
Systematic review and meta-analysis: reminder systems to reduce catheter-associated urinary tract infections and urinary catheter use in hospitalized patients

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CRD summary

The review concluded that urinary catheter reminders and stop orders appeared to reduce catheter-associated urinary tract infection rates and should be strongly considered to enhance the safety of hospitalised patients. A lack of randomised trial evidence and the variation seen between studies mean that the authors' conclusions should be interpreted with caution.

Authors' objectives

To evaluate the effect of interventions that remind clinicians of the presence of urinary catheters to prompt timely removal of catheters during hospitalisation.

Searching

MEDLINE, EMBASE, CINAHL, The Cochrane Library, BIOSIS and Web of Science were searched to August 2008; search terms were reported. Article reference lists were searched.

Study selection

Studies of interventions that reminded physicians or nurses to remove unnecessary urinary catheters were eligible. Studies had to include a comparison group and report one of catheter-associated urinary tract infection (CAUTI) rates, urinary catheter use and need for catheter replacement as an outcome. [A: Searches were conducted for studies in any language. International researchers were contacted for data relating to any unpublished studies. Conference abstracts were searched]

All included patients were aged 15 or older and were admitted for acute hospitalisation. Most studies were of intensive care unit patients only or non-intensive care unit medical/surgical patients. Interventions were delivered using a variety of methods. Most studies used reminder interventions; the other studies used stop orders. Half of the studies included cointerventions. Two-thirds of the studies were performed in North America; others were in Europe or Asia. There was variation between studies in the definitions used to define CAUTI.

The authors did not state how many reviewers selected studies.

Assessment of study quality

There appeared to be no formal assessment of study quality, although the authors made brief mention of issues of reporting of incomplete data collection, lack of blinding of outcome assessors and funding.

Data extraction

Data were extracted to calculate risk ratios (RR) or standardised mean differences (SMD) with 95% confidence intervals (CI). Additional data were sought from authors of primary studies where necessary.

Two reviewers independently extracted data. Disagreements were resolved by a third reviewer.

Methods of synthesis

Meta-analyses were performed to calculate pooled risk ratios or standardised mean differences using a random-effects model. Sensitivity analyses included exploration of the effectiveness of the different types of intervention (reminder versus stop order) and the effects of removal of individual studies.

Heterogeneity was assessed using the Cochran Q test and I^2 statistic.

Results of the review

Fourteen studies were included: 12 pre-post intervention studies (three of which also included a control group), one

randomised trial and one non-randomised crossover trial. Reported sample sizes ranged from 50 to 6,297 patients. Follow-up ranged from five days to 30 months. None of the studies were reportedly funded by industry.

The number of CAUTI episodes was significantly reduced following either reminder or stop order interventions (RR 0.48, 95% CI 0.28 to 0.68, $I^2=79%$; seven studies).

Sensitivity analysis revealed heterogeneity only in the reminder intervention analysis ($I^2=84%$). Analyses of studies that used cointerventions and analyses that explored the effects of removal of individual studies yielded similar results.

Risk reduction was greater in studies of non-intensive care unit patients (RR 0.27, 95% CI 0.17 to 0.37; four studies) than in studies of intensive care unit patients (RR 0.67, 95% CI 0.55 to 0.80; three studies).

Stop order interventions significantly reduced the mean number of days of urinary catheter use (SMD -0.30, 95% CI -0.48 to -0.12, $I^2=51%$; three studies), but reminder interventions did not (five studies, $I^2=99.9%$).

Authors' conclusions

Urinary catheter reminders and stop orders appeared to reduce rates of CAUTI and should be strongly considered to enhance the safety of hospitalised patients.

CRD commentary

The review addressed a clear question and was supported by appropriate inclusion criteria. Relevant studies were sought by searching electronic databases and checking references. [A: Efforts were made to minimise risks of language and publication biases.] Suitable methods were employed to reduce risks of reviewer error and bias during data extraction, but the authors did not report on whether such methods were used during study selection. The authors did not report a full evaluation of study quality.

Most studies had a pre-post design, so a temporal effect (rather than a treatment effect) could not be ruled out. The single randomised trial showed no differences between groups in the percentage of patients who developed CAUTI. Heterogeneity was assessed and possible sources explored, but the main results of the review were still based on clinically and statistically heterogeneous studies. With these limitations in mind, the authors' conclusions should be interpreted with caution.

Implications of the review for practice and research

Practice: The authors stated that reminders and stop orders can be important and simple tools to enhance patient safety and comfort.

Research: The authors did not state any implications for research.

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