Ten top tips: managing wound odour

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Chronic wounds are an enormous burden to society, costing billions of dollars annually in the USA alone. Despite the extensive research into methods to heal chronic wounds, many remain unhealed for months to years for various intrinsic and extrinsic reasons. As wounds stall, necrotic tissue, biofilm and/or frank infection can develop and produce significant odour. Wound odour is very distressful for patients, caregivers and healthcare professionals. For patients, it can trigger feelings of shame, embarrassment and depression, and may contribute to malaise, nausea and loss of appetite. Offensive odours can spread to clothing, bedding, furniture and living areas. Wound odours often lead to social isolation for patients and feelings of guilt for caregivers during a critical time when both physical and emotional support are essential. Healthcare professionals face the challenge of controlling odour and providing supportive education for suitable wound care to help improve the patient's quality of life. These 10 top tips focus on the cause of odour from a wound, its significance, prevention and treatment.

1 Understand the causes of odour: Most wound odours are thought to arise from the metabolic processes of anaerobic bacteria. In chronic wounds, such as pressure ulcers, leg ulcers and diabetic foot ulcers, the odour may also be due to tissue degradation and/or poor tissue perfusion. Malignant wounds, especially those from breast, head and neck cancers, also become odourous as the cancer extrudes through the skin. The aptly named, foul-smelling compounds called cadaverine and putrescine, are released by anaerobic bacteria as part of the putrefaction of tissue. Many organisms common to nonhealing wounds create a characteristic smell *[Table 1]*. Electronic nose technology is being developed but, to date, has not been integrated into either diagnostic assessment of potentially infected wound, nor in effective education of healthcare professionals (Akhmetova et al, 2016; Ousey et al, 2017; Edwards-Jones, 2018; Darwin et al, 2019).

2 Label the extent of the odour: Simply stating the wound and its drainage are odourous does not convey the extent of the problem nor guide a management plan. Be specific about the degree of odour. Baker and Haig (1981) clearly identified four degrees of wound odour:

- Strong — odour is evident upon entering the room, or 6–10 feet from the patient with the dressing intact
- Moderate — odour is evident upon entering the room with the dressing removed
- Slight — odour is evident at close proximity to the patient when the dressing is removed
- No odour — no odour is evident, even at the patient's bedside with the dressing removed.

3 Cleanse the odourous wound and periwound skin before applying a clean dressing: Solutions that contain surfactant antimicrobials should be used to remove loose debris in the wound bed, which support bacteria growth. These solutions include polyhexamethylene biguanide (PHMB) and octenidine dihydrochloride (OCT). Antiseptic cleansing solutions reduce bacterial counts and include hypochlorous acid (HOCl), acetic acid, sodium hypochlorite (NaOCl) and povidone iodine (EPUAP et al, 2019). For low-resource patients, buttermilk or plain non-sweetened yogurt may reduce wound bacteria when applied as a compress impregnated in gauze for 10–15 minutes and then rinsed off (Samala and Davis, 2015). Wounds with heavy drainage can contribute to periwound skin breakdown contributing to wound enlargement, additional odour and pain. Consider protecting periwound skin with topical barrier film wipes/sprays, barrier ointments (such as petrolatum) or zinc-based creams/pastes before redressing the wound (Woo and Sibbald, 2010).

4 Remove necrotic tissue: An important step in controlling odour is to remove necrotic/non-viable tissue. Various methods of debridement exist, and the choice of the method depends on the size and status of the wound and the goal of the patient (Samala and Davis, 2015). Conservative debridement (removal of loose hanging non-viable tissue) should be considered in palliative/non-healing wounds (Woo and Sibbald, 2010). Training and licensure also dictate the method of debridement; however, the needs and goals of

Table 1. Organism and their associated odour.	
Organism	**Characteristic odour (we do not advise you intentionally smell wounds or drainage, to avoid inhaling live organisms)**
Candida albicans	Yeast or musty odour
Citrobacter	Dirty athletic shoes
Clostridium difficile	Putrid, fecal, sickly sweet
Enterococcus faecalis	Faecal
Escherichia coli	Faecal
Peptostreptococcus anaerobius	Faecal
Proteus mirabilus	Fishy
Pseudomonas aeruginosa	Sweet grape juice, almonds, corn tortilla
Staphylococcus	Dirty athletic shoes

the patient are most important. The options available are:

1. Sharp debridement is the most rapid method, but can be painful even with local anesthetic. Malignant wound tissue is often friable and bleeds easily and methods to control bleeding need to be rapidly available. Palliative surgical debridement of large malignant or fungating wounds may be considered if the patient is an appropriate candidate for surgery (Woo and Sibbald, 2010)
2. Enzymatic debridement uses collagenase to break down fibrin and collagen in the necrotic tissue. Because the product takes time (possibly several weeks) to work, it will need to be combined with other methods to reduce odour with increased dressing changes to control anticipated increased exudate
3. Mechanical debridement uses mechanical forces, such as forceful irrigation, ultrasonic treatment, or wet-to-dry dressings. These methods can be painful and require staff time to perform. A newer, reportedly less painful, method of mechanical debridement is available on the market using monofilament fibres imbedded in a pad (Schultz et al, 2018)
4. Biologic debridement uses organisms to digest bacteria and necrotic tissue. Medical maggots/larvae are effective for selective debridement; however, they can be psychologically unacceptable to patients and families (Mumcuoglu, 2001)
5. Autolytic debridement uses occlusive dressings to contain white blood cells at the surface of the wound. This method is slow and may require more frequent dressing changes to control the anticipated increase in exudate. It can increase the risk of sepsis if the patient's immune system is compromised. It is not usually the first option considered for debridement of odourous wounds.

5 **Treat infection:** All chronic wounds have bacteria present. Wound management consists of maintaining the bacterial balance to avoid critical colonisation (infection). Wound infection occurs on a continuum from localised to systemic. Use of mnemonics, such as NERDS and STONEES, can help direct topical (see Tip 6) and/or systemic treatments (Woo and Sibbald, 2010; IWII, 2016). Depending on findings from the wound assessment and clinical examination of the patient, systemic antibiotics may be prescribed. (Institute Wound Infection Institute [IWII], 2016; Virgen et al, 2020)

6 **Use topical antimicrobials to reduce the bioburden:** There are many antimicrobials (e.g. metals, such as silver or bismuth, iodine, medical grade honey) incorporated into numerous dressing materials that can be used to reduce the bacterial load and, thereby, reduce the odour of a wound (Woo and Sibbald, 2010; Akhmetova et al, 2016; IWII, 2016; Wild et al, 2016; Beers, 2019; Darwin et al, 2019). Two randomised control trials (RCTs) were found that reported reductions in malodour from malignant wounds during 4 weeks of a topical dressing with a silver- or honey-coated wound dressing, with no apparent significant difference between the honey- or silver-coated dressings' effects (Lund-Nielsen et al, 2011; Kalemikerakis et al, 2012). Metronidazole in various preparations has been reported to effectively reduce bioburden and decrease wound odour in malignant wounds (Samala and Davis, 2015; Akhmetova et al, 2016; Beers, 2019; Darwin et al, 2019, Virgen et al, 2020). A study by Villela-Castro et al (2018) reported on a double-blinded, RCT to compare the effects of Polyhexamethylene biguanide (PHMB) and 0.8% metronidazole on malignant wound odour; both were found to significantly reduce malodour in the studied wounds within in 4 days.

7 **Absorb and contain the odorous drainage**: There are numerous absorbent dressings on the market. Exudate amount will determine frequency of dressing changes which, in turn,

Figure 1. Pressure ulcer on the heel. Patient had arterial disease, end-stage renal disease on dialysis, smoked and was non adherenet. Debrided at bedside, treated with honey, maggots, negative pressure wound therapy, modified compression, offloading boot.

Figure 2. Fungating head and neck cancer. Odor was reduced with topical metronidazole. Drainage managed with super absorbent dressings.

Figure 3. Leg wound with mixed arterial and venous disease. Patient was non adherent. Odour managed with acetic acid for chronic pseudomonas. Periwound protected with skin barriers. Drainage managed with super absorbent dressings. Modified compression and elevation also used.

will determine insurance coverage dependent on the location of the patient. Often controlling bacteria burden and/or biofilm helps to decrease drainage making dressing changes more manageable and affordable. Activated charcoal is a substance that possess a large active surface area that can absorb or trap the volatile organic compounds that produce fetid wound odours. Activated carbon is typically made of natural sources, such as rice, coconut shells, or other woods, and has been incorporated into multiple commercially available dressings such as Carboflex (ConvaTec), Carbonet (Smith-Nephew), CliniSorb (CliniMed) and Actisorb Plus (Acelity). These dressings contain charcoal cloth that are 85% to 98% active carbon. The main difference between these products is the materials used to cover the charcoal cloth. Despite widespread clinical use of charcoal products for management of malodorous wounds, little has been reported on the effect on wound odour (Samala and Davis, 2015; Akhmetova et al and , 2016; Darwin et al, 2019).

The use of negative pressure wound therapy has long been contraindicated in patients with malignancy due to the possible encouragement of tumour growth. A small case series of patients (*n*=5) with cancers received treatment with NPWT for control of drainage, odour and pain with dressing changes. The average duration of NPWT was 49 days prior to death in the sample (Riot et al, 2015). Cai et al (2017) describe a case report using NPWT in a chronic abdominal wound related to treatment-resistant metastatic colon cancer. Skin closure was achieved and remained intact until the patient expired. This case and others demonstrate that individualised approaches should consider the patient's clinical scenario, the available evidence, as well as the risks and benefits of a specific technology.

8 Conceal the odour when it cannot be well controlled: Various aromatics can be used to help conceal odour. Many items have been used including candles, incense, flowers, and air-fresheners in the room. Aromatics can be placed in a container under or near the bed (or patient's primary preferred location). Aromatics include vanilla beans, cat litter, cider vinegar, charcoal, or baking soda. Drops of peppermint or wintergreen can be placed on the outer dressings. Be certain before using concealers that the patient can tolerate their smell. If the scent is strong, it can produce nausea (Woo and Sibbald, 2010; Samala and Davis, 2015; Darwin et al, 2019).

9 Plan ahead when caring for patients with malignant fungating wounds: Advanced cancers of the head and neck, breast commonly erode through the skin. These tumours are often colonised with mixed anaerobic microbes that thrive in moist and necrotic tissue. The cutaneous infiltration produces fetid odour, profuse exudate, pain, and infection. Hu and colleagues (2020) reported on two cases using

crushed topical metronidazole controlling odour within 24 hours of application. da Costa Santos et al (2010) conducted a systematic review of products used with fungating wounds (2010). Within the 59 studies that analysed odour control, seven were clinical trials (35%), five were case series (25%), and eight (40%) were case studies. Eleven topical treatments were identified. Topical metronidazole and hypertonic sodium chloride (Mesalt, Mölnlycke) dressing yielded 2b level of evidence or B grade of recommendation. Activated carbon dressing and curcumin ointment yielded 2c level of evidence or B grade of recommendation.

These wounds can also bleed. Provide haemostatic dressings, absorbable gelatin sponges and/or topic tranexaminc acid (TXA) to control bleeding (Woo and Sibbald, 2010). At some point, profuse bleeding may be expected, and because bleeding is so startling to families, educate them and recommend they use dark red, brown or black towels to clean up the bleeding.

10 Address quality of life related to the odour from the wound and/or drainage: Ask at each visit about quality and quantity of sleep. Odour in the home can alter quality of life for patient and family. A cardinal rule for all healthcare providers is to avoid showing distress at the odour being emitted. If needs be, breathe through your mouth or place an odour concealer in your mask. Address other important factors that contribute to odour including faecal and/or urinary incontinence and general hygiene principles with routine bathing and skin care, clothing and linen changes. If possible, assess the primary caregiver's ability for respite from their role as caregiver.

Conclusion

Wound odour is a manageable condition. Stemming the odour by reducing the bioburden in the wound or disguising the odour are common approaches to improve the quality of life for the patient and family. WINT

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