic tissue and suction to remove debris	Wounds with large volumes of slough	<ul> <li>Contraindicated in patients with bleeding diatheses and patients on anticoagulant therapy (relative contraindications)</li> </ul>
		Removes large volumes of slough
		<ul> <li>May be used with other methods of debridement</li> </ul>
		May be used for bed-bound patients
		<ul> <li>Can cause trauma to the wound bed and surrounding tissue</li> </ul>
		Is ineffective for removing eschar
		Causes pain
		<ul> <li>Increases the risk of infection</li> </ul>
		<ul> <li>Creates a risk of aerosol and splash contamination</li> </ul>
		<ul> <li>Requires specialized equipment</li> </ul>
		Is labor-intensive
		<ul> <li>Some mechanical debridement techniques, such as wet-to-dry dressings and hydrotherapy (whirlpool), have been traditionally used for debridement but are now considered suboptimal care</li> </ul>
<b>Autolytic debridement</b> —endogenous enzymes and white blood cells in wound fluid dissolve and digest necrotic tissue when the wound is kept moist with moisture-retentive dressings (such as alginates, hydrogels, hydrocolloids, and transparent films)	Uninfected wounds that don't require urgent removal of necrotic tissue	<ul> <li>Contraindicated in the presence of infection and deep or extensive wounds</li> </ul>
		Is safe and painless
		<ul> <li>Is relatively inexpensive compared with other methods</li> </ul>
		<ul> <li>Can be performed in a variety of settings by nonspecialized caregivers and patients</li> </ul>
		<ul> <li>Slowly provides results</li> </ul>

		Can cause maceration of surrounding tissue
		<ul> <li>Requires ongoing treatment and repeat dressing changes</li> </ul>
		<ul> <li>Increases the risk of infection (when treatment is prolonged)</li> </ul>
<i>Enzymatic debridement</i> —enzymes, such as collagenases, are applied topically to the wound to dissolve and digest necrotic tissue while avoiding healthy tissue	Wounds that do not require urgent removal of necrotic tissue; most effective on slough; can be used on eschar but may require cross- hatching of the eschar surface for penetration	<ul> <li>Contraindicated in patients with an allergy to any component of the enzyme product and with concomitant use of products that contain silver and other metals</li> </ul>
		Can be combined with other methods
		<ul> <li>Can be performed in a variety of settings by nonspecialized caregivers and patients</li> </ul>
		Slowly provides results
		Can cause discomfort
		<ul> <li>Requires ongoing treatment and repeat dressing changes</li> </ul>
		<ul> <li>Increases the risk of infection (when treatment is prolonged)</li> </ul>
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## Equipment

- Fluid-impermeable pads
- Sealable waterproof trash bag
- Gloves
- Normal saline solution
- Gauze pads
- Prescribed topical enzymatic debriding agent
- Tongue depressor
- Moisture-retentive dressing supplies
- Written educational materials
- Agency-approved pain assessment tool
- Optional: prescribed pain medication, personal protective equipment, disposable wound-measuring device, wound irrigation device, prescribed pH-balanced wound cleanser, protective skin barrier, scalpel, tape, secondary dressing supplies

## Preparation of Equipment

Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your agency.

## Implementation

- Review the referral information, plan of care, and prior visit documentation, if available.<sup>[3]</sup> Note the type of wound, prior assessment data, and past and current interventions used for the patient's wound, including their effectiveness.<sup>[1]</sup>
- Verify the practitioner's orders. 4 5 6 Z
- Review the patient's medical record for allergies to enzymatic debriding agents. Ensure that other wound care products (including cleansers and dressings) don't contain metal ions (such as silver, zinc, iodine, or mercury) because these substances can inactivate enzymes. <a>[1]</a>
- Gather and prepare the necessary equipment and supplies.
- Introduce yourself and state the purpose of your visit.
- Confirm the patient's identity using at least two patient identifiers.
- Ask the patient and family (if appropriate) about any recent changes in the patient's health status, including
  practitioner visits, tests, and changes in medications, diet, and activity level.
- Perform hand hygiene. 9 10 11 12 13
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs to increase their understanding, allay their fears, and enhance cooperation. 14 15 16 17
- Screen for and assess the patient's pain using agency-defined criteria that are consistent with the patient's age, condition, and ability to understand. 18
- Because wound care can be painful, ensure that the patient has premedicated with prescribed pain medication.<sup>1</sup> If not, administer pain medication, as needed and prescribed, following safe medication administration practices.<sup>19</sup> Allow adequate time for the medication to take effect. Also, use nonpharmacologic pain management strategies, as needed.<sup>18</sup>
- Organize the equipment and supplies on a clean surface. Place a fluid-impermeable pad between the environment and equipment, if necessary.<sup>[9]</sup> Arrange the items according to their order of use *to avoid cross-contamination while performing wound care*.<sup>[21]</sup>
- Place a sealable waterproof trash bag within reach to dispose of soiled dressings.
- Perform hand hygiene. 9 10 11 12 13
- Put on gloves and, as needed, other personal protective equipment *to comply with standard precautions*.[9] 22] 23] 24] 25]
- Assist the patient to a position that maximizes comfort while allowing easy access to the wound. Expose only the wound and surrounding area *to maintain warmth and modesty*.
- Place a fluid-impermeable pad under the wound to prevent soiling.
- Remove the old dressing carefully by pulling it gently on a horizontal plane away from the patient's skin while simultaneously stabilizing the skin *to avoid skin tearing*. If necessary, loosen the old dressing using a small amount of normal saline solution *to decrease the pain of removal and trauma to the skin and wound*.
- Inspect the soiled dressing, noting the type and amount of drainage.
- Discard the soiled dressing in the waterproof trash bag. 24
- Remove and discard your soiled gloves, perform hand hygiene, and put on new gloves. 9[10][11][12][13][22][23][24][25]
- Assess the wound, wound edges, and surrounding tissue. Note the wound's type, anatomic location, shape, size, and color as well as the presence of necrotic tissue (eschar or slough), odor, maceration, and moisture. As appropriate, measure the wound with a disposable wound-measuring device *to determine if the wound is improving, worsening, or remaining stable*.
   (See the "Wound assessment, home care" procedure.)
- Clean the wound with normal saline solution or a prescribed pH-balanced wound cleanser *to remove exudate, crusts, and old topical medication*. Avoid cleansers that are highly acidic or alkaline *because enzymes are sensitive to pH and these solutions can decrease the effectiveness of the enzymes*.
  - To clean the wound mechanically, start at the center of the wound and clean the wound gently with a moistened gauze pad, working outward toward the edges in a circular pattern. Don't press hard or scrub the wound *because doing so can further damage the tissue*. Don't return to the center of the wound after cleaning it with the gauze pad to *avoid recontaminating the wound*. Remove loose tissue with the gauze pad.
  - If adherent material is present in the wound, irrigate the wound using a wound irrigation device. (See the "<u>Wound irrigation, home care</u>" procedure.)
- Discard the soiled gauze pad in the sealable waterproof trash bag. 24

- Remove and discard your soiled aloves, perform hand hygiene, and put on new gloves. 9 10 11 12 13 22 23 24 25
- Pat the surrounding skin dry with gauze pads to prevent maceration.
- Apply a protective skin barrier, as needed and ordered, to the skin surrounding the wound that will come in contact with drainage, dressings, or adhesive tape according to the manufacturer's instructions *to prevent skin injury*. Allow it to dry for the length of time specified by the manufacturer.
- If eschar or pseudoeschar is present, use a scalpel to score or crosshatch the tissue (as shown below) before applying a topical enzymatic debriding agent *to enhance penetration* if permitted by your agency and your state's regulations. Avoid penetrating too deeply *to prevent damage to the underlying tissue*.



- Apply a thin layer (about the thickness of a nickel) of the prescribed enzymatic agent to the necrotic tissue using a tongue depressor.  $\underline{1}$
- Apply a moisture-retentive dressing, such as an alginate, hydrogel, hydrocolloid, or transparent film dressing, according to the manufacturer's instructions *to maintain moisture for wounds that appear dry in nature*. 1 2 26 (See <u>Dressings used for autolytic debridement</u>.)

# DRESSINGS USED FOR AUTOLYTIC DEBRIDEMENT

Dressings that retain wound moisture—including alginate, hydrogel, hydrocolloid, and transparent film dressings —may be used for autolytic debridement.

## Alginates

Alginate dressings (shown below) are conformable, absorbent nonwoven fiber dressings. They are made from brown seaweed that contains calcium salts. When an alginate dressing comes in contact with wound drainage, it forms a gel to maintain a moist wound bed. Alginate dressings require a secondary dressing.



#### Hydrocolloids

Hydrocolloid dressings (shown below) are conformable, self-adherent occlusive, or semiocclusive dressings made of gelatin, pectin, and carboxymethylcellulose. Particles in the dressing react with exudate in the wound and form a soft gel over the wound. Their translucency allows for visual assessment of the amount of fluid under the dressing.



#### Hydrogels

Hydrogel dressings (shown below) are made of polymer structures of water (or glycerin) to provide a moist environment and soften necrotic tissue for removal. Because they are water- or glycerin-based, these dressings can macerate surrounding skin. Some hydrogel dressings require a secondary dressing.



#### **Transparent films**

Transparent film dressings (shown below) are nonabsorbent, thin, polyurethane membranes coated with an adhesive that allows them to adhere to wound margins without sticking to the actual wound. They provide a barrier against contaminants, fluid, and bacteria while promoting a moist environment. Because they aren't absorptive, excessive fluid that seeps out from under the dressing can macerate surrounding skin. Their transparency allows for visual inspection of the wound without disrupting the dressing.



• *Clinical alert:* Moisture retentive dressings are used if the wound bed is dry. If the wound appears moist, an alternative dressing, such as sterile gauze, may be more appropriate to maintain appropriate moisture content. [26]

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- Secure the moisture-retentive dressing, as needed. Cover it with a secondary dressing, as appropriate. Use tape specially formulated for fragile skin *to prevent skin stripping and tearing during removal*.
- Seal the waterproof plastic bag.
- Discard used supplies in appropriate receptacles. 23 24 28 29
- Remove and discard your gloves and other personal protective equipment, if worn. <u>24</u>
- Perform hand hygiene. 9 10 11 12 13
- Reassess and respond to the patient's pain by evaluating the response to treatment and progress toward pain management goals. Assess for adverse reactions and risk factors for adverse events that may result from treatment. 18
- Review progress toward the goals in the patient's plan of care with the patient and family, as appropriate.<sup>[3]</sup> 30
- Make arrangements for the next visit, as appropriate, and ensure that the patient and family have adequate supplies for self-care until then.
- Provide and review written educational materials, the visit schedule, and contact information should concerns arise between visits. 31 32 33 34
- Report changes in the patient's condition and progress toward goals to the patient's practitioner, as appropriate. 35 36 37 38
- Coordinate care with other services, such as a wound, ostomy, and continence nurse, as appropriate. 39 40 41 42
- Document the procedure. 43 44 45 46

#### Special Considerations

- Sterile technique may be required to perform wound care in select clinical situations, such as in patients who have dehisced surgical wounds and patients who are at increased risk for infection.
- If the patient is at increased risk for infection, the practitioner may prescribe a topical antibiotic agent, which may be used concomitantly with enzymatic debriding agents.
- Antimicrobial dressings that incorporate medical-grade *Leptospermum* honey may be prescribed to debride nonviable tissue and support moist wound healing while also controlling infection, odor, and inflammation. They shouldn't be used for patients with allergies to honey or bee stings and aren't appropriate for dry necrotic wounds. Honey-based dressings are available in multiple forms, including creams, ointments, alginates, and hydrocolloids.
- As the wound changes during the course of treatment, the type of dressing needed may also change, based on the state of healing, the amount of drainage the wound produces, and other factors.

## Patient Teaching

Teach the patient and family (if appropriate) about the normal healing process. Discuss the causes of wounds as well as the strategies used to manage them, including pain management, skin care, repositioning, and adequate nutrition and hydration. If the patient or family will be performing wound care independently, have the patient or the responsible family member perform a return demonstration or teach-back the information, as appropriate. Advise them that wound odor and drainage may increase during autolytic debridement. Instruct the patient and family to notify the practitioner if signs and symptoms of an infection (including redness, swelling, warmth, and worsening pain) develop at the site or if signs and symptoms of a systemic infection (such as fever and chills) occur.  $\frac{49}{2}$ 

## Complications

Wound debridement can cause infection due to the length of treatment. Autolytic debridement can cause increasing odor as necrotic tissue liquefies; maceration of the surrounding tissue can also occur if accumulating fluid leaks out from under the dressing. Enzymatic debridement can cause some discomfort and allergic reactions.

## Documentation

Record the date and time of the wound care. Document your assessment of the wound before and after care, noting the effects of autolytic or enzymatic debridement on the wound. Document the patient's pain assessments and tolerance of the procedure. Also document any interventions implemented, including medications administered. If you contacted the practitioner, record the date, time, and information conveyed as well as any

information received. Document teaching provided to the patient and family (if applicable), their understanding of that teaching, and any need for follow-up teaching.

This procedure has been co-developed and reviewed by the National Association for Home Care & Hospice.



## Related Procedures

- Bite management, animal (Advanced practice)
- Bite management, human (Advanced practice)
- Bite management, insect (Advanced practice)
- Hydrotherapy for wound care
- Moist saline gauze dressing application
- <u>Negative pressure wound therapy</u>
- <u>Negative pressure wound therapy, home care</u>
- <u>Negative pressure wound therapy, pediatric</u>
- Postpartum infection care
- <u>Sharp debridement</u>
- Traumatic abrasion wound care
- Traumatic abrasion wound care, ambulatory care
- Traumatic amputation wound care
- Traumatic bite wound care, ambulatory care
- <u>Traumatic laceration wound care</u>
- Traumatic puncture wound care
- Traumatic puncture wound care, ambulatory care
- Traumatic simple laceration wound care, ambulatory care
- <u>Wound care using maggots</u>
- Wound care, gunshot
- Wound care, pediatric
- Wound debridement (Advanced practice), ambulatory care
- <u>Wound dehiscence and evisceration management</u>
- Wound palliative care, home care
- Wound pouching
- <u>Wound stapling (Advanced practice)</u>
- Wound suturing (Advanced practice)

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**Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions** The following leveling system is from *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice* (2<sup>nd</sup> ed.) by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt.

- Level I: Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)
- Level II: Evidence obtained from well-designed RCTs
- Level III: Evidence obtained from well-designed controlled trials without randomization
- Level IV: Evidence from well-designed case-control and cohort studies
- Level V: Evidence from systematic reviews of descriptive and qualitative studies
- Level VI: Evidence from single descriptive or qualitative studies

Level VII: Evidence from the opinion of authorities and/or reports of expert committees

Modified from Guyatt, G. & Rennie, D. (2002). Users' Guides to the Medical Literature. Chicago, IL: American Medical Association; Harris, R.P., Hefland, M., Woolf, S.H., Lohr, K.N., Mulrow, C.D., Teutsch, S.M., et al. (2001). Current Methods of the U.S. Preventive Services Task Force: A Review of the Process. American Journal of Preventive Medicine, 20, 21-35.

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