Review of clinical trials of skin antiseptic agents used to reduce blood culture contamination

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CRD summary
The review concluded there was no clear evidence of the effectiveness of antiseptic agents for preventing false-positive blood culture results, but there was some evidence of the possible benefits of pre-packaged skin antiseptic kits and alcohol-containing antiseptics. However, the poor reporting of review methods and the inclusion of only a small number of diverse, sometimes poor-quality studies mean that the reliability of the authors’ conclusions is limited.

Authors' objectives
To evaluate the effectiveness of skin antiseptic agents on the rate of false-positive blood culture results.

Searching
MEDLINE, EMBASE and the Cochrane Library were searched up to March 2006; the search terms were reported. The reference lists of retrieved articles were screened for additional articles. Experts in the field were also contacted for unpublished data. Only articles written in English were eligible for inclusion.

Study selection

Study designs of evaluations included in the review
Inclusion criteria were not specified in terms of the study design.

Specific interventions included in the review
Studies examining skin antiseptic agents used during the taking of blood cultures were eligible for inclusion. The included interventions were povidone-iodine (PI), tincture of iodine (IT), iso-propyl alcohol (IPA) and chlorhexidine; one study compared different skin antiseptic kits.

Participants included in the review
Inclusion criteria were not specified in terms of the participants, though it was evident that patients undergoing blood cultures were eligible for inclusion. The participants in the included studies were medical and surgical in-patients, intensive care patients and emergency department in-patients. Half of the studies included only adult patients, and neonatal patients were excluded from one other study.

Outcomes assessed in the review
Studies assessing blood culture contamination were eligible for inclusion.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity. However, study limitations and strengths were reported for each study.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative. Each study was described in the text and additional descriptive information was tabulated.

How were differences between studies investigated?
Results of the review
Four studies (19,014 blood cultures) were included: three randomised controlled trials (RCTs) and one prospective clinical trial. The total number of participants was at least 2,121 (number of participants not reported in one study).

One RCT (1,503 patients) where participants had venipuncture site disinfection treatment with either 10% PI or with a kit containing 2% IT in 47% alcohol produced a total of 376 cultures out of 3,851 with positive results. Contamination rates were 3.8% for the PI group and 2.4% for the IT group (p=0.01).

One RCT (403 patients) included participants who underwent skin preparation with 0.5% chlorhexidine gluconate in alcohol and aqueous, or 10% PI. Out of a total of 2,041 cultures, 124 had positive results. Contamination rates were 1.4% for the chlorhexidine gluconate group and 3.3% for the PI group (p=0.004).

No statistically significant differences were found in one randomised crossover study comparing the effectiveness of 10% PI, 70% IPA and 47% IT in ethyl alcohol with PI and 70% ethyl alcohol, and one prospective clinical trial comparing the effectiveness of two kits, either 2% chlorhexidine in 70% IPA or 2% IT in 47% ethyl alcohol and 70% IPA.

There was evidence of clinical heterogeneity among the studies. In addition, it is unlikely that any of the study investigators were blinded to the interventions.

Authors’ conclusions
There was no clear evidence on the effectiveness of antiseptic agents for preventing false-positive blood culture results. However, there was evidence of some possible benefits from the use of pre-packaged skin antiseptic kits and alcohol-containing antiseptics, but optimum strategies remain unknown.

CRD commentary
The review addressed a broad research question encompassing different interventions. Inclusion criteria were not defined with respect to the participants or study design, but were defined in terms of outcomes. Only three databases were searched for studies published in English and this might have resulted in relevant studies being missed. The authors did, however, attempt to limit the possibility of publication bias by contacting experts in the field. The review methods were poorly described and it is unclear whether efforts were made to reduce reviewer error and bias. The validity of the studies was not assessed systematically, although the strengths and weaknesses of each study were discussed. Given the small number of studies, and the differences in research designs, use of antiseptic kits, skin preparation techniques and study populations, a narrative synthesis was appropriate. The authors also reported that confounding due to multiple interventions was possible. Overall, the poor reporting of review methods and the inclusion of only a small number of heterogeneous, sometimes poor-quality studies mean that the reliability of the authors’ conclusions is limited.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that further large-scale RCTs are urgently required to identify the most effective skin antiseptic agent.

Funding
Department of Veterans Affairs, Advanced Career Development Award.

Bibliographic details
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.