

Risk Factors Associated with Hemodialysis Catheter Malfunction: Results from a Randomized Trial

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BACKGROUND: Catheter-locking solutions (CLS) aim to prevent complications such as malfunction and bacteremia in hemodialysis (HD) patients using central venous catheters (CVC). We found a two-fold reduction in CVC malfunction when once-weekly substituting heparin CLS with recombinant tissue-plasminogen activator (rt-PA), compared with thrice-weekly heparin. Determining those who will benefit from prophylactic rt-PA will inform future use and control costs. Using RCT data we sought to determine risk factors associated with CVC malfunction.

METHODS: HD patients with newly placed CVC were randomized to rt-PA mid-week and heparin (5000u/ml) on the other HD runs (n=110) or thrice-weekly heparin (5000u/ml) CLS (n=115). We defined CVC malfunction; peak blood flow < 200 mL/min for 30 mins; mean blood flow < 250 mL/min for 2 consecutive HD runs; or inability to initiate HD. Cox regression determined association between patient demographics and HD variables (blood flow, pump speed, CVC reversal) in the 6 runs prior to CVC malfunction (those with primary outcome) or in the 6 runs prior to study end or censoring (those without primary outcome), and CVC malfunction risk.

RESULTS: Baseline patient characteristics were similar between groups. Risks for CVC malfunction were line reversal at the prior run (HR 12.51; 95% CI 7.10 – 22.04), or at least once in the prior 6 runs (HR 9.30; 95% CI 4.36 – 19.84). Malfunction risk increased for each run with a line reversal (HR 1.75; 95% CI 1.55 – 1.98). Reduction in liters of blood processed or blood flow rate were associated with increased malfunction risk.

CONCLUSIONS: HD characteristics are associated with CVC malfunction; line reversals demonstrate the highest risk. This study may identify those at increased risk of CVC malfunction who may benefit from once-weekly prophylactic rt-PA. The effectiveness of routine prophylactic rt-PA CLS use in these patients is unknown.