Examining the literature on using tap water in wound cleansing

**ABSTRACT**


Practitioners working in the community setting and whose caseload predominantly consists of treating chronic wounds often use tap water as a wound cleanser with the rationale that chronic wounds are already colonised with bacteria. However, there is some controversy, as discussed within this review, of the suitability of tap water as a cleansing agent for acute wounds.

The registered nurse needs to consider the evidence base for practice in a multitude of areas as a requirement of the NMC (NMC, 2002). First it is important to understand what is meant by evidence-based practice. French (1999) suggests it is: ‘The systematic interconnecting of scientifically generated evidence with the tacit knowledge of the expert practitioner to achieve a change in a particular practice.’ However, some evidence may be misleading if the practitioner is inexperienced in the critical analysis of research, making the implementation of evidence-based practice difficult to achieve.

Individual case studies are widely reported in literature. However, while these provide practitioners with the opportunity to compare their management of a patient with a similar problem, they should not be taken as a demonstration of efficacy and applied to a wider population (Freak, 1995). An understanding of the research process will enable practitioners to critically analyse research findings and incorporate them into clinical practice (Baxter, 2001).

Systematic reviews of literature are invaluable in enabling practitioners to identify those studies that meet specific inclusion criteria and whose measures of outcome specifically meet those of interest to them.

For many years normal saline has been considered the cleansing solution of choice. However, in recent years the question has arisen of whether tap water is a viable alternative for wound cleansing.

**REFERENCES**


**AUTHORS**

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**BOX 1. CRITERIA TO ASSIST IDENTIFICATION OF INFECTION IN GRANULATING WOUNDS**

- Abscess
- Cellulitis
- Discharge: serous exudates with inflammation; seropurulent, haemopurulent pus
- Suggested additional criteria
- Delayed healing (compared with normal rate for site, condition)
- Discolouration
- Friable granulation tissue that bleeds easily
- Unexpected pain/tenderness
- Pocketing at base of wound, bridging at base of wound
- Abnormal smell
- Wound breakdown

(Source: Cutting and Harding, 1994)
a 17-month period involving 705 subjects. A comparison was made of any differences in the infection rate between wounds cleansed with tap water and sterile saline (in addition to the debridement of all wounds). The main outcome measure was the rate of wound infection, defined in the study as the presence of pus and prolonged healing. The results showed the infection rate was almost double in the group who received sterile saline, 10.3 per cent compared with 5.4 per cent. In addition, no bacterial species grown from the tap water were subsequently grown from an infected wound. The study concluded that tap water should replace sterile saline for cleaning acute traumatic superficial soft tissue wounds.

The study’s large sample size (705) supports its reliability and validity. However, the study methodology has limitations. The lower infection rate in the tap water group may be due to the difference in the temperatures of the tap water and saline used, 37°C compared with room temperature. The latter may cause local vasodilatation and affect wound resistance to infection (Fernandez et al, 2003), disadvantaging the saline group.

The issue of randomisation may also be questioned. Wounds were irrigated with sterile saline during even weeks and with tap water during odd weeks. It is unclear if the surgeons undertaking the debridement were aware of this. It may be argued that during the weeks tap water was used, the surgeons debrided more carefully and irrigated the wounds more generously, introducing the potential for bias.

Furthermore, despite the large sample size, half the patients were aged 18–35 years, limiting the ability to generalise the results of the study to the wider population. The trial was undertaken in Sweden where quality of water is variable. These limitations raise doubts about the efficacy of this study.

Study three
Museru et al (1989) examined the use of distilled water, boiled water and normal saline in irrigating the wounds of 86 patients with open fractures in A&E. Comparable wound types were used. Patients were randomised, but the method was not given. No exclusion criteria were described so patients with co-morbidities may or may not have been included.

The outcome measures were wound infections, chronic osteomyelitis, tetanus and gangrene. But the length of follow-up was not stated. If the follow-up was a matter of weeks this may have allowed wound infection, tetanus or gangrene to develop, but chronic osteomyelitis may take longer. The definition of wound infection was not given and patient satisfaction was not considered.

Study four
In a further A&E study, Godinez et al (2002) examined 94 subjects who were randomised to tap water or saline for irrigation of minor extremity lacerations or comparable wounds. Age and gender were not described. Irrigation differed between control and treatment groups; the saline was aspirated into a syringe, while water flowed from a tap onto the wound area. The outcome measure stated was wound infection, but no definition was given.

The authors concluded it was safe to use tap water to irrigate minor extremity wounds as the infection rate in the tap water group was zero, while in the control group (saline) infection rate was 7 per cent. There was no mention of patient satisfaction as an outcome measure.

Surgery
Study one
Reiderer and Inderbitzi (1997) undertook a quasi-randomised controlled trial of 121 patients having surgery for inguinal hernia. Wounds were cleansed while showering on day one postsurgery or kept dry for 14 days and not cleansed at all. There were two outcome measures: a comparison of wound infection rates was made, with infection defined in the study as irritation, slight redness of skin and stitch abscess; and patient satisfaction was considered. The study found no significant difference in infection rates in the two groups, although the group who showered reported a greater sense of well-being.

The study failed to use an objective measurement tool for assessing patient satisfaction and patient reports of well-being may have been influenced by other factors, such as whether patients volunteered the information or had been asked how they felt. In addition it may be argued that the definition of infection used in the study was too narrow and is of some concern considering that most wounds appear slightly red and patients experience some irritation as part of the normal healing process.

Cutting and Harding (1994) suggest that traditional definitions of infection are inadequate and provide additional criteria (Box 1). Finally, the study sample size was relatively small (121) and therefore the generalisability of the results to the wider population is difficult.

Study two
In 2000, Neues and Haas performed a randomised study by allocating patients to one of three groups. The control group included patients whose surgical wounds were to be kept dry for eight to 10 days, another group showered with water only from day two postoperatively and a third group showered using water and shower gel from day two postoperatively. The study included 817 subjects comparable for age and surgical wound. Gender was not mentioned. The authors stated wound infection as their outcome measure, but this was not defined.

While this study aims to show if tap water is safe, a number of patients were lost to follow-up, including a third of the control group and half of the group using water only. Whether these groups can be statistically compared for significant difference may be questionable.

Study three
Tay (1999) conducted a quasi-randomised controlled trial; allocation was determined by the month. The study involved 100 women who had an episiotomy for a...
normal vaginal delivery. Half the women received perineal toilet using water and procaine spirit, while half received water only.

There were three outcome measures. The first of these was wound infection, which was not defined in the study. Second was wound healing, which was assessed using a variety of factors, such as bruising and wound union. The third measure was a pain score using a verbal scale of 0–10.

All wounds were assessed on day 14 and were found to be well healed. The results indicated no statistical significance in the number of infections or pain scores.

However, in common with the other studies discussed, there were limitations. Most significantly a universal definition of wound infection was not used. Therefore, assessment of infection was open to assessor interpretation and may have varied from one assessor to another. This may have introduced bias. Furthermore, as all the subjects were female and of child-bearing age, the study results are not generalisable to other groups of patients.

Community

Griffiths et al (2001) performed a randomised controlled trial, examining the incidence of infection in 35 patients whose acute or chronic wounds were cleansed with tap water or saline at room temperature, at a community health centre. Patients with co-morbidities including diabetes were not excluded. The patients and the outcome assessors were blinded to the treatment to remove bias.

The patients’ wound dressings included alginates, hydrocolloids, foams and hydrogels. The outcome measures included: the number of patients healed at the end of six weeks, the number of patients within each group who developed wound infection, cost-effectiveness, variance in wound size and patient satisfaction.

Three patients who took part in the study developed wound infections, all of whom were in the control group in which wounds were irrigated with normal saline. Eight wounds in the experimental group healed, as did 16 in the control group, but the study does not report whether these wounds were acute or chronic, or which dressings were used.

Several types of dressing were used including those that may provide an occlusive barrier to bacteria, such as hydrocolloids (Mertz, 1985). Chronic wounds are likely to contain more potential pathogenic bacteria due to colonisation than acute wounds (Cutting, 1998), and are therefore more likely to develop infection. Patients with diabetes are unlikely to produce the same inflammatory signs of infection as patients without diabetes (Mulder et al, 1998).

The main criticism of this study is its small sample size. A larger sample that took into account only acute injuries, for example full dermal-thickness laceration, and the same dressing type would have removed some of the variable factors. Patient satisfaction was considered to have been higher in the tap water group, but this was not reported as a consequence of the study but because of patients’ earlier comments regarding being able to shower at home prior to a dressing change.

Discussion

A common theme throughout a number of the studies was the lack of definitions for outcome measures. These enable the researcher to measure the outcome against defined criteria. Patient satisfaction is an important outcome, but this does not appear to have been taken into account in these studies.

Some studies did not use comparable wounds, for example acute wounds compared with chronic wounds. Sample size was often variable, with subjects being lost to follow-up, reducing the sample size still further, which makes extrapolation to the general public difficult.

Conclusion

This critical review demonstrates that at present there is limited research available on the use of tap water as a viable option for wound cleansing. Furthermore, the data discussed is not without its flaws and inconsistencies. For example, the use of these methods in children has not been considered at all.

Taking these factors into account it is fair to say that currently there is insufficient robust evidence to either support or disclaim the use of tap water as a viable option for wound cleansing. However, its use may be appropriate in certain situations, for example in the cleansing of traumatic and chronic wounds, such as leg or pressure ulcers, that are already contaminated.

Flanagan (1997) argues that prior to the use of saline, tap water had been used for centuries in the cleansing of wounds and that as long as the water comes from a properly treated supply and the tap is run for a few minutes prior to use, fears of bacterial contamination appear to be unfounded.

It is vital that practitioners liaise closely with both tissue viability and infection control specialists who may be better placed to provide information on this area while taking account of all relevant factors (Box 2). Only then may informed decisions be made about the role of tap water in wound cleansing.

Further research, in particular in the community setting, using robust methodology is required before a definitive answer to whether tap water can be used in wound cleansing can be given.