Evidence summary: Wound management: debridement — wet-to-dry moistened gauze

Update: August 2013

Author
Wound Healing and Management Node Group

QUESTION

What is the best available evidence regarding the use of wet-to-dry saline moistened gauze for debridement of wounds?

CLINICAL BOTTOM LINE

Wet-to-dry dressings are considered substandard, out-dated care for debriding wounds, given evidence that they delay healing, and increase wound pain and the incidence of infection when compared to alternative modern therapies[1]. The term 'wet-to-dry debridement' or 'normal saline compress' is classified as a form of mechanical debridement and involves the application of gauze moistened with normal saline (0.9%) over a wound bed containing non-viable tissue. Extra layers of gauze or other dry dressings (for example, a dressing pad) are then placed over the moistened gauze. Once the gauze has dried out (usually within a few hours), it is removed along with adherent tissue. The dressings are applied several times throughout the day (for example, two or four times) until the wound is cleared of all non-viable tissue[2,3]. Research has shown that wet-to-dry and wet-to-moist dressings are rarely considered two distinct procedures by clinicians who often apply saline to remove the dry gauze[2-4]. This lack of procedural compliance may reflect clinicians' experiential knowledge of the disadvantages associated with the removal of dry gauze dressings. These include the following: (i) pain and discomfort for the patient; (ii) damage to newly formed epithelial and granulating tissue with subsequent delay in healing (iii) bleeding due to rupture of capillaries in the wound bed[1,5].

Use of wet-dry saline moistened gauze — Extent of non-compliance with best practice

- Not only is this method of debridement still in wide use, it is also frequently used on wounds not requiring mechanical debridement. A retrospective chart review of 202 randomly selected patients with open wounds healing by secondary intention with admission orders for wet-to-dry dressings found that in more than 78% of these wounds mechanical debridement was not clinically indicated[3]. (Level III)
- Even among clinicians who are aware of evidence-based recommendations to use alternative methods of debridement, a significant proportion do not appear to put that knowledge into practice. A survey of the impact of the National Institute for Health and Care Evidence (NICE) guideline on the use of debriding agents for difficult-to-heal surgical wounds found that, although there had been a 27% decrease in the use of gauze dressings for debridement since the guideline was published, 59% of the respondents indicated that there had been no change in their use (while 14% gave no response)[6]. (Level III)

Wound healing

- An appropriate moist wound environment maximises the biological processes required for wound healing[7]. (Level I) Wet-to-dry dressings allow the wound bed to dry out, and healing and immune cells to desiccate within the wound, which is detrimental to the healthy tissue in the wound bed and impedes granulation tissue development and epithelialisation[8]. (Level IV)
- Wet-to-dry debridement is associated with temperature reduction in the wound tissue due to the frequency of dressing changes. Tissue temperatures in wounds with a gauze dressing have been found to be 25°C to 27°C, approximately 10°C below normal tissue temperature[9]. Temperature reduction below 37°C leads to a delay in mitosis for up to four hours, thereby reducing granulation tissue formation and epithelialisation, and reduces leukocyte activity including phagocytosis for up to 12 hours, increasing the risk of infection. It can take up to four hours for the wound bed to return to 37°C post dressing change[9-11]. (Level IV)

A small exploratory study (n=44 patients, 133 dressing episodes) found that wound bed temperatures immediately after a dressing change were, on average, marginally below the threshold deemed necessary for optimal cellular activity. Although not statistically significant, the type of dressing influenced the time taken to reach this level[12]. (Level III)

- Wet-to-dry debridement is non-selective in removing tissue and can damage the wound bed by also damaging viable granulation tissue.[1] (Level 1) [3,4] (Level III) [8] (Level IV)
- Wet-to-dry debridement prolongs the inflammatory process[4] (Level III) which delays wound healing[10,11,13]. (Level IV) This may be due to wet-to-dry dressings causing trauma to the tissues and/or leaving fibres in the wound bed on removal, which act as foreign bodies inducing the inflammatory stage of wound healing[3,4]. (Level III)

- Wet-to-dry debridement increases the likelihood of the wound bleeding due to capillary damage[14]. (Level III)

Infection control

- The removal of gauze from the wound bed releases bacteria into the surrounding atmosphere thereby contributing to airborne contamination. A study investigating the extent and duration of airborne contamination during the redressing of small colonised wounds found that absorbent cotton wool or gauze dressings resulted in the release of a markedly higher number of organisms than hydrocolloid dressings. In addition, the reduction of the number of airborne organisms was much slower[15]. (Level III) Additional laboratory and clinical studies supported these initial findings; for example, airborne *Staphylococcus aureus* — 192 colony-forming units (CFUs) per 80 litres of air from an absorbent gauze/wool dressing compared to 15 CFUs from a hydrocolloid dressing, in dressings moist on removal. Airborne dispersal was greatest with moderately dry dressings[16]. (Levels III & VI) The maximisation of infection control practices is vital to limit the spread of microbial resistance[17]. (Level I)

Pain

- Wet-to-dry debridement can be painful. In a systematic review of the clinical effectiveness of debridement in treating surgical wounds healing by secondary intention, of the 10 studies using plain or impregnated gauze as a comparator and which reported on pain/discomfort, eight found those with gauze dressings experienced significantly more pain during dressing changes than the more 'modern' dressings[1]. (Level I)

Cost-effectiveness

- Research has clarified that the labor and material costs associated with frequent wet-to-dry dressings make the dressing markedly more expensive[18]. (Level II)
- Several comprehensive cost estimates have been undertaken by United States home health agencies comparing wet-to-dry dressings with advanced wound products. In one of these studies (2002) the weekly costs of labor and materials were estimated to be US$11,440.74 for the saline and gauze dressings compared to US$334.56 for an advanced dressing (not specified). When taking into

account healing outcome rates, the costs of four weeks were calculated to be US$5,762.96 versus US$1,338.24[2]. (Level III)

- In a later study (2007) the weekly costs for the use of wet-to-dry dressings were estimated to be US$2,830.34 compared to US$419.64 for adhesive foam[19]. (Level IV)

CHARACTERISTICS OF THE EVIDENCE

This evidence summary is based on a structured search of the literature and selected evidence-based health care databases. The evidence in this summary is from:

- Three systematic reviews[1,5,7]. (Level I)
- One economic modelling study based on a systematic review of literature[18]. (Level II)
- A small clinical trial on normal saline dressings (n=20)[14]. (Level II)
- Three descriptive, exploratory studies[4,12,15-16]. (Level III)
- One retrospective, descriptive study involving chart reviews[3]. (Level III)
- A case study analysing the cost of wet-to-dry dressings[2]. (Level III)
- A survey (n=63) of tissue viability nurses on use of debriding agents[6]. (Level III)
- Four laboratory studies[8,10,11,15-16]. (Level IV)
- One article reviewing the literature on wet-to-dry dressings and reporting on a related performance improvement project[19]. (Level IV)
- One article summarising the evidence on wet-to-dry dressings including their use for debridement[9]. (Level IV)
- One article reviewing the literature on debridement[13]. (Level IV drawing on Levels I–IV evidence.)
- A Guideline on developing an institutional antimicrobial stewardship program to optimise clinical outcomes while minimising unintended consequences of antimicrobial use, including the emergence of resistance[17]. (Level I)

(Note: References 15 & 16 report on both a clinical and a laboratory study.)

BEST PRACTICE RECOMMENDATIONS

- Given that debridement using wet-to-dry saline moistened gauze has a number of identified risks and limitations, this form of debridement is not recommended. (Grade C)
- An alternative debriding method or therapy supported by evidence should be used. (Grade B)

RELATED TOPICS

JBI Evidence Summary ID3469 `Wet-to-dry saline moistened gauze for wound dressing'

REFERENCES

1. Lewis R, Whiting P, ter Riet G, O'Meara S & Glanville J. A rapid and systematic review of the clinical effectiveness and cost-effectiveness of debriding agents in treating surgical wounds healing by secondary intention. Health Technology Assessment 2001; 5(14). (Level I)
2. Ovington L. Hanging wet-to-dry dressings out to dry. Adv Skin Wound Care 2002; 15(2):79–84. (Level III)
3. Cowan L & Stechmiller J. Prevalence of wet-to-dry dressings in wound care. Adv Skin Wound Care 2009; 22(12):567–73. (Level III)
4. Armstrong M & Price P. Wet-to-dry gauze dressings: Fact and fiction. Wounds 2004; 16(2):1–6. (Level III)
5. Wiechula R. The use of moist wound-healing dressings in the management of split-thickness skin graft donor sites: a systematic review. Int J Nurs Pract 2003; 9:S9–S17. (Level I)
6. Howard S. A survey measuring the impact of NICE guidance 24: The use of debriding agents and specialist wound care clinics for difficult to heal surgical wounds. London, 2004. (Level III)
7. Bolton L. Operational definition of moist wound healing. J Wound Ostomy Continence Nurs 2007; 34(1):23–9. (Level I)
8. Winter G. Formation of scab and the rate of epithelisation of superfical wounds in the skin of the young domestic pig. Nature 1962; 193:293–4. (Level IV)
9. Spear M. Wet-to-dry dressings — evaluating the evidence. Plastic Surg Nurs 2008; 28(2):92–5. (Level IV)
10. Locke P. The effects of temperature on mitotic activity at the edges of experimental wounds. Chatham: Lock Laboratories Research, 1979. (Level IV)
11. Esclamando R, Damiano G & Cummings C. Effect of local hypothermia on early wound repair. Arch Otolarnygology Head Neck Surg 1990; 116(7):803–8. (Level IV)
12. McGuiness W, Vella E & Harrison D. Influence of dressing changes on wound temperature. J Wound Care 2004; 13(9):383–5. (Level III)
13. Leaper D, Schultz G, Carville K, Fletcher J, Swanson T & Drake R. Extending the TIME concept: what have we learned in the past 10 years? Int Wound J 2012; 9(Suppl 2):1–19. (Level IV)
14. Lim J, Saliba L, Smith L, McTavish J, Raine C & Curtin P. Normal saline wound dressings — is it really normal? Br J Plastic Surg 2000; 53:42–5. (Level II)
15. Lawrence J, Lilly H & Kidson A. Wound dressings and airborne dispersal of bacteria. The Lancet 1992; 339(8796):807. (Levels III & IV)
16. Lawrence J. Dressings and wound infection. Am J Surg 1994; 167 (I Suppl):21S–4S. (Level III)
17. Dellit, TH, Owens RC, McGowan JC, Gerding DN, Weinstein RA, Burke JP *et al.* Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship. Clin Inf Dis 2007; 44(2):159–177. (Level I)
18. Kerstein M, Gemmen E, van Rijswijk L, Lyder C, Phillips T, Xakellis G *et al.* Cost and cost effectiveness of venous and pressure ulcer protocols of care. Dis Manag Health Outcome 2001; 9(11):651–63. (Level II)
19. Dale B. Say goodbye to wet-to-dry wound care dressings: Changing the culture of wound care management in your agency. Home Healthcare Nurse 2011; 29(7):429–40. (Level IV)