Prevention of healthcare-associated infections. Closing the quality gap: revisiting the state of the science

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CRD summary
This review concluded that there was moderate strength of evidence across four healthcare-associated infections that both adherence and infection rates improved when audit and feedback (with or without provider reminder systems) were added to organisational change and provider education. These conclusions seem broadly reliable but the strategies were diverse and may not always be applicable.

Authors' objectives
To update a previous report by identifying quality improvement strategies that improve adherence to effective preventive interventions and reduce rates of healthcare-associated infections.

Searching
MEDLINE, CINAHL and EMBASE were searched from January 2006 to January 2012 for publications in English. Studies on interventions in non-hospital settings were found via a technical expert panel and an additional search (to July 2011) on relevant studies in nursing homes. The search strategy was reported. Reference lists of included studies were handsearched and relevant web sites were scanned for further studies. Relevant studies from a previous report (see Other Publications of Related Interest) were included.

Study selection
Experimental studies with a control group or quasi-experimental studies that included at least 100 patients were eligible for inclusion. Studies had to report the effect of a quality improvement strategy on adherence to evidence-based prevention interventions or on rates of healthcare-associated infections (central line-associated bloodstream infections, ventilator-associated pneumonia, surgical site infections and catheter-associated urinary tract infections). Eligible settings included hospitals, outpatient surgical centres, freestanding dialysis centres and long-term care facilities. Eligible studies had to perform statistical analyses to compare baseline and postintervention infection rates or adherence rates.

Included studies were mostly conducted in the United States. The number of quality improvement strategies per study ranged from one to five; 16 different combinations were employed across the studies. Most studies reported infection rates only or both infection and adherence rates. Rates for all four healthcare-associated infections were reported, most commonly for central line-associated bloodstream infections. Control groups mostly received usual care.

Three reviewers independently selected studies for inclusion; any uncertainties were screened in duplicate.

Assessment of study quality
Study quality was assessed according to study design, adequacy of statistical analysis, reporting and analysis of baseline and postintervention adherence rates and infection rates, independence of the intervention implementation from other quality improvement efforts and length of follow-up.

Two reviewers independently performed quality assessments; any discrepancies were resolved by discussion or involvement of a third reviewer.

Data extraction
Data on outcomes (adherence to prevention interventions and/or change in infection rates) were extracted by one reviewer and checked by a second reviewer. Any discrepancies were resolved by discussion between the extractor and the checker and involvement of a third reviewer where necessary.

Methods of synthesis
Data were presented in a narrative synthesis. Only studies that adjusted for confounding and/or secular trends were
Results of the review

Sixty-one articles (containing 71 studies) were included that demonstrated adequate adjustment for trends. Six of the 71 studies were rated as being of higher quality; the others were of medium or lower quality. Detailed breakdowns of the quality assessment results were provided in the report.

Only studies that reported on both infection and adherence rates (30 studies) were included in the key findings across the infections. In all of these studies controls received usual care. Moderate strength of evidence was found for improvement of infection and adherence rates when audit and feedback plus provider reminder systems (eight studies) or audit and feedback alone (11 studies) were used with the base strategies (organisational change and/or provider education) for quality improvement. Low strength of evidence was found for the improvement of rates when provider reminders systems alone were used with the base strategies (nine studies). Insufficient evidence was found for the improvement of rates with the base strategies only (organisational change plus provider education or provider education alone) (two studies).

All studies that reported on adherence rates, infection rates or both (71 studies) were included in the key findings for each infection. Reduced rates of central line-associated bloodstream infections were found with use of base strategies alone and in combination with audit and feedback plus provider reminder systems. For ventilator-associated pneumonia, infection rates and various types of adherence rates were improved with base strategies and audit and feedback (both with and without provider reminder systems). Similarly, adherence to antibiotic timing in surgical site infections was increased with use of the same strategies. Adherence to urinary catheterisation was improved in catheter-associated urinary tract infections using provider reminder systems with or without base strategies. All of this evidence was rated as being of moderate strength.

The full results were provided in the report.

Cost information

There was insufficient evidence of cost-savings for quality improvement strategies.

Authors' conclusions

There was moderate strength of evidence across all four healthcare-associated infections examined that both adherence and infection rates improved when audit and feedback (with or without provider reminder systems) were added to organisational change and provider education.

CRD commentary

The review question and inclusion criteria were clearly defined. An extensive range of data sources were searched. The restriction to publications in English increased the risk of relevant studies being missed. Efforts were made throughout the review process to minimise reviewer error and bias. Quality assessment criteria seemed suitable; results revealed that most studies were either of medium or lower quality. Methodological and clinical differences between the studies were reported and supported use of a narrative synthesis. The authors acknowledged that just one quality improvement strategy may incorporate very different interventions with differing effects on outcomes.

The conclusions seem broadly reliable but they were based on a diverse collection of quality improvement strategies that may not be applicable in all situations.

Implications of the review for practice and research

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

Research: The authors stated that further research was required on use of quality improvement strategies in non-hospital settings, sustainability of results over time (several years) and cost savings and return on investment. The authors made methodological recommendations to support causal inference, generalisability of findings and comparability of process measures across future studies.

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Other publications of related interest

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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.