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Meta-analysis of intraoperative povidone-iodine application to prevent surgical-site infection

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Review published: 2010.

Link to full article: [[Journal publisher](#)]

CRD summary

This review found that the intra-operative use of [povidone iodine](#) was associated with reductions in surgical-site infections. Although there was some potential for bias in the conduct of the review and some reporting errors, the authors' conclusions are likely to be reliable.

Authors' objectives

To evaluate the effectiveness of intra-operative [povidone iodine](#) compared with no antiseptic solution in reducing surgical-site infections and to assess the comparative effectiveness of administration by spray or irrigation.

Searching

MEDLINE, Science Direct, LILACS, the Cochrane Database of [Systematic Reviews](#), the Cochrane Central Register of Controlled Trials (CENTRAL), and Health Technology Assessment databases were searched from the inception to November 2009; search terms were reported. Reference lists of relevant were checked to identify additional studies. There were no language restrictions.

Study selection

[Randomised controlled trials](#) (RCT) in which intra-operative [povidone iodine](#) application was compared with no povidone-iodine application during surgery, where post-operative surgical site infections was the primary outcome, were eligible for inclusion. Trials of [interventions](#) for surgical-site infections, trials that reported only bacterial endpoints, and trials of patients with lacerations, burn [wounds](#) or receiving emergency sutures were excluded.

Half of the included trials were published prior to 1990; three trials were published after 2000. Intra-operative application was defined as administration of [povidone iodine](#) just prior to or after [wound](#) closure. [Abdominal surgery](#) was performed in most trials including [gastric](#) or colorectal surgery, [appendectomy](#) or [laparotomy](#). Other surgeries performed were general surgery, non-abdominal surgery, neurosurgery, gynaecological surgery or orthopaedic surgery. There were variations in antibiotic use across the trials.

Two reviewers performed the study selection; any disagreements were resolved by discussion with a third reviewer.

Assessment of study quality

Methodological quality was assessed using [randomisation](#), explicitness of inclusion criteria allocation concealment, blinding and completeness of follow-up. The risk of bias for each trial was graded as low, moderate or high.

The authors did not state how many reviewers performed the quality assessment.

Data extraction

Data were extracted to calculate relative risks (RR) and 95% confidence intervals (CI) for the incidence of surgical-site infections.

The authors did not state how many reviewers performed the quality assessment.

Methods of synthesis

Pooled relative risks and 95% confidence intervals were calculated using a fixed-effect model. If statistical heterogeneity was evident, a random-effects model was used to statistically combine the data. Heterogeneity assessment was based on the results of the Cochran Q-test and I^2 .

Subgroup analyses were performed on: the method of administration (spray compared to irrigation); publication date; administration before or after [wound](#) closure; superficial or deep subsequent wound [infection](#); surgery type; and administration of antibiotic prophylaxis. Sensitivity analysis was undertaken on the basis of methodological quality.

Publication bias was assessed by visual appraisal of funnel plots and by the Begg and Egger tests.

Results of the review

Twenty-four [RCTs](#) (n=5,004 patients, range 34 to 627) were included in the review. Fifteen trials were classified as having a low risk of bias. Nine trials were classified as having a moderate or high level risk of bias. [Randomisation](#) was adequately reported in 14 trials. Blind evaluation was reported in 10 trials. Explicit inclusion criteria were reported in 13 trials. Baseline similarities were stated in 14 trials. The analyses were based on the highest quality trials. Trials with a moderate risk of bias were only included in the sensitivity analysis for the main comparison.

There were statistically significant reductions in surgical-site infections observed with [povidone iodine treatment](#) compared with no treatment (RR 0.58, 95% CI 0.40 to 0.83; 15 [RCTs](#); $I^2=54\%$). The sensitivity analysis including trials with a moderate risk of bias did not substantially change the main finding (RR 0.64, 95% CI 0.51 to 0.82; $I^2 = 55\%$).

Povidone-[iodine](#) was also associated with significant reductions in surgical-site infections when applied by irrigation (RR 0.35 95% CI 0.16 to 0.75; eight [RCTs](#); $I^2=61\%$), when used in general surgery (RR 0.24 95, 95% CI 0.13 to 0.44; two [RCTs](#); $I^2=26\%$) and neurosurgery (RR 0.07, 95% CI 0.01 to 0.55; two [RCTs](#); $I^2<25\%$), in trials published prior to 1990 (RR 0.59, 95% CI 0.41 to 0.87, 12 [RCTs](#); $I^2=58\%$), when applied after [wound](#) closure (RR 0.67, 95% CI 0.46 to 0.97; eight [RCTs](#); $I^2=61\%$), where surgical-site [infection](#) was defined as purulent discharge or micro-organism (RR 0.43, 95% CI 0.26 to 0.71; six [RCTs](#); $I^2=47\%$), and where the infection was deep (RR 0.13, 95% CI 0.05 to 0.37; four [RCTs](#); $I^2<25\%$).

No significant between-group differences in surgical-site infections were observed for spray, [abdominal surgery](#), before [wound](#) closure, trials in which all patients received antibiotics or for superficial [infection](#).

There was no evidence of publication bias found in the Begg or Egger tests, or by appraisal of the funnel plots.

Authors' conclusions

The results of the meta-analysis indicated that the intra-operative use of [povidone iodine](#) was associated with reductions in surgical-site infections.

CRD commentary

The review addressed a clearly defined question. Criteria for the inclusion of studies were clearly stipulated. Appropriate databases were searched with no language restriction and there were attempts to identify unpublished trials. Steps were taken to minimise errors and bias for the performance of the study selection, but were not reported for the assessment of methodological quality or data extraction.

The methodological quality of included trials was assessed using relevant criteria; the results were reported in full. The heterogeneity present across most of the results raised questions about whether it was appropriate to pool the results in a

meta-analysis, although the authors conducted appropriate sub-group and sensitivity analyses to explore potential sources of heterogeneity.

Although there was some potential for bias in the conduct of the review and some reporting errors, the authors' conclusions are likely to be reliable.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that because of the paucity of recent research and the potential for changes in surgical practice, future well-designed and adequately powered studies were required to confirm the results of this review; they should be stratified according to antibiotic administration and [wound](#) contamination.

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Record Status

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CRD has determined that this article meets the [DARE scientific quality criteria](#) for a systematic review.

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