

BURN WOUND CLEANSING - A MYTH OR A SCIENTIFIC PRACTICE

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SUMMARY. Burn wound cleansing is an integral step in every wound management protocol. Yet a lot of this practice is based on myth rather than real scientific basis. The literature is poor in scientific papers comparing the outcome of patients who underwent wound cleansing to those who did not. A survey form was designed by the Mediterranean Council for Burns and Fire Disasters – MBC and sent by e-mail to its members as well as members of the European Burn Association and other burn specialists, and 76 replies were received. Responses showed wide inconsistencies in the methods of burn wound cleansing, the solutions used for cleansing, the added antiseptics or detergents used, and the frequency of cleansing. Wound cleansing and dressing is a process that should be based on evidence and not on a ritualistic behaviour or a personal preference. In order to optimize burn wound care and promote optimal healing, more clinical evidence-based studies are needed to confirm or negate the positive or negative effects of any topical solution currently in use for burn wound cleansing.

Keywords: burn, wound cleansing, wound care, topical antiseptics

Introduction

Wound cleansing is an integral step in every wound management protocol¹ whether in acute or chronic wounds.^{2,3} Yet a lot of this practice is based on myth rather than a real scientific basis⁴ and there is evidence that it might not be always necessary for wound healing.^{2,5} Although burn wounds are a special type of wound, their management falls along the same lines as the management of most acute wounds.^{6,7}

Tools

A Medline and Pubmed search was performed using the terms ‘wound cleansing’, ‘topical antiseptics’, ‘burn wound management’, and ‘wound irrigation’. No study was found that scientifically compared the outcome of patients who underwent wound cleansing to those who did not. Also no study could be retrieved that compared the efficacy of using one topical solution for cleansing or irrigation versus another.

Based on this search, a short questionnaire* was developed by the Mediterranean Council for Burns and Fire Disasters (MBC) and distributed to members of the MBC, the European Burn Society, and other burn specialists.

* Appendix 1

Mediterranean Council for Burns and Fire Disasters
MBC SURVEY

Out-patient care

1. Burn wounds are cleansed by:
 - Immersion in basin/tub
 - Immersion then spraying/showering
 - Shower
 - Irrigation and wiping (bedside)
2. What type of cleansing solution
 - Tap water
 - Sterile water
 - Sterile physiological saline
3. Additives to cleaning solution
 - Regular soap
 - Other detergent (specify)
 - Povidone iodine
 - Chlorhexidine
 - Other antiseptic (specify)
4. How often burn wound is cleansed
 - Once daily
 - Twice daily
 - As needed depending on type of topical antibacterial treatment

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In-hospital care

1. Burn wounds are cleansed by:
 - Immersion in basin/tub
 - Immersion then spraying/showering
 - Shower
 - Irrigation and wiping (bed side)
2. What type of cleansing solution
 - Tap water
 - Sterile water
 - Sterile physiological saline
3. Additives to cleaning solution
 - Regular soap
 - Other detergent (specify)
 - Povidone iodine
 - Chlorhexidine
 - Other antiseptic (specify)
4. How often burn wound is cleansed
 - Once daily
 - Twice daily
 - As needed depending on type of topical antibacterial treatment

Results

A total of 76 responses were received over a period of three months after sending the questionnaire. The answers were coded and the results were tabulated and analysed giving percentages of each answer using Microsoft Excel program (Microsoft Office Excel 2007©).

Our questionnaire was divided into two parts: out-patient management and in-patient management.

Part 1: Out-patient management

Burn wound cleansing (Table I)

None of the responders used immersion in a tub alone for cleansing a burn patient. However, 4.23% of them used this modality in combination with other modalities such as showering, irrigation, and wiping; 64.79% used irrigation and wiping as a sole method for cleansing the burn wound and 80.28% used this method either alone or in combination with other methods.

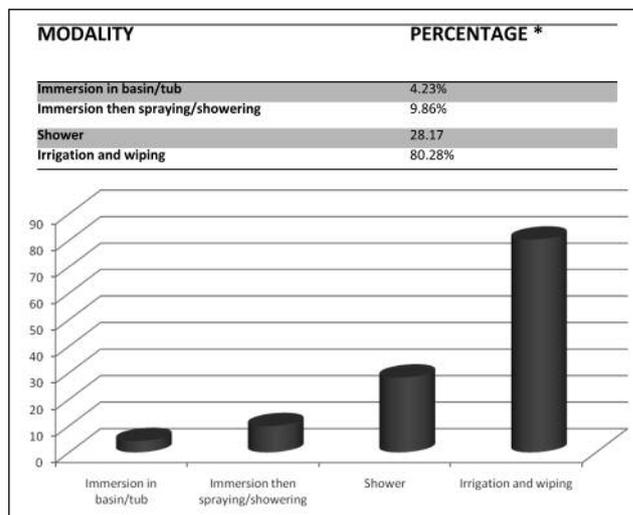
Type of cleansing solution (Table II)

Only 7% of our responders used sterile water to clean a burn wound. The majority (60.56%) used sterile physiological saline and a large number (42.25%) used tap water.

Additives to cleaning solution (Table III)

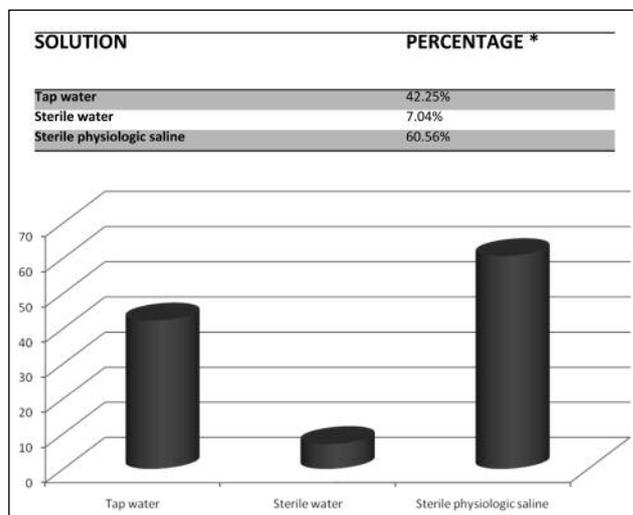
The two most commonly reported additives to the cleaning solution were povidone iodine (35.21%) and chlorhexidine (42.25%). However, as noted in the Table, several combinations of these antiseptics and others were also reported (Table III).

Table I - Burn wound cleansing (out-patient)



* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Table II - Type of cleansing solution used (out-patient)

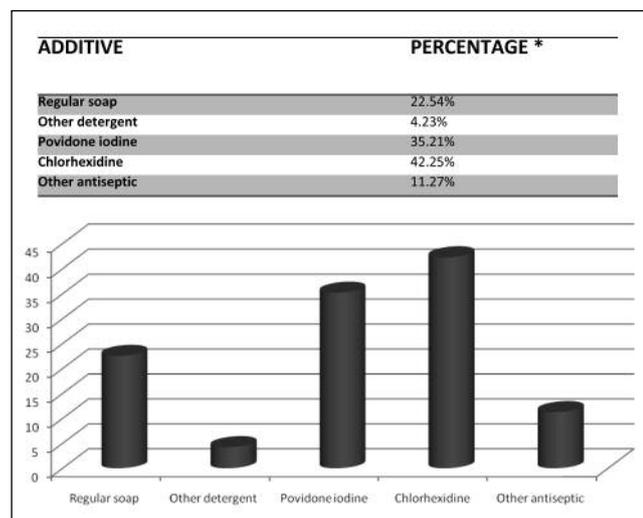


* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Frequency of cleaning the burn wound (Table IV)

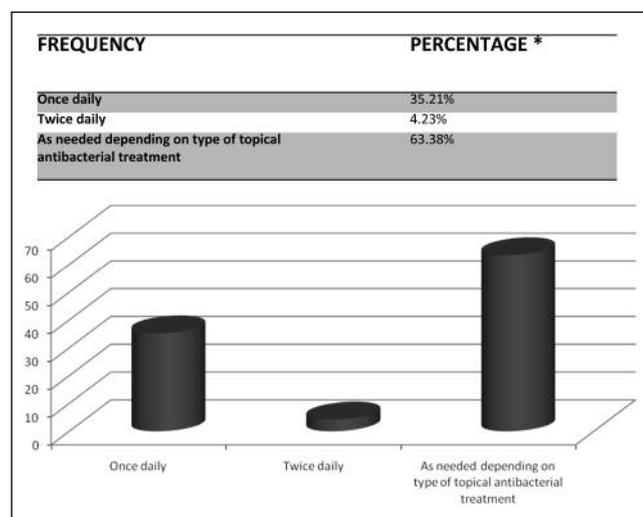
Most responders reported cleaning the wound as needed, depending on the topical antimicrobial used. However, a large number of them (35.21%) cleaned the wound only once daily.

Table III - Additives to cleaning solution (out-patient)



* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Table IV - Frequency of burn wound cleansing (out-patient)



* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Part 2: In-patient management

Burn wound cleansing (Table V)

With the in-patient treatment, irrigation and wiping were still the most commonly used method of wound cleansing (54.93%). However, unlike the out-patient therapy, in which none of the responders used the tub and very few used immersion and spraying, about 22% of our responders used these methods for their in-patients. Showering was also a very commonly used method (53.52%).

Type of cleansing solution (Table VI)

Tap water and physiological saline were reported to be used equally by the responders (49.3%). Only 18.3% used sterile water as a cleansing solution.

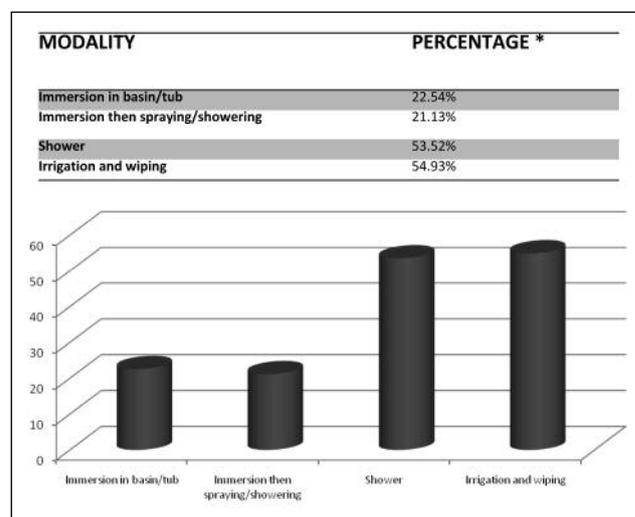
Additives to cleaning solution (Table VII)

Povidone iodine and chlorhexidine were still the most commonly used additives to the cleansing solution. Soap was reported to be used by 18.3%.

Frequency of cleaning the burn wound (Table VIII)

Most responders reported cleaning the wound as dictated by the type of topical antimicrobial used (63.38%). However, a good number (38.03%) reported cleaning the wound only once per day.

Table V - Burn wound cleansing (in-patient)

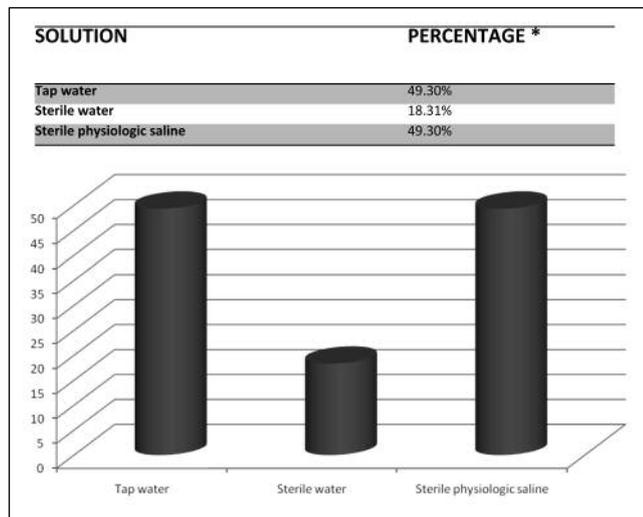


* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Location of dressing change

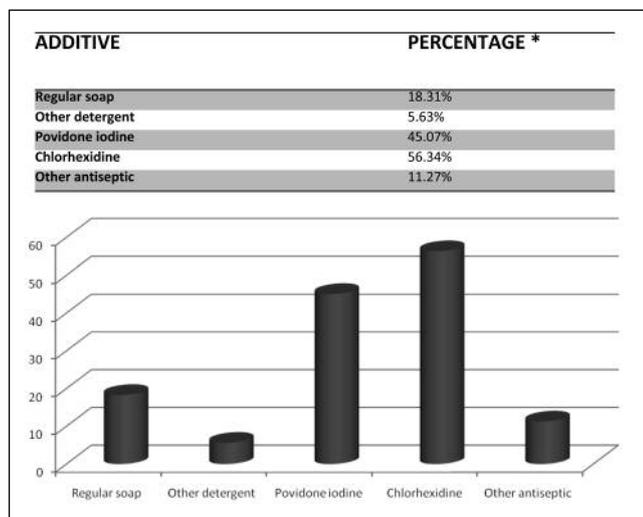
The majority preferred to change their dressing in the treatment room. Still, about 48% of responders cleaned the wound and changed the dressing at the bedside.

Table VI - Type of cleansing solution used (in-patient)



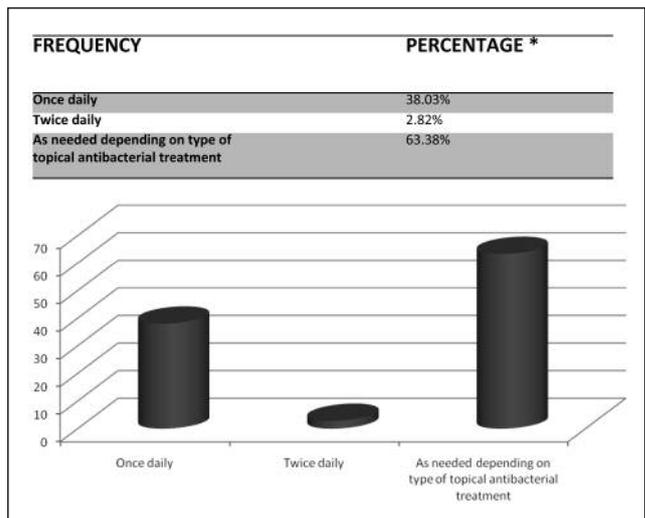
* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Table VII - Additives to cleansing solution (in-patient)



* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Table VIII - Frequency of burn wound cleansing (in-patient)



* Percentages do not add up to 100% because combinations between the answers were counted into both answers.

Discussion

Despite major advances in therapy, infection remains the leading cause of morbidity and mortality from extensive burn injury.^{6,8,9} Infected wounds not only heal more slowly but also may lead to systemic infections and prevent adequate skin grafting.^{10,11} In addition, infection makes the wounds grow deeper and larger in surface area.^{10,11} The development of topical antimicrobials has significantly decreased the rate of wound sepsis over the last 50 years.^{6,9} However, the best wound care strategy, with regard to method, solution, and frequency of wound cleansing is yet to be determined.¹ Many view these actions of wound cleansing as ritualistic and not based on scientific evidence.^{1,4,12} Using detergents and topical solutions should not be viewed as harmless to the process of wound healing.² Many of these molecules are harmful and affect wound healing negatively when improperly applied.²

Hydrotherapy (tub bath) has long been used for burn wound cleansing.⁹ In the early 1990s, most burn centres around the world used hydrotherapy for burn wound cleansing.⁹ However, a few years later reports started to appear linking hydrotherapy and the contamination of the equipment and the water used with the emergence of bacterial resistance and bacterial outbreaks throughout North America.^{1,9,13-18} Showering and using disposable plastic drapes for the hydrotherapy tanks and aborting the use of immersion methods have recently been used to replace the old techniques in order to avoid cross-contamination and emergence of resistant bacterial strains.¹³⁻¹⁵ Despite all these re-

ports and concerns, our survey showed that about 22% of our responders still used immersion hydrotherapy to clean burn wounds of in-patients. None of the responders used this cleansing modality for burn wounds in out-patients. In a personal communication from Dr Edward Tredget, of the FireFighters Burn Treatment Unit at the University of Alberta, Canada, he stated that all their wound cleansing was performed at the bedside. This method was adopted after a major outbreak of *Pseudomonas aeruginosa* in the early 1990, when the same organism was cultured from equipment, water outlets, and water used in the unit for the wound cleaning process.

Similarly to the numbers cited by other surveys,¹⁵ the majority of our responders used either sterile saline or tap water for the treatment of their in-patients. However, for the out-patients, most reported the use of sterile saline solution and only a few recommended using tap water. Angeras et al. in 1992 demonstrated that the use of tap water instead of sterile saline 0.9 per cent produced no difference in wound infection rates.^{1,19} In a Cochrane database review in 2008, Fernandez and Griffiths reported on 11 randomized and quasi-randomized controlled trials that compared rates of infection and healing with water and saline, as well as no cleansing. Tap water was statistically more effective than saline at reducing infection rates in adults with acute wounds and no different from saline in children.²⁰ No statistically significant differences in infection rates were seen when wounds were cleansed with tap water or not cleansed at all.²¹

Adding detergents and disinfectants to the cleansing solution is another step that was reported by our responders. Povidone iodine and chlorhexidine were the most commonly used with both out-patients and in-patients. These solutions should not be looked at innocently. Many authors have questioned the use of chlorhexidine 0.05% in

wound cleansing on the basis that its reported toxicity outweighs the benefits of its antiseptic properties.^{22,23} When added to culture of fibroblasts and keratinocytes for 15 minutes, chlorhexidine 0.05% resulted in complete cell death after 24 hours.²⁴ In another study, chlorhexidine was found to inhibit pro-matrix metalloproteinase (MMP)-9 and pro-MMP-2 release in normal human dermal fibroblast cells stimulated with 10 ng/ml tumour necrosis factor- α and 10 ng/ml transforming growth factor- β .^{1,2,25} The same applies to povidone iodine and other antiseptic solutions used in wound cleansing.²

The frequency of cleansing the wound is usually dictated by several factors, including the amount of exudation, the half-life of the dressing's active ingredient, when present, and the presence of debris and necrotic tissues.¹ However, the frequency is most often based on a ritualistic pattern and the personal preferences of the caring personnel than on evidence-based practice.^{1,26-29} Routine cleansing and dressing changes may be harmful to the wound healing process as they may damage the fragile newly formed cells and remove exudates containing the growth factors and moisture needed for wound healing optimization.^{1,2,30,31}

Conclusion

Wound cleansing and dressing is a process that should be based on evidence and not a ritualistic behaviour or a personal preference.^{1,2} Thorough knowledge should be obtained about the effects of the topical agents before using them, whether detergents, antiseptics, or antimicrobials. More clinical studies are needed to confirm or negate the positive or negative effects of any topical solution or dressing recommended to optimize burn wound healing.

RÉSUMÉ. Le nettoyage des brûlures constitue un aspect intégral de tous les protocoles de traitement des lésions. Pourtant, cette pratique se base sur un mythe plutôt que sur des bases scientifiques réelles. Il y a, dans la littérature scientifique, un nombre plutôt limité de publications scientifiques qui comparent les résultats des patients qui ont subi le nettoyage de la plaie à ceux qui ne l'ont pas fait. Un formulaire d'enquête a été conçu par le Conseil Méditerranéen pour les Brûlures (MBC) et envoyé par e-mail à ses membres comme aussi aux membres de l'Association Européenne des Brûlures et à d'autres brûlologues, obtenant 76 réponses. Les réponses ont indiqué des variations marquées dans les méthodes de nettoyage des brûlures, les solutions utilisées pour le nettoyage, les antiseptiques ajoutés ou les détergents utilisés et la fréquence du nettoyage. Le nettoyage de la lésion et les pansements constituent un processus qui doit être fondé sur des preuves et non sur un comportement ritualiste ou une préférence personnelle. Afin d'optimiser les soins des brûlures et de favoriser la guérison optimale, il faudra effectuer un grand nombre d'études basées sur les preuves cliniques pour confirmer ou nier les effets positifs ou négatifs des solutions topiques actuellement utilisées pour le nettoyage des brûlures.

Mots clés: brûlures, nettoyage des lésions, soins des brûlures, nettoyage des lésionswound cleansing, wound care, topical antiseptics.

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