# Critical Review Form
## Meta-analysis

Water for wound cleansing, *Cochrane Database of Systematic Reviews* 2008: Issue 1, Art No.: CD003861, DOI: 10.1002/14651858. CD003861.pub2.

**Objective:** **"To compare the effects of water (tap or cool, boiled or distilled) and saline for wound cleansing". (p. 2)**

**Methods:**

**Using a search of the Cochrane Wounds Group Specialized Register, MEDLINE, EMBASE, CINAHL, and The Cochrane Controlled Trials Register, the systematic review authors sought to identify all RCTs and quasi-randomized controlled trials comparing wound healing outcomes or infection rates in wounds cleaned with water and those cleaned with normal saline.**

**Wound was defined as a break in the skin. Outcomes based upon subjective measures (redness, swelling) were analyzed separately from those with objective measures of healing (change in surface area or wound depth) or infection (wound culture or biopsy).**

**The following trials were included: tap water compared with no cleansing, sterile saline, cooled, boiled water or any other solution. Three authors reviewed the abstracts identified. The decision to include or exclude a study was made by consensus. Quality was assessed via the Jadad scale and the Cochrane criteria (see p 4). A weighted treatment effect was calculated and heterogeneity was assessed by the $I^2$ statistic. A random effects model was used where data was pooled for meta-analysis.**

**The primary outcome was wound infection with Gold Standard bacterial counts, wound cultures, wound biopsy or subjective indicators of infection (pus, discoloration or friable granulation tissue). Secondary outcomes included wound healing proportions, costs, pain scores, patient satisfaction and staff satisfaction.**

| Guide | Question | Comments |
|---|---|---|
| I | ***Are the results valid?*** | |
| 1. | Did the review explicitly address a sensible question? | Yes, whether sterile saline and tap water differ for wound infections when used for irrigation of acute or chronic wounds. |
| 2. | Was the search for relevant studies details and exhaustive? | Yes, the authors conducted well-described electronic searches of Cochrane, MEDLINE, EMBASE, and CINAHL. Additionally, they contacted primary authors, company representatives, and content experts to identify additional eligible studies. |
| 3. | Were the primary studies of high methodological quality? | Not really.<br>• 29 RCTs identified but only 11 met inclusion criteria.<br>• Of those 11, five were missing essential information. Only three had adequate randomization schemes and only two described allocation concealment.<br>• Eight trials provided clear descriptions of inclusion/exclusion criteria. Baseline characteristics were only described in six trials.<br>• Two trials described *a priori* power calculations.<br>• All tap water vs. sterile saline trials were single center and all studies reported a wide range of outcome measures (and irrigation methods).<br>• Cost analysis was only reported in two trials. |
| 4. | Were the assessments of the included studies reproducible? | Yes, the Jadad scale and the Cochrane Quality Scale Assessment tool have been validated and widely used for evidence appraisal. |
| **II.** | ***What are the results?*** | |

| | | |
|---|---|---|
| 1. | What are the overall results of the study? | • In 3 adult RCT's, all the point estimates favor TW (see the most relevant Forest Plot below). Infection rates are reduced with tap water (ARR 2.8%, NNT 36 with 95% CI 20-323).<br>• Based upon 2 RCT's in children there is no difference between tap water and sterile saline for infection rates RR 1.07 (0.43-2.64)<br>• No trials of acute wounds assessed wound healing rates in adults or children.<br>• Only 1 trial (see PGY-I paper) assessed cost-effectiveness in acute wounds and projected a $65.6 million/year savings if tap water used in the US.<br>• No studies assessed tap water quality in non-first world nations.<br>The Cochrane authors missed the fact that Valente, et al assessed tap water quality in NYC.<br><br>**Other irrigation methods:**<br>• Tap water cleansing vs. no cleansing did not differ in infection rates (RR 1.06, 0.07-16.5) or wound healing (RR 1.26, 0.18-8.66).<br>• Under-powered studies failed to detect a difference in infection rates for distilled water vs. sterile saline. |
| 2. | How precise are the results? | Not very – fairly wide CI (see above) |
| 3. | Were the results similar from study to study? | No statistically significant heterogeneity was noted by $I^2$ analysis for the pooled results reported above. However, studies did not report standardized irrigation protocols, volumes, or instructions within or across institutional settings. Furthermore, studies did not report water quality or objective outcomes assessments. |
| ***III.*** | ***Will the results help me in caring for my patients?*** | |
| 1. | How can I best interpret the results to apply them to the care of my patients? | Heterogeneous studies suggest no difference between tap water and sterile saline as an irrigation fluid for acute lacerations in terms of infections or wound healing. |
| 2. | Were all patient important outcomes considered? | No studies assessed patient comfort, clinician acceptance, or long-term wound cosmesis. Patient expectations may be an important, unmeasured impediment to routinely using TW rather than SS. |
| 3. | Are the benefits worth the costs and potential risks? | Yes. Tap water is cheap and readily available in developed nations. In locales without potable water, distilled water may be acceptable. |

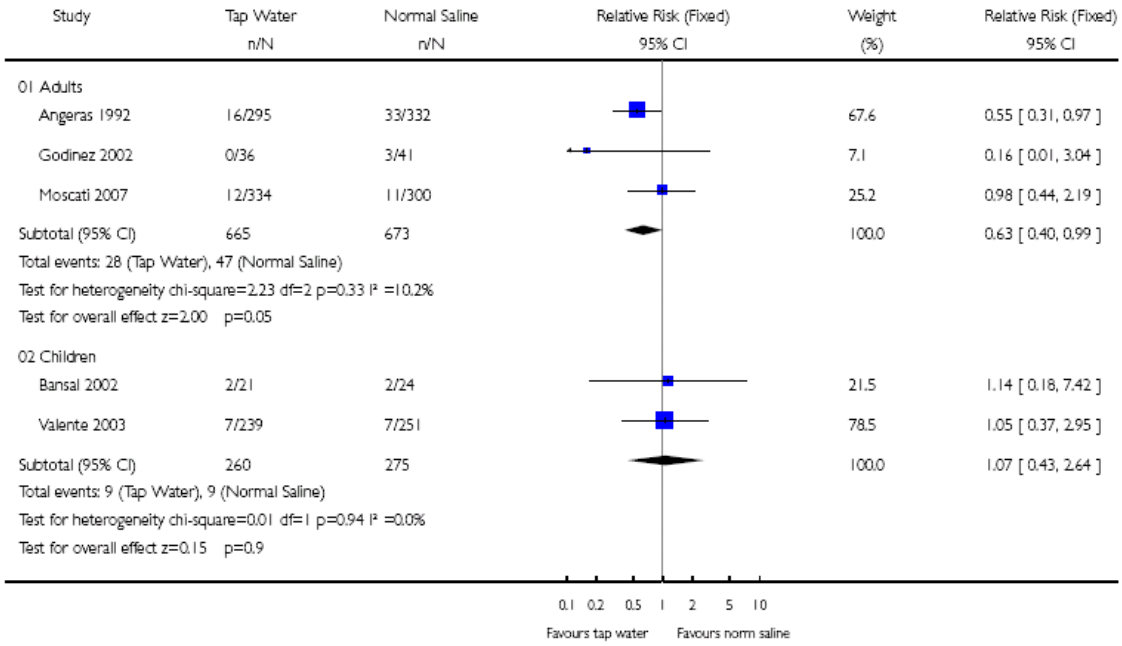
**Limitations**

1) **Heterogeneous, single-center trials limiting ability to pool results or confidently generalize findings.**
2) **No patient or clinician satisfaction assessments.**
3) **No primary study author responded to Cochrane author requests for more detailed result reporting.**
4) **Limited assessment of water quality or preparation (temperature, volume used)**

**Bottom Line**

**In adults, tap water may prevent infection of acute lacerations compared with SS, though this is likely due to the temperature, pressure flow, and volume of irrigation fluid used. In children, TW and SS irrigation of acute lacerations offer similar infection rates. Future trials ought to be multi-center and include non-first world settings while controlling for water quality, irrigation pressure, volume, and temperature with wound severity in adults and children. Additionally, future research should ascertain patient expectations which may be an important, unmeasured impediment to routinely using TW rather than SS.**

## Tap Water vs. Normal Saline for Outcome Wound Infection


Study
Tap Water n/N
Normal Saline n/N
Relative Risk (Fixed) 95% CI
Weight (%)
Relative Risk (Fixed) 95% CI
01 Adults
Angeras 1992 16/295 33/332 67.6 0.55 [ 0.31, 0.97 ]
Godinez 2002 0/36 3/41 7.1 0.16 [ 0.01, 3.04 ]
Moscati 2007 12/334 11/300 25.2 0.98 [ 0.44, 2.19 ]
Subtotal (95% CI) 665 673 100.0 0.63 [ 0.40, 0.99 ]
Total events: 28 (Tap Water), 47 (Normal Saline)
Test for heterogeneity chi-square=2.23 df=2 p=0.33 I² =10.2%
Test for overall effect z=2.00 p=0.05
02 Children
Bansal 2002 2/21 2/24 21.5 1.14 [ 0.18, 7.42 ]
Valente 2003 7/239 7/251 78.5 1.05 [ 0.37, 2.95 ]
Subtotal (95% CI) 260 275 100.0 1.07 [ 0.43, 2.64 ]
Total events: 9 (Tap Water), 9 (Normal Saline)
Test for heterogeneity chi-square=0.01 df=1 p=0.94 I² =0.0%
Test for overall effect z=0.15 p=0.9
0.1 0.2 0.5 1 2 5 10
Favours tap water
Favours norm saline