Systematic review and meta-analysis of the effect of the World Health Organization surgical safety checklist on postoperative complications


CRD summary
This review concluded that the evidence strongly suggested that implementing the World Health Organization (WHO)'s surgical safety checklist reduced postoperative complications and mortality, but it could not be regarded as definitive. The authors' cautious conclusions reflect the limitations of the evidence, which was not randomised and varied clinically and statistically; the conclusions seem to be appropriate.

Authors' objectives
To evaluate the effectiveness of the World Health Organization (WHO)'s surgical safety checklist in reducing postoperative complications.

Searching
MEDLINE, EMBASE, CINAHL and The Cochrane Library were searched, up to February 2013, for studies published in English; unpublished studies were not sought. Search terms were reported, and reference lists of relevant studies were checked.

Study selection
Randomised controlled trials (RCTs), non-randomised controlled trials, controlled before-and-after studies, interrupted time series (ITS), and repeated-measures studies were eligible. Studies had to report a quantitative evaluation of the impact of the WHO surgical safety checklist on postoperative complications, including mortality. Those that addressed only a particular issue or complication, such as the effectiveness of surgical-site marking, were excluded. The main outcomes of interest were postoperative complications, surgical site infections, and deaths.

Where reported, the included studies were conducted in the UK, Iran, the Netherlands, the USA or Moldova. The patients were over 16 years old and underwent various types of surgery.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
An assessment of the risk of bias and a critical appraisal were conducted according to the guidelines of the Cochrane Collaboration's Effective Practice and Organisation of Care Group.

Two reviewers independently assessed the quality of the trials; disagreements were resolved by discussion with a third reviewer.

Data extraction
The data were extracted to calculate risk ratios and their 95% confidence intervals. Two reviewers independently extracted these data; disagreements were resolved by discussion with a third reviewer.

Methods of synthesis
Risk ratios and 95% confidence intervals were pooled using the random-effects, DerSimonian and Laird model. Heterogeneity was assessed using Cochran's Q and $I^2$. For Cochran's Q a probability of less than 0.100, and for $I^2$ a percentage of more than 50, were considered evidence of significant heterogeneity.

Yule's Q contingency coefficient was used as to measure the association between effectiveness and adherence (range -1 to +1, with 0 indicating no association). Adequate adherence was defined as, adherence to the provided checklist measures, for at least 90% of patients.

Results of the review
Seven studies were included in the review. All were prone to confounding and bias due to their design (no randomisation); variability in compliance between checklists items; and various or unclear implementation strategies, which led to different levels of compliance and possible Hawthorne effects (observer effects; behaviour improves when it is observed).

Meta-analysis showed that the use of the WHO surgical safety checklist significantly reduced postoperative complications (RR 0.59, 95% CI 0.47 to 0.74; I²=75%; five studies), mortality (RR 0.77, 95% CI 0.60 to 0.98; I²=24%; four studies), and surgical site infections (RR 0.57, 95% CI 0.41 to 0.79; I²=74%; five studies).

Other complications, such as blood loss, unplanned return to the operating theatre, and pneumonia, were reported. There was a strong correlation between a significant decrease in postoperative complications and adherence to the aspects of care embedded in the checklist (Q 0.82; p=0.042).

**Authors' conclusions**
The evidence strongly suggested a reduction in postoperative complications and mortality following the implementation of the WHO surgical safety checklist, but it could not be regarded as definitive.

**CRD commentary**
The review question and inclusion criteria were clear. Several relevant sources were searched, but not for unpublished studies and only for studies in English; language and publication bias cannot be ruled out. Appropriate methods were used to reduce the risks of reviewer error and bias for quality assessment and data extraction, but it was unclear if similar methods were used for the selection of studies.

Study quality was assessed, but the full details were not reported. None of the included studies was randomised, and the authors reported that due to a lack of description of methods, questions on bias and confounding could not be answered. Appropriate methods were used to pool the data and assess heterogeneity. The analyses of two of the three main outcomes showed evidence of heterogeneity.

The authors' cautious conclusions reflect the limitations of the evidence, which was not randomised and prone to bias, and varied clinically and statistically; the conclusions seem to be appropriate.

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

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