Intracavity lavage and wound irrigation for prevention of surgical site infection: systematic review and network meta-analysis

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Intracavity lavage and wound irrigation

- Surgical site infections (SSIs) are wound infections that occur after an operative procedure.
- They are costly and associated with poorer patient outcomes, increased mortality, morbidity and reoperation rates.
- Surgical wound irrigation and intracavity lavage (ICL) are intraoperative techniques
- These may reduce the rate of SSIs through removal of dead or damaged tissue, metabolic waste, and wound exudate.

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Systematic literature review

- Systematic literature review (SLR) compared ICL techniques on SSI
- Searched Cochrane Wounds Specialised Register, the Cochrane Central Register of Controlled Trials, Ovid MEDLINE, Ovid Embase, and EBSCO CINAHL Plus.
- Included all RCTs of surgical procedures with primary wound closure where intraoperative washout method was only systematic difference
- SLR identified 59 studies involving 14,738 participants
- 12 of these from reference searching, suggesting publication bias.
- Meta-analysis found limited evidence of differences between techniques.
- Important comparisons (e.g. antibiotic vs antiseptics) could not be conducted due to lack of direct evidence.
- We applied network meta-analysis to attempt to boost certainty and fill in gaps.

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Classification of irrigation options

- Reference treatment was nonantibacterial (incl. saline solutions) irrigation.
- Alternatives were no irrigation and antiseptic (incl. iodine) irrigation.
- In addition, there were four classes of antibiotics, with 17 options in total.
- Cephalosporins (8 in total): cefazolin, cephapirin, cefoxitin, cefotetan, cefamandole, cephalothin, cefoxin, moxolactam
- Penicillins (2): ampicillin, clindamycin
- Other antibiotics (1): taurolidine PVP
- Aminoglycosides (6 mono or combo): tetracycline, kanamycin sulphate +cephalothin sodium, kanamycin, gentamicin, gentamicin+clindamicin, chloramphenicol succinate
- An assumption that all 17 antibiotic options were independent was not viewed as clinically plausible and would lead to sparse evidence.
- This gives a total of 7 interventions and the following network of evidence…

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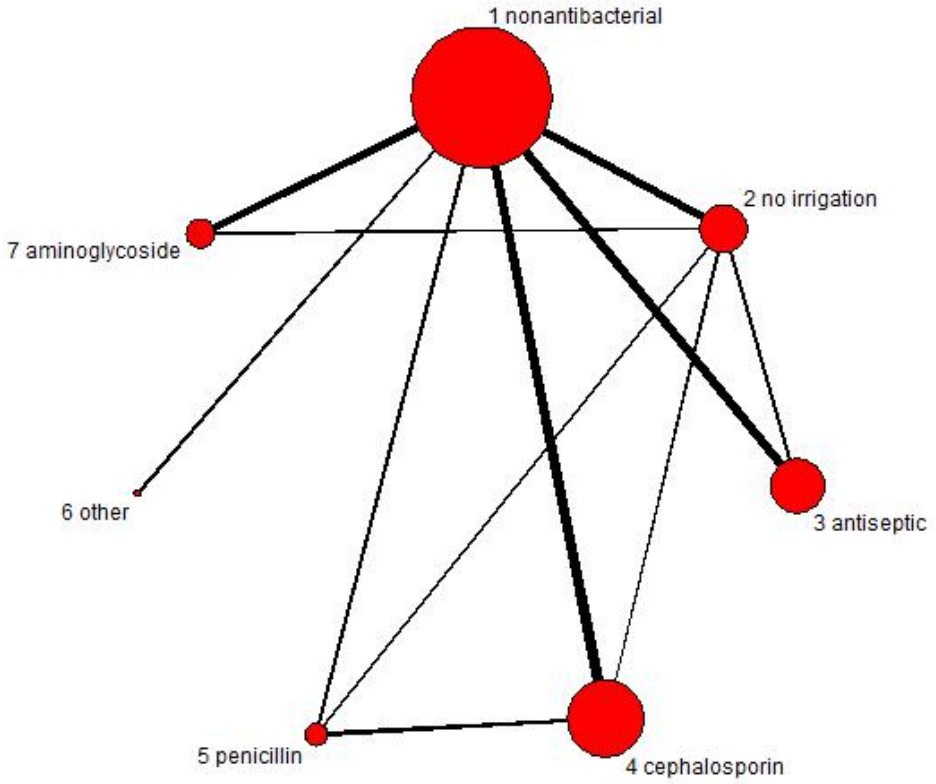
Network of evidence

- Network meta-analysis can indirectly compare treatment options.
- This allows, for example, a comparison of antibiotics vs antiseptics, despite the lack of a direct RCT comparison.
- Node size represents number of trials on each treatment.
- Edge thickness represents trials on that comparison
- We used a random effects network meta-analysis due to substantial heterogeneity between trials.
- This choice was supported on the basis of DIC and deviance and heterogeneity assessments (sd^2 and I^2).



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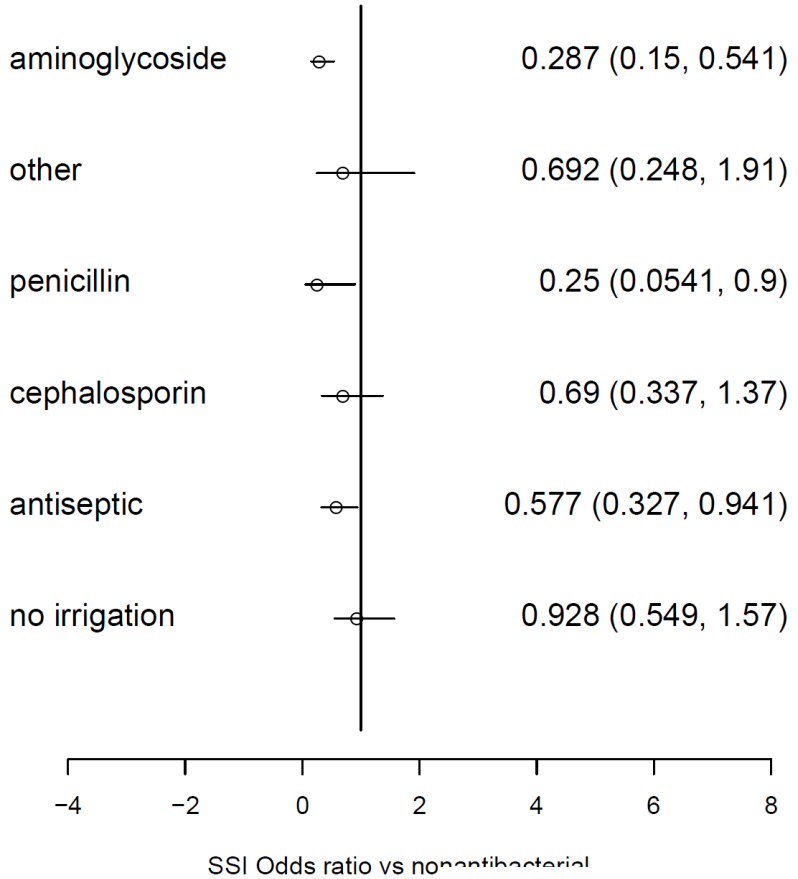
Results of network meta-analysis

- Indicate aminoglycoside, penicillin, and antiseptics have a lower risk of SSI than nonantibacterial irrigation.
- Aminoglycoside has lowest SSI risk with limited uncertainty….



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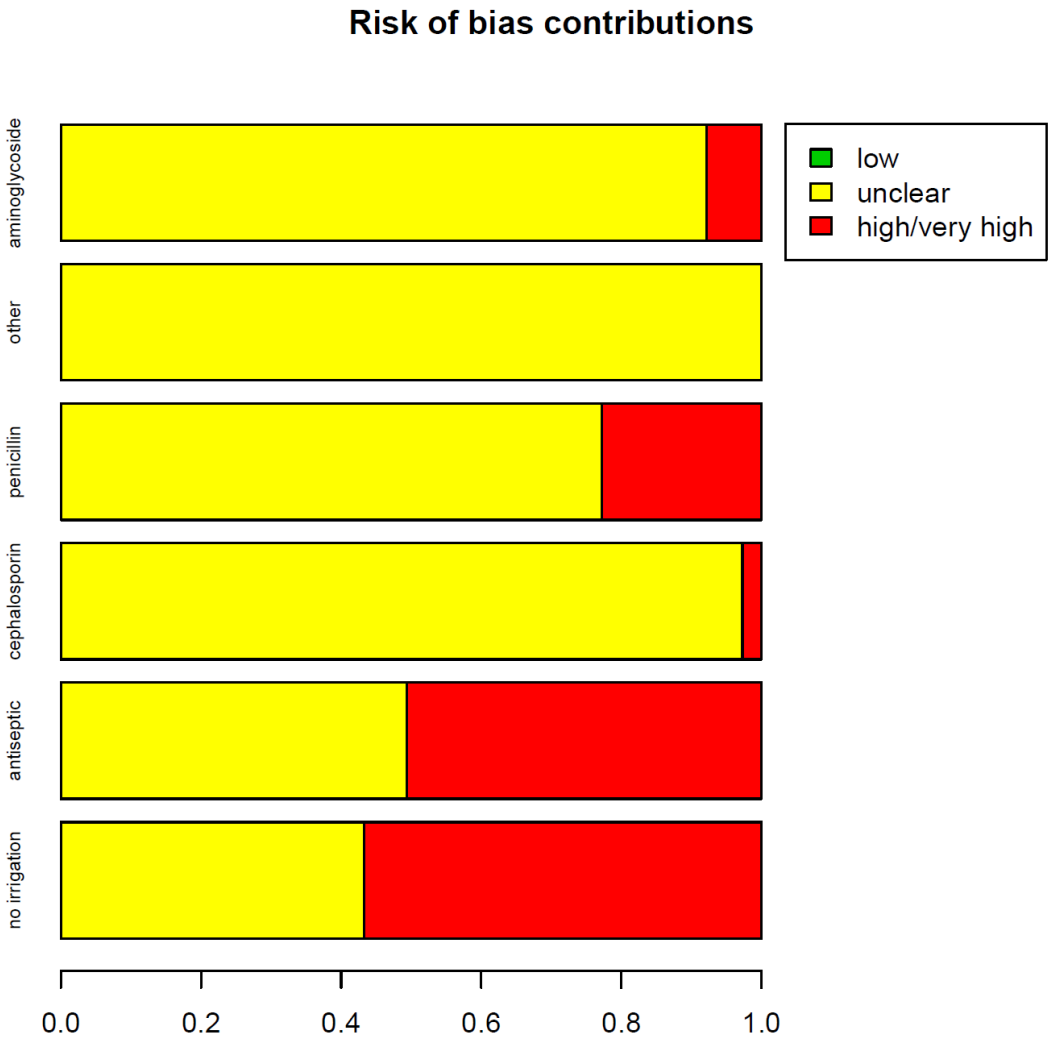
Risk of bias

- We used Cochrane risk of bias tool to assess risk of bias in each RCT.
- Here present all-domain bias
- Quantified contribution of each trial to the comparisons with nonantibacterial irrigation.
- Area represents proportion of evidence at each bias category.
- All important evidence at unclear or high risk of bias.



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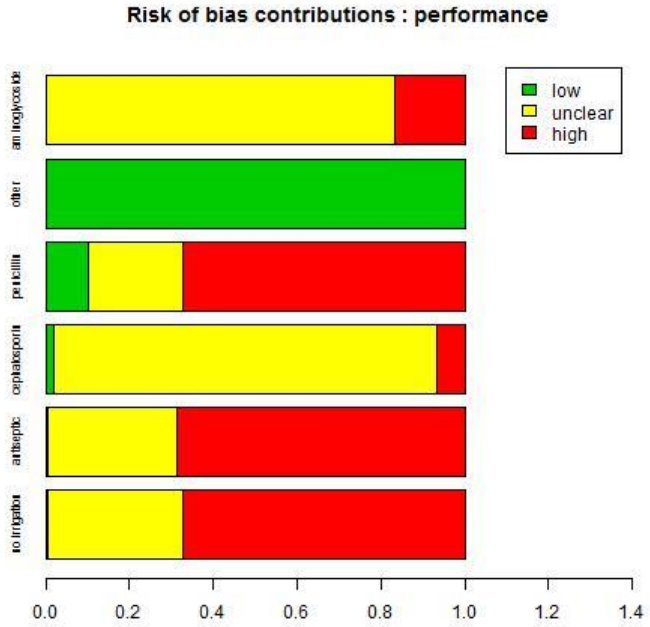
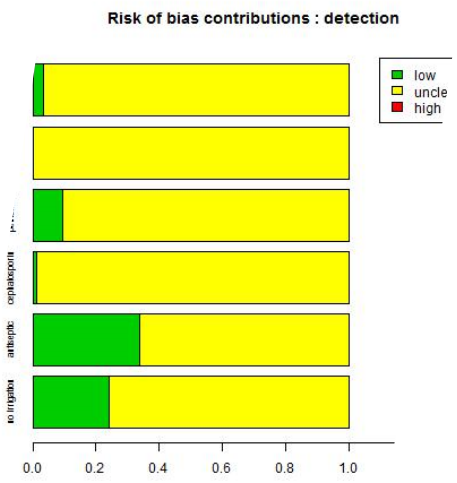
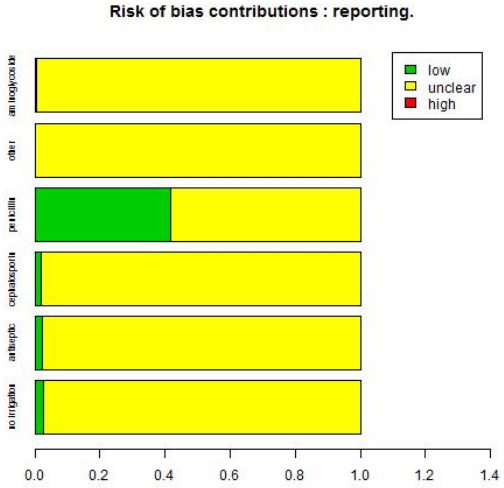
Risk of bias – individual domains







- Evidence at high risk of bias due to performance issues.
- Other domains only at low or unclear risk of bias

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Meta-regression on wound contamination

- Degree of contamination varied across RCTs.
- Used meta-regression to explore impact of wound contamination
- Only 4 RCTs on 'clean' wounds, so merged with 'clean-contaminated'
- Results suggest penicillin and aminoglycoside remain optimal
- However, these options better in clean or clean-contaminated wounds.

	Clean/Clean-contaminated (n=25)	Contaminated/Dirty/Mixed (n=17)
OR no irrigation	0.834 (0.45, 1.51)	1.05 (0.56, 2)
OR antiseptic	0.508 (0.257, 0.913)	0.64 (0.336, 1.15)
OR cephalosporin	0.616 (0.281, 1.3)	0.778 (0.347, 1.7)
OR penicillin	0.21 (0.0416, 0.838)	0.266 (0.0564, 1)
OR other	0.615 (0.203, 1.82)	0.774 (0.262, 2.33)
OR aminoglycoside	0.263 (0.129, 0.521)	0.331 (0.155, 0.705)

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Conclusions

- Penicillin or aminoglycosides likely best solutions for ICL to prevent SSI.
- However, no clarity on which of these is best!

- Majority of evidence at unclear or high risk of bias
- Particularly high risk due to issues with performance

- Adjustments for wound contamination did not impact treatment decision
- Penicillin and aminoglycoside more beneficial for clean or clean-contaminated

- Issues with publication bias remain
- Also found evidence of inconsistency between direct and indirect evidence.

- Recommend high quality randomised controlled comparison of penicillin and aminoglycoside

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