



Pressurised irrigation versus swabbing method in cleansing wounds healed by secondary intention: A randomised controlled trial with cost-effectiveness analysis



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ABSTRACT

Background: Wound cleansing should create an optimal healing environment by removing excess debris, exudates, foreign and necrotic material which are commonly present in the wounds that heal by secondary intention. At present, there is no research evidence for whether pressurised irrigation has better wound healing outcomes compared with conventional swabbing practice in cleansing wound.

Objectives: This study investigated the differences between pressurised irrigation and swabbing method in cleansing wounds that healed by secondary intention in relation to wound healing outcomes and cost-effectiveness.

Design: Multicentre, prospective, randomised controlled trial.

Setting: The study took place in four General Outpatient Clinics in Hong Kong.

Methods: Two hundred and fifty six patients with wounds healing by secondary intention were randomly assigned by having a staff independent of the study opening a serially numbered, opaque and sealed envelope to either pressurised irrigation ($n = 122$) or swabbing ($n = 134$). Staff undertaking study-related assessments was blinded to treatment assignment. Patients' wounds were followed up for 6 weeks or earlier if wounds had healed to determine wound healing, infection, symptoms, satisfaction, and cost effectiveness. The primary outcome was time-to-wound healing. Patients were analysed according to their treatment allocation. This trial is registered with ClinicalTrials.gov, number NCT01885273.

Results: Intention-to-treat analysis showed that pressurised irrigation group was associated with a shorter median time-to-wound healing than swabbing group [9.0 days (95% CI: 7.4–13.8) vs. 12.0 (95% CI: 10.2–13.8); $p = 0.007$]. Pressurised irrigation group has significantly more patients experiencing lower grade of pain during wound cleansing (93.4% vs. 84.2%; $p = 0.02$), and significantly higher median satisfaction with either comfort or cleansing method (MD 1 [95% CI: 5–6]; $p = 0.002$; MD 1 [95% CI: 5–6]; $p < 0.001$) than

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did swabbing group. Wound infection was reported in 4 (3.3%) patients in pressurised irrigation group and in 7 (5.2%) patients in swabbing group ($p = 0.44$). Cost-effectiveness analysis indicated that pressurised irrigation in comparison with swabbing saved per patient HK\$ 110 (95% CI: –33 to 308) and was a cost-effective cleansing method at no extra direct medical cost with a probability of 90%.

Conclusions: This is the first randomised controlled trial to compare the pressurised irrigation and swabbing. Pressurised irrigation is more cost-effective than swabbing in shortening time that wound heals by secondary intention with better patient tolerance. Use of pressurised irrigation for wound cleansing is supported by this trial.

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What is already known about the topic?

- Wound cleansing is an important part of assisting the wound to heal by secondary intention; by removing foreign debris and excess exudate, reducing bacterial bioburden and rehydrating the wound
- Swabbing is a dominant practice in wound cleansing despite the mention about its risk for tissue trauma thus compromising healing.
- Pressurised irrigation has been advocated as an acceptable practice to cleanse wounds, due to its merit in being able to cleanse without traumatising the wound bed.

What this paper adds

- Pressurised irrigation has better wound healing outcomes including shorter wound healing time, less pain during wound cleansing, and higher satisfaction with comfort and the cleansing method compared with swabbing practice to cleanse wound.
- Pressurised irrigation is a cost-effective alternative to swabbing for cleansing wounds that heal by secondary intention.
- This study is the first with randomised controlled trial design to compare the irrigation and swabbing, while accounted for cost analysis, which previous studies had not done.

1. Introduction

A wound heals by secondary intention if surgical closure is not indicated by reason of wound edges being unable to approximate due to tissue loss and wound being contaminated or infected, including acute traumatic wounds (Dire and Walsh, 1990), dehisced surgical wounds (Miller and Glover, 1999), chronic wounds (Falanga, 2000), leg ulcer (Waspe, 1996) and burn wound (McKirdy, 2001). By secondary healing, the wound is allowed to “granulate in”, that is, the wound closes by contraction and filling with connective tissue, which may be a protracted process, more nursing time in managing the wound will be required. Wound cleansing is an important part of assisting this healing process; by removing foreign debris and excess exudate, reducing bacterial bioburden and rehydrating the wound (Atiyeh et al., 2009; Falanga, 2000).

The most appropriate technique of wound cleansing remains contentious over the years. The routines for

cleansing wounds vary between countries, hospitals and departments, some literatures recommend not to use swabbing routinely due to the risk for tissue trauma thus compromising healing (Oliver, 1997), while others recommend swabbing with soaked non-woven gauze at appropriate pressure which can remove slough and loose necrotic tissue without damage (Towler, 2001; Young, 1995). In Hong Kong, the use of swabbing in cleansing wounds is a dominant practice in majority of healthcare setting despite the availability of literature and expert recommendation.

A number of narrative review articles have indicated various techniques for wound cleansing. However, irrigation of wounds is gaining widespread acceptance as clinicians recognise its benefits, namely preservation of newly granulating tissue, effective removal of bacteria and debris and patient comfort and convenience (Ennis et al., 2004; Oliver, 1997). The original Agency for Health Care Policy and Research (AHCPR) guidelines describe safe and effective irrigation pressures as being 4–15 psi, based on a series of different studies (Brown et al., 1978; Rodeheaver et al., 1975; Wheeler et al., 1976). Studies suggest that pressures of 8–12 psi are strong enough to overcome adhesive forces of bacteria (Chisholm et al., 1992; Longmire et al., 1987). Use of pressurised irrigation facilitates ease of irrigation, markedly decreases the time involved in this traditionally labour-intensive activity, and may decrease budgetary burden due to extra add needles or syringes for irrigation.

Since cleansing by irrigation being considered advantageous, there has been a lot of debate and research with regards to the most appropriate equipment and amount of pressure required to effectively cleanse a wound without causing trauma (Towler, 2001). No study that compared the technique of swabbing with either irrigation or pressurised irrigation was identified from the updated search.

A Cochrane Wound Group’s review concluded that there were no randomised controlled trials identified that compared the common techniques of swabbing and scrubbing (Fernandez et al., 2006; Moore and Cowman, 2013). The conclusions in the Cochrane review were based on the Joanna Briggs Institute Best Practice report that the data were analysed using Cochrane Review manager, showing that there were only five trials comparing the effect of showering to non-showering patients in the post-operative period (Fernandez et al., 2006). The pooled results of four studies (Fraser et al.,

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