

Best Practice

Evidence based information sheets for health professionals

Solutions, techniques and pressure in wound cleansing

Recommendations

These recommendations are based on the best available clinical evidence at the time of the conduct of this review. However, there is an urgent need to support these findings with rigorous research as some of the conclusions are based on single studies with a limited sample size.

Solutions

Tap water should not be used if declared unpotable (unsuitable for drinking). Tap water should be run for 15 seconds prior to use.

1. For adults with lacerations and postoperative wounds, potable tap water may be an effective cleansing solution. However, the choice of solution should reflect patient preference and a formal economic evaluation. **(Grade B)**
2. Chronic wounds in adults may be cleansed using potable tap water if normal saline is unavailable. **(Grade B)**
3. Potable tap water may be used for cleansing simple lacerations in children. **(Grade A)**
4. Boiled and cooled water is an effective wound cleansing solution in the absence of normal saline or potable tap water. **(Grade C)**
5. **Irrigation** with 1% povidone-iodine is effective in reducing the infection rate in contaminated wounds. **(Grade B)** However there is no evidence of the optimal time that Povidone Iodine should be left in place. **(Grade E)**

Pressure

1. Pressures of 13 psi is effective in reducing infection and inflammation in both adults and children with lacerations and traumatic wounds. **(Grade B)**

Techniques

1. Showering patients does not impact on infection and healing rates of postoperative wounds, and may benefit patients with a feeling of well-being and health associated with cleanliness. **(Grade A)**
2. Showering for cleaning ulcers and other chronic wounds should be undertaken with caution. **(Grade C)**
3. Whirlpool therapy may reduce pain and inflammation in surgical wounds and improve the healing rate in pressure ulcers. **(Grade C)**
4. There is no research to support or refute swabbing and scrubbing to cleanse wounds.
5. Sitz bath may be used for patients following episiotomy. **(Grade E)**
6. **Soaking** in 1 % povidone-iodine is not effective in reducing bacterial count. **(Grade B)**

Due to a lack of research evidence, these recommendations should not be extrapolated to immuno-suppressed patients.

Information Source

This *Best Practice* information sheet, which updates and supersedes the JBI information sheet of the same title published in 2003, has been derived from a systematic review conducted in 2004.^{1,2} The primary references on which this information sheet is based are available in the systematic review report available from The Joanna Briggs Institute² www.joannabriggs.edu.au

Solutions

Fourteen RCTs were eligible for inclusion of which four trials involved patients with lacerations, one trial each involved patients with traumatic wounds, open fractures or ulcers, and seven studies involved patients in the postoperative period. The studies evaluated patients in hospital emergency departments, wards and community settings. No trials were identified that used EUSol, hydrogen peroxide or chlorhexidine solutions.

Tap water vs No cleansing

Infection (n=5 trials)

Pooling the results of the five trials undertaken on postoperative patients showed no statistically significant difference in the infection rate between wounds that were cleansed with tap water compared with those not cleansed (OR 0.80; 95% CI 0.29-2.3).

Grades of Recommendation

These Grades of Recommendation have been based upon the JBI developed *Grades of Effectiveness*³

- Grade A** Effectiveness established to a degree that merits application
- Grade B** Effectiveness established to a degree that suggests application
- Grade C** Effectiveness established to a degree that warrants consideration of applying the findings
- Grade D** Effectiveness established to a limited degree
- Grade E** Effectiveness not established

Definitions

For the purpose of this information sheet the following definitions have been used:

Potable tap water Tap water that has been declared of suitable quality for drinking. Of the included trials only one randomised controlled trial (RCT) reported the potability of the tap water.

ShurClens (Pluronic F-68) is a non-ionic surfactant poloxamer 188 used for cleansing wounds.

Sitz bath (also called a hip bath) is a type of bath in which only the hips and buttocks are soaked in water or saline solution. Its name comes from the German verb "sitzen," meaning "to sit."

Whirlpool therapy is a form of powered irrigation, that loosens and removes necrotic tissue, debris and exudates.

Wound cleansing The use of fluids to remove loosely adherent debris and necrotic tissue from the wound surface.

Healing (*n=3 trials*)

Pooled data from three RCTs that investigated the healing rates in patients with postoperative wounds demonstrated no statistically significant difference between the groups (OR 1.21; 95% CI 0.29 -5.10).

Normal saline vs No cleansing

Infection (*n=1 trial*)

Results from one small trial (*n= 35*) that assessed infection rates in traumatic lacerations that were soaked in normal saline and those that received no treatment indicated higher infection rate in wounds soaked in normal saline compared to untreated wounds. Due to the small sample size these results should be interpreted with caution.

Patient satisfaction (*n=3 trials*)

One trial undertaken in a community setting, reported that patients who had showered their wounds prior to the trial preferred that method of irrigation to cleansing with normal saline. Two studies stated that patients who were encouraged to shower their postoperative wounds reported a feeling of well-being, however, a standard measure for assessment was not used.

Tap water vs Normal saline

Infection (*n=4 trials*)

One trial undertaken on adult patients with acute lacerations reported higher infection rates in wounds cleaned with normal saline compared to tap water ($p<0.05$). This could possibly be due to methodological weakness of the trial as the solutions were administered at different temperatures. The warmer of the two solutions, tap water at 37°C, could have caused vasodilatation thus reducing the potential for infection.

Two trials were undertaken in children with simple lacerations and one trial was undertaken in adults with chronic wounds. All four trials demonstrated no difference in the infection rates between wounds cleansed using tap water or normal saline.

Healing (*n=1 trial*)

One trial, undertaken on chronic wounds, reported that there was no statistically significant difference in the number of wounds that healed after cleansing with tap water or normal saline. However, it should be noted that this trial was of a low power to detect a clinically important difference as statistically significant (49 wounds and only three infections).

Cost analysis (*n=1 trial*)

The use of tap water was reported to be inexpensive compared to the use of normal saline in the only RCT that reported this outcome. The estimated cost (in 2001) per dressing using normal saline

was AUD\$1.43 plus the cost of the dressing, compared to AUD\$1.16 using tap water. The trial also indicated that if the wound was cleansed during showering, the only cost would be the dressing. Additional costs for the saline group included staff time, and materials and equipment used for the dressings.

Tap water vs Procaine spirit

Infection (*n=1 trial*)

Women who had undergone a normal vaginal delivery with an episiotomy were randomised to have the incision site cleaned with either tap water or procaine spirit. No statistically significant differences in the number of infections or pain scores were found. In addition no statistically significant difference in wound complications was reported and by the 14th day all the wounds had healed well.

Isotonic saline vs Distilled water vs Boiled and Cooled water

Infection (*n=1 trial*)

One RCT undertaken on 86 patients reported that cleansing with isotonic saline resulted in infection in 35% of the open fractures. Low infection rates were observed in wounds cleansed with either distilled water (17%) or boiled and cooled water (29%), however these results were not statistically significant ($p>0.05$). The RCT reported that distilled water including boiled and cooled water may be effective solutions for wound cleansing when saline is unavailable. This RCT reported no difference in the infection rate and the incidence of osteomyelitis in fractures that were cleansed with either isotonic saline, boiled water or distilled water.

Normal saline vs 1% Povidone-iodine solution

Infection (*n=3 trials*)

No significant difference in infection rates was reported in the only trial undertaken on soft tissue lacerations cleansed with either normal saline or 1% povidone-iodine. However pooled data of the two RCTs undertaken on contaminated wounds (postoperative and traumatic lacerations) favoured the use of 1% povidone-iodine (OR 0.15; 95% CI 0.05-0.43) ($p<0.0004$).

Healing (*n=1 trial*)

In the only trial that reported this outcome, primary healing was increased in the postoperative wounds cleansed with povidone-iodine. However, there was no difference in the number of wounds that healed between three weeks and three months or between three months and six months between the groups.

Normal saline vs Pluronic F-68 (Shur Clens)

Infection (*n=1 trial*)

No difference in infection rates was reported when traumatic lacerations were cleansed with either normal saline or Pluronic F-68 ($p=0.65$).

Povidone-iodine vs Pluronic F-68 (Shur Clens)

Infection (*n=1 trial*)

Results of the infection rates in uncomplicated soft tissue lacerations cleaned with povidone-iodine and Pluronic F-68 indicated that although the infection rates for the groups was 4.3% and 5.7%, respectively, these results were not statistically significant ($p=0.57$).

1% Povidone-iodine vs No cleansing

Infection (*n=1 trial*)

One study that compared infection rates in contaminated traumatic wounds that were soaked in 1% povidone-iodine with those that were not cleansed with any solution reported similar infection rates in both groups. The trial also indicated that wounds soaked in saline had a significant trend towards increased bacterial count after treatment ($p=0.0001$). However, no reduction in bacterial count was observed in wounds soaked in 1% povidone-iodine solution.

Techniques

Six RCTs and three comparative studies with concurrent controls were included. Eight studies involved patients after surgery, and one trial was undertaken on patients with non-contaminated lacerations.

There were no RCTs identified that compared the common techniques of wound cleansing such as swabbing and scrubbing.

Whirlpool therapy vs Conservative treatment

Healing (*n=2 trials*)

The results of the only RCT that assessed this outcome indicated that pressure ulcers randomised to the conservative plus whirlpool therapy group improved at a significantly faster rate than did the conservative treatment group ($p<0.05$). However, there was no statistically significant difference in the number of wounds that healed, deteriorated or remained unchanged at follow up ($p<0.05$). Another controlled trial without randomisation that investigated the effects of whirlpool therapy on wound healing and pain relief in patients after abdominal

surgery indicated that the patients who received the whirlpool therapy in the first 72h experienced decreased wound inflammation and reduced pain.

13psi irrigation using a 30–60 mL syringe with a 18–20 G needle vs Cleansing with gauze

Infection (*n=1 trial*)

One controlled trial without randomisation compared wound infections and cosmetic appearance in wounds (non-bite, non-contaminated, facial and scalp lacerations) that were irrigated with normal saline and those that were cleansed with gauze and saline. No difference in infection rates between the groups was noted however, optimal cosmetic appearance at the time of suture removal was higher in the non-irrigation group.

Showering vs Non-showering

Infection (*n=5 trials*)

Pooled results of the five RCTs that compared the effect of showering to non-showering patients in the postoperative period, indicated that there was no statistical difference in the infection rate between the groups (OR 0.80, 95% CI 0.29–2.23).

Healing (*n=3 trials*)

No statistically significant difference in the healing rate (OR 1.21; 95% CI 0.29- 5.10) or incidence of wound dehiscence was reported between the groups.

Soaking vs Standard treatment

Infection (*n=1 trial*)

One comparative study with concurrent controls demonstrated no significant difference in the infection rates in episiotomy wounds that were soaked in Sitz baths and those that were not.

Healing (n=1 trial)

Sitz baths also did not significantly affect the healing rates of episiotomy wounds.

Patient satisfaction (n=2 trials)

Two RCTs reported that patients in the showering group felt a sense of health and well-being derived from the hygiene and motivation of showering.

Pressure

Three RCTs and one comparative study with concurrent controls were included. The eligible trials involved patients with lacerations, full thickness wounds, traumatic wounds and ulcers.

13 psi (12 cc syringe with a 22 G needle) vs 0.05 psi (bulb syringe)

Infection (n=1 trial)

One trial that made this comparison indicated that there was a statistically significant decrease in infection ($p=0.017$) and inflammation ($p=0.034$) in the wounds irrigated with the syringe and needle. However it should be noted that the criteria for infection were subjective. The authors concluded that inflammation and infection could be reduced using irrigating pressures of 13 psi.

2 psi (port) vs 1.5 psi (cap)

Infection (n=1 trial)

The rate of infection and the speed of irrigation were compared in one RCT using two new irrigation devices, the port and the cap. The port device was spiked aseptically into a 1000 mL saline bag while the cap was aseptically threaded onto a 1000 mL saline bottle. Irrigation pressure reported was 2 psi for the port device and 1.5 psi for the cap device. The results indicate that there is no difference in wounds cleaned with either device. However, the time taken to irrigate wounds

using these devices was significantly less than using a syringe and catheter/needle.

8 psi (30 mL syringe with 20 G needle) vs 8 psi (pressurised canister)

Infection (n=1 trial)

One RCT compared infection rates and irrigation times in 535 patients with lacerations cleansed with sterile normal saline delivered either through a 30 mL syringe and 20 G intravenous catheter or through a pressurised canister. The wound complication rate between the groups was not statistically significant ($p=0.50$). Although the pressure exerted by the two devices was the same (8 psi) the irrigation time using the pressurised canister was 3.9 min compared to 7.3 min in the syringe irrigation group ($p<0.0001$). The trial also reported that irrigation with the pressurised canister was cost effective compared to syringe irrigation.

8psi (pressurised canister) vs 0.05psi (bulb syringe)

Infection (n=1 trial)

One trial with concurrent controls that compared the effects of cleansing full thickness wounds in 30 patients using either a pressurised canister or a bulb syringe indicated that although large amounts of solution was used when cleansing the wounds using a bulb syringe, these wounds had higher bacterial counts.

Acknowledgments

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and the Sydney South West Area Health Service).

An expert panel reviewed the recommendations developed during the systematic review process. In addition this *Best Practice* information sheet has been peer reviewed by experts nominated by Joanna Briggs collaborating centres.

References

1. JBI (2003) Solutions, techniques and pressure for wound cleansing. *Best Practice* 7(1), 1-6. **note this sheet has been superseded.
2. Fernandez, Ritin, Griffiths, Rhonda & Ussia, Cheryl (2004) Effectiveness of solutions, techniques and pressure in wound cleansing. *JBI Reports* 2(7), 231-270.
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