



**TITLE: Flow Rates for the Administration of Intravenous Fluids in Pediatric Patients: Clinical Evidence, Safety, and Guidelines**

**DATE:** 14 February 2012

### **RESEARCH QUESTIONS**

1. What is the clinical evidence regarding the safest infusion rate for intravenous fluids delivered by central or peripheral venous catheters in pediatric patients?
2. What is the clinical evidence regarding the safest infusion rate for intravenous fluids delivered by intravenous lines in pediatric patients?
3. What is the clinical evidence regarding the infusion rate for intravenous fluids at which heparin should be added to maintain the patency of central or peripheral venous catheters for pediatric patients?
4. What is the clinical evidence regarding the infusion rate for intravenous fluids at which heparin should be added to maintain the patency of intravenous lines for pediatric patients?
5. What are the evidence based guidelines regarding flow rates for intravenous fluids in order to maintain patency in pediatric patients?

### **KEY MESSAGE**

No relevant literature was identified regarding the safest infusion rates for intravenous fluids or the infusion rate for intravenous fluids at which heparin should be added to maintain the patency of intravenous lines in pediatric patients.

### **METHODS**

A limited literature search was conducted on key resources including PubMed, EBSCO CINAHL, The Cochrane Library (2012, Issue 1), University of York Centre for Reviews and

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Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2002 and February 1, 2012. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

## **RESULTS**

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

No relevant health technology assessment reports, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, or evidence-based guidelines were identified regarding the safest infusion rate for intravenous fluids or the infusion rate for intravenous fluids at which heparin should be added to central venous catheters, peripheral venous catheters, or intravenous lines in order to maintain patency. Additional references of potential interest are provided in the appendix.

## **OVERALL SUMMARY OF FINDINGS**

No relevant literature regarding the safest infusion rate for intravenous fluids and infusion rate for intravenous fluids at which heparin should be added to maintain the patency of intravenous lines in pediatric patients, therefore, no summary is provided.

## REFERENCES SUMMARIZED

### **Health Technology Assessments**

No literature identified.

### **Systematic Reviews and Meta-analyses**

No literature identified.

### **Randomized Controlled Trials**

No literature identified.

### **Non-Randomized Studies**

No literature identified.

### **Guidelines and Recommendations**

No literature identified.

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**APPENDIX – FURTHER INFORMATION:**

**Randomized Controlled Trials – infusion rate of IV fluids not indicated**

1. Uslu S, Ozdemir H, Comert S, Bolat F, Nuhoglu A. The effect of low-dose heparin on maintaining peripherally inserted percutaneous central venous catheters in neonates. *J Perinatol*. 2010 Dec;30(12):794-9.  
[PubMed: PM20376059](#)
2. Shah PS, Kalyn A, Satodia P, Dunn MS, Parvez B, Daneman A, et al. A randomized, controlled trial of heparin versus placebo infusion to prolong the usability of peripherally placed percutaneous central venous catheters (PCVCs) in neonates: the HIP (Heparin Infusion for PCVC) study. *Pediatrics* [Internet]. 2007 Jan [cited 2012 Feb 1];19(1): e284 - e291. Available from: <http://www.pediatricsdigest.mobi/content/119/1/e284.full>

**Guidelines and Recommendations – not Canadian or specific to pediatric patients**

3. The RCN IV Therapy Forum. Standards for infusion therapy [Internet]. 3<sup>rd</sup> ed. London (UK): Royal College of Nursing; 2010 [cited 2012 Feb 1]. Available from: [http://www.rcn.org.uk/\\_data/assets/pdf\\_file/0005/78593/002179.pdf](http://www.rcn.org.uk/_data/assets/pdf_file/0005/78593/002179.pdf)

**Practice Guidelines**

4. Neonatal guidelines: parenteral fluid management in neonates [Internet]. Winnipeg (MAN): University of Manitoba; 2007 Apr [cited 2012 Feb 1]. Available from: [http://umanitoba.ca/faculties/medicine/units/pediatrics/sections/neonatology/media/460\\_Parenteral\\_Fluid\\_Guidelines\\_2007.pdf](http://umanitoba.ca/faculties/medicine/units/pediatrics/sections/neonatology/media/460_Parenteral_Fluid_Guidelines_2007.pdf)
5. The Royal Children's Hospital (RCH) [Internet]. Victoria (AU): The Royal Children's Hospital; 2012. Intravenous fluids: IV fluids - for children beyond the newborn period; [2002?] [cited 2012 Feb 1]. Available from: [http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=5203](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=5203)
6. The Royal Children's Hospital (RCH) [Internet]. Victoria (AU): The Royal Children's Hospital; 2012. Peripheral intravenous (IV) device management; [2002?] [cited 2012 Feb 1]. Available from: [http://www.rch.org.au/rchcpg/index.cfm?doc\\_id=9507](http://www.rch.org.au/rchcpg/index.cfm?doc_id=9507)  
*See Section 6: IV Management*

**Review Articles**

7. Barrington KJ. Umbilical artery catheters in the newborn: effects of heparin. *Cochrane Database Syst Rev* [Internet]. 1999 [assessed as up to date 2009; cited 2012 Feb 1];(1): CD000507. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000507/pdf>