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Cochrane Database of Systematic Reviews 2007, Issue 4. Art. No.: CD005983.

DOI: [10.1002/14651858.CD005983.pub2](https://doi.org/10.1002/14651858.CD005983.pub2).

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[Intervention Review]

Heparin-bonded catheters for prolonging the patency of central venous catheters in children

Prakeshkumar S Shah¹, Niketa Shah²

¹Department of Paediatrics and Department of Health Policy, Management and Evaluation, Rm 775A, University of Toronto, Toronto, Canada. ²Department of Pediatrics, New Jersey Hospital, Jersey City, New Jersey, USA

Contact address: Prakeshkumar S Shah, Department of Paediatrics and Department of Health Policy, Management and Evaluation, Rm 775A, University of Toronto, 600 University Avenue, Toronto, Ontario, M5G 1X8, Canada. pshah@mtsinai.on.ca.

Editorial group: Cochrane Vascular Group.

Publication status and date: Edited (no change to conclusions), published in Issue 3, 2011.

Citation: Shah PS, Shah N. Heparin-bonded catheters for prolonging the patency of central venous catheters in children. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD005983. DOI: [10.1002/14651858.CD005983.pub2](https://doi.org/10.1002/14651858.CD005983.pub2).

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ABSTRACT

Background

Central venous catheters (CVCs) are a mainstay in the management of critically ill children. However, these catheters are associated with mechanical and infectious complications which reduce their life span. Heparin bonding of catheters has shown promise in animal studies and in adults.

Objectives

The primary objective was to determine the effect of heparin-bonded CVCs on the duration of catheter patency in children. Secondary objectives were to determine the effect of heparin-bonded catheters on catheter-related thrombosis, occlusion, sepsis and side effects.

Search methods

The Cochrane Peripheral Vascular Diseases (PVD) Group searched their trials register (last searched 8 August 2007) and the Cochrane Central Register of Controlled Trials (CENTRAL) (last searched *The Cochrane Library* 2007, Issue 3). We also searched MEDLINE (1966 to March 2007).

Selection criteria

We included randomized and quasi-randomized controlled trials of heparin-bonded catheters versus non heparin-bonded catheters or antibiotic-impregnated catheters that reported on any of the prespecified outcomes, without language restriction.

Data collection and analysis

We assessed the methodological quality of the trials using the information provided in the studies and by contacting authors. We extracted data and estimated the effect size and reported as risk ratio (RR), risk difference (RD) or number needed to treat (NNT), as appropriate.

Main results

We included two eligible studies with a total of 287 patients; both had good methodological quality. There was no difference in the duration of catheter patency between heparin-bonded and non heparin-bonded catheters (median duration seven days versus six days) reported in one study. There was no difference in the risk of catheter-related thrombosis (RR 0.71, 95% CI 0.44 to 1.15; RD -0.05, 95% confidence interval (CI) 0.13 to 0.02; $I^2 = 79%$). Data from one study revealed a statistically significant reduction in the risk of catheter occlusion (RR 0.06, 95% CI 0.00 to 1.07; RD -0.08, 95% CI -0.13 to -0.02; NNT 13, 95% CI 8 to 50), catheter-related infections (RR 0.06, 95% CI 0.01 to 0.41; RD -0.17, 95% CI -0.25 to -0.10; NNT 6, 95% CI 4 to 10) and catheter colonization (RR 0.21, 95% CI 0.06 to 0.71; RD -0.11, 95% CI -0.19 to -0.04; NNT 9, 95% CI 5 to 25) in the heparin-bonded catheter group.

Authors' conclusions

Two eligible studies on the use of heparin-bonded catheters versus placebo in children were identified. The use of heparin-bonded catheters is a promising therapy but warrants further studies.

PLAIN LANGUAGE SUMMARY**Heparin-bonded catheters for prolonging the patency of central venous catheters in children**

Central venous catheters are used for prolonged intravenous therapy in the management of critically ill children, for parenteral nutrition, medication and monitoring. Having these catheters in place can cause blood clots in or around the end of the catheter as well as infection, either local or a blood stream infection. As a result, the catheter becomes blocked, eventually to the point that it is occluded and can no longer be used to give fluids. Anticoagulant drugs such as heparin can be given to prolong the usefulness of the catheter or the catheters coated with heparin (heparin-bonded catheters). Heparin can cause side effects such as bleeding, allergic reactions, induced thrombocytopenia (an abnormal drop in the number of platelets in the blood) and osteoporosis with long-term use.

The review authors identified two good quality controlled trial that randomized 287 children aged one day to 16 years to either a heparin-bonded catheter or a standard catheter. The median duration of time that the catheter could be used to give fluids (its patency) was not clearly different with the two types of catheter, seven days in the heparin-bonded catheter group and six days in the standard catheter group. There was a trend towards the heparin-bonded catheter reducing the risk of catheter-related thrombosis over the time the catheter was in and a trend towards reduction in the risk of catheter occlusion in the first week after catheter placement.

The risk of catheter-related infections and bacterial colonization of the catheter were significantly reduced using the heparin-bonded catheter, with a longer time to develop infection (delayed in the heparin-bonded catheter group). There was no significant difference in risk of thrombocytopenia after catheter placement.