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A comparison of efficacy of heparin 0.5 unit/ml versus heparin 1 unit/mL in parenteral nutrition administered in the neonatal population

Jane Gervasio, Meredith McKinney, Iftekar Kalsekar, Elaina Szeszycki

Introduction: Heparin is utilized in neonatal parenteral nutrition (PN) to maintain line patency. Adverse effects of heparin have been associated with bleeding and thrombocytopenia. Determining the lowest effective dose of heparin necessary to prevent loss of intravenous access is optimal. A retrospective study from our institution reported no differences in efficacy between 0.5 unit/mL and 1 unit/mL of heparin in PN which prompted a prospective investigation. The purpose of this trial was to prospectively compare line patency and safety between neonates receiving PN using heparin dosages at 1 unit/mL and 0.5 unit/mL.

Methods: This study was a prospective, observational chart review. Neonates admitted to either Riley Children's Hospital or Methodist Hospital Neonatal Intensive Care Unit (NICU) receiving PN were eligible for enrollment into the study. NICU patients receiving heparin for therapeutic indications were not included. Neonates were followed to determine if a difference in line patency was observed between patients receiving 0.5 units/mL of heparin compared to those receiving 1 unit/mL of heparin in the PN. Demographic information was collected as well as heparin induced complications including thrombocytopenia, bleeding and line hemorrhaging. Data was analyzed on intent to treat basis. Number of complications between 0.5 unit/mL and 1 unit/mL of heparin were assessed using chi square tests. All statistical analyses were conducted using the Statistical Package for Social Sciences.

Results: Ninety-one patients were enrolled with an equal distribution observed between males (50.5%) and females (49.5%). As expected, the majority of admissions into the NICU included prematurity (72.5%) and respiratory distress (64.9%). Initial concentrations of 0.5 unit/mL of heparin were administered in 71.4% of neonatal PN. Outcomes and complications associated with heparin administration are reported on Table 1. Line removal was associated with diagnosed sepsis in 4.4% of the patients.

Conclusions: There were no significant differences in line patency between neonatal patients receiving 0.5 unit/mL or 1 unit/mL of heparin in their PN. Smaller dosages of heparin at 0.5 unit/mL appear to maintain line patency and may result in less drug induced adverse outcomes compared to the use of higher dosages of heparin. Further investigation is necessary to determine the minimum effective dosage of heparin in PN that will still maintain line patency.

Table 1. Outcomes and complications associated with heparin administration.

| | 0.5 unit/mL N = 65 | 1 unit/mL N = 26 | <i>p</i> < 0.05 |
|-----------------------------------|-----------------------|---------------------|-----------------|
| Thrombocytopenia | 26.4% | 5.5% | 0.137 |
| Line changes due to complications | 5.5% | 4.4% | 0.270 |
| Occlusion | 0% | 1.1% | 0.286 |