The preventable proportion of nosocomial infections: an overview of published reports
Harbarth S, Sax H, Gastmeier P

CRD summary
The aim of this review was to provide a crude estimate of the proportion of potentially preventable nosocomial infections. The authors concluded that at least 20% of all nosocomial infections are probably preventable. The limited search and the lack of any reported validity assessment of included studies considerably weakens the evidence presented in this review.

Authors' objectives
To provide a crude estimate of the proportion of potentially preventable nosocomial infections, using data from multi-modal intervention studies and transmission studies conducted during the past 10 years.

Searching
MEDLINE was searched from January 1990 to October 2002: the index terms were stated. In addition, the reference lists in relevant studies and reviews were checked. Studies were included if they were published in English, French or German.

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

Specific interventions included in the review
Studies of multi-modal prevention interventions conducted under real-life working conditions and transmission studies were eligible for inclusion. Studies of infection control in long-stay care facilities, studies of one or two specific interventions measures, and randomised studies of treatment or devices used in infection control, were excluded. The included intervention studies were conducted in different parts of the world. The interventions varied widely and included surveillance with feedback, algorithms, guidelines, programmes of education, posters and leaflets, quality circles and other multidisciplinary interventions. Transmission studies were also eligible for inclusion, but they have not been included in this abstract as they did not evaluate an intervention.

Participants included in the review
The review examined nosocomial infections, thus implying that hospital patients were eligible for inclusion. The included intervention studies were conducted among patients in different settings: hospital-wide and a variety of specific departments within hospitals, including obstetrics, neonatal intensive care units (ICU), general surgical, and ICU and cardiac surgical.

Outcomes assessed in the review
Studies that presented crude quantitative data and did not focus on a single type of microorganism were eligible for inclusion. Studies that reported outbreaks were excluded, as were studies describing hand hygiene that did not report infection rates. The included intervention studies assessed all types of nosocomial infections, catheter-related bacteraemia, ventilator-associated pneumonia, surgical site infections and urinary tract infections. The studies used different definitions for the outcomes and different methods of data collection.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies for inclusion.

Assessment of study quality
The authors stated that validity was assessed, but it was not stated which criteria were used. Two reviewers
independently assessed the validity of the studies.

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

The data extracted from intervention studies included patient group, sample size, study design, observation period, infection rates and results. The difference in nosocomial infection rates before and after the intervention, or for the intervention compared with the control group, were extracted for each intervention study. Risk ratios and risk differences were extracted where possible.

**Methods of synthesis**

*How were the studies combined?*

The studies were combined in a narrative with accompanying tables. The range of percentage reduction in all types of nosocomial infections, and the reduction in specific types of infection, was reported for the intervention studies.

*How were differences between studies investigated?*

Apart from grouping the studies of all types of nosocomial infection and specific types of infection separately, differences between the studies were not discussed.

**Results of the review**

Twenty-five intervention studies were included. There was one prospective controlled study and two before-and-after studies; the remaining studies were observational studies, 17 of which were described as prospective. The number of patients or samples was not reported.

All types of nosocomial infection (10 studies): the reductions in the risk of nosocomial infection ranged from 11 to 55% across studies using multi-modal interventions.

Specific types of nosocomial infection (15 studies): the reductions in the risk of specific nosocomial infection ranged from 14 to 71% across studies using multi-modal interventions.

The highest reduction (71%) was found in one study attempting to reduce blood-stream infection rates in neonatal intensive care.

Pooled data from 4 studies showed that interventions reduced catheter-related infection in critically ill adults by 56% (from 8.7 to 3.8 episodes per 1,000 catheter-days).

Other studies showed that the interventions were associated with smaller but substantial reductions in ventilator-associated pneumonia (2 studies found reductions of 38% and 70%) and surgical site infection (1 study found a 34% reduction).

**Authors' conclusions**
The authors concluded that at least 20% of all nosocomial infections are probably preventable.

**CRD commentary**
The review question was clear in terms of the intervention, participants and outcomes. The inclusion criteria were not defined in terms of study design. Only one database was searched and this may have resulted in the omission of other relevant studies. No attempt was made to locate unpublished studies, thus raising the possibility of publication bias. The authors stated that two reviewers assessed validity, but there were no details of the quality criteria used and the results of this assessment were not reported. The methods used to extract the data were not described, so it is not known whether any efforts were made to reduce errors and bias.
A narrative synthesis was appropriate given the heterogeneity among studies. While some of the limitations of the studies were discussed in general terms, attention was not drawn to evidence from higher quality studies. The limited search and the lack of any reported validity assessment considerably weakens the evidence presented in this review.

**Implications of the review for practice and research**

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

**Research:** The authors stated that they hoped the review would encourage further research into feasible and cost-effective interventions aimed at preventing nosocomial infections.

**Bibliographic details**


**PubMedID**

12919755

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Bacteremia /epidemiology /etiology /prevention & control; Catheters, Indwelling /adverse effects; Cost-Benefit Analysis; Cross Infection /epidemiology /etiology /prevention & control /transmission; Disease Transmission, Infectious /prevention & control; Feasibility Studies; Humans; Infection Control /organization & administration; Program Evaluation; Research Design; Risk Factors

**AccessionNumber**

12003001935

**Date bibliographic record published**

31/12/2004

**Date abstract record published**

31/12/2004

**Record Status**

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.