Optimal timing for intravascular administration set replacement (Review)


This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in The Cochrane Library 2013, Issue 9

http://www.thecochranelibrary.com

WILEY
Optimal timing for intravascular administration set replacement

Amanda J Ullman1, Marie L Cooke2, Donna Gillies3, Nicole M Marsh4, Azlina Daud5, Matthew R McGrail6, Elizabeth O’Riordan7, Claire M Rickard1

1NHMRC Centre of Research Excellence in Nursing, Centre for Health Practice Innovation, Griffith Health Institute, Griffith University, Brisbane, Australia. 2NHMRC Centre of Research Excellence in Nursing, Griffith University, Brisbane, Australia. 3Western Sydney Local Health District - Mental Health, Parramatta, Australia. 4Centre for Clinical Nursing, Royal Brisbane and Women’s Hospital, Brisbane, Australia. 5School of Nursing and Midwifery, Griffith University, Nathan, Australia. 6Gippsland Medical School, Monash University, Churchill, Australia. 7Faculty of Nursing and Midwifery, The University of Sydney and The Children’s Hospital at Westmead, Sydney, Australia

Contact address: Amanda J Ullman, NHMRC Centre of Research Excellence in Nursing, Centre for Health Practice Innovation, Griffith Health Institute, Griffith University, 170 Kessels Road, Brisbane, Queensland, 4111, Australia. a.ullman@griffith.edu.au.

Editorial group: Cochrane Anaesthesia Group.

Publication status and date: New search for studies and content updated (conclusions changed), published in Issue 9, 2013.

Review content assessed as up-to-date: 12 June 2012.


ABSTRACT

Background

The tubing (administration set) attached to both venous and arterial catheters may contribute to bacteraemia and other infections. The rate of infection may be increased or decreased by routine replacement of administration sets. This review was originally published in 2005 and was updated in 2012.

Objectives

The objective of this review was to identify any relationship between the frequency with which administration sets are replaced and rates of microbial colonization, infection and death.

Search methods

We searched The Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2012, Issue 6), MEDLINE (1950 to June 2012), CINAHL (1982 to June 2012), EMBASE (1980 to June 2012), reference lists of identified trials and bibliographies of published reviews. The original search was performed in February 2004. We also contacted researchers in the field. We applied no language restriction.

Selection criteria

We included all randomized or controlled clinical trials on the frequency of venous or arterial catheter administration set replacement in hospitalized participants.
Data collection and analysis

Two review authors assessed all potentially relevant studies. We resolved disagreements between the two review authors by discussion with a third review author. We collected data for seven outcomes: catheter-related infection; infusate-related infection; infusate microbial colonization; catheter microbial colonization; all-cause bloodstream infection; mortality; and cost. We pooled results from studies that compared different frequencies of administration set replacement, for instance, we pooled studies that compared replacement ≥ every 96 hours versus every 72 hours with studies that compared replacement ≥ every 48 hours versus every 24 hours.

Main results

We identified 26 studies for this updated review, 10 of which we excluded; six did not fulfil the inclusion criteria and four did not report usable data. We extracted data from the remaining 18 references (16 studies) with 5001 participants: study designs included neonate and adult populations, arterial and venous administration sets, parenteral nutrition, lipid emulsions and crystalloid infusions. Most studies were at moderate to high risk of bias or did not adequately describe the methods that they used to minimize bias. All included trials were unable to blind personnel because of the nature of the intervention.

No evidence was found for differences in catheter-related or infusate-related bacteraemia or fungaemia with more frequent administration set replacement overall or at any time interval comparison (risk ratio (RR) 1.06, 95% confidence interval (CI) 0.67 to 1.69; RR 0.67, 95% CI 0.27 to 1.70). Infrequent administration set replacement reduced the rate of bloodstream infection (RR 0.73, 95% CI 0.54 to 0.98). No evidence revealed differences in catheter colonization or infusate colonization with more frequent administration set replacement (RR 1.08, 95% CI 0.94 to 1.24; RR 1.15, 95% CI 0.70 to 1.86, respectively). Borderline evidence suggested that infrequent administration set replacement increased the mortality rate only within the neonatal population (RR 1.84, 95% CI 1.00 to 3.36). No evidence revealed interactions between the (lack of) effects of frequency of administration set replacement and the subgroups analysed: parenteral nutrition and/or fat emulsions versus infusates not involving parenteral nutrition or fat emulsions; adult versus neonatal participants; and arterial versus venous catheters.

Authors’ conclusions

Some evidence indicates that administration sets that do not contain lipids, blood or blood products may be left in place for intervals of up to 96 hours without increasing the risk of infection. Other evidence suggests that mortality increased within the neonatal population with infrequent administration set replacement. However, much the evidence obtained was derived from studies of low to moderate quality.

PLAIN LANGUAGE SUMMARY

Optimal timing for intravascular administration set replacement

The tubing (administration set) attached to venous and arterial catheters may contribute to bloodstream infection. The rate of infection may be increased or decreased by scheduled replacement of administration sets.

The objective of this review was to identify any association between the frequency with which administration sets were replaced and rates of microbial colonization, bloodstream infection and death.

We searched databases (CENTRAL, MEDLINE, CINAHL and EMBASE) to June 2012. We identified 16 studies with 5001 participants for inclusion in this updated review. No evidence suggests that bloodstream infection was more or less likely with more frequent changes, although the quality of included trials was low to moderate. Some evidence indicates that mortality was increased in neonates receiving parenteral nutrition when administration set replacement was less frequent.