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**Optimizing Blood Flow Rate in Hemodialysis Catheters:  
Heparin vs 4% Na Citrate**

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**Purpose:** The purpose of this project was to compare heparin and 4% Na citrate as locking solutions for maintaining patency in hemodialysis catheters.

**Background:** Central Venous Catheters (CVCs) continue to be used at a high rate for hemodialysis access. They are frequently complicated by thrombosis, infection, and catheter malfunction, which can compromise dialysis adequacy and catheter survival. Prophylactic heparin is the current standard locking solution but has many undesirable side effects, including bleeding risks and heparin-induced thrombocytopenia. 4% Na citrate is an alternative locking solution without the negative side effect profile of heparin, but its efficacy in maintaining catheter patency has not been established.

**Methods:** A prospective data collection was performed on all adult patients that received hemodialysis through a CVC during a 61-day period in an acute hemodialysis unit. Rates of catheter malfunction – defined as achieved blood flow rate (BFR) less than ordered, need for line reversal, and difficulty with aspiration – were recorded for catheters locked with 4% Na citrate and heparin 1000u/ml.

**Results:** There were 416 CVC observances in 76 pts. Heparin demonstrated a higher overall catheter dysfunction rate than 4% Na citrate when BFR, aspiration, and line reversal were evaluated together; heparin had a 30% catheter dysfunction rate compared to 22% for Na citrate. Heparin also demonstrated a higher catheter dysfunction rate when only suboptimal BFR was evaluated, at 15% for heparin compared to 9% for Na citrate. Additionally, heparin was associated with a higher catheter dysfunction rate (33%) for hemodialysis treatments that had an ordered 350ml/min BFR when compared to Na citrate (19%).

**Conclusions:** 4% Na citrate is associated with higher catheter patency rates when compared to heparin 1000units/ml locking solution. Since it also offers a lower side effect profile compared to concentrated heparin, Na citrate may represent a superior locking solution for hemodialysis catheters.

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