Reduction of flushing volume and incompatibilities by a clinical pharmacist in a paediatric intensive care unit

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Introduction

Critically ill children require a variety of intravenous fluids and drugs during their stay in a paediatric intensive care unit (PICU). However, vascular access is limited. Thus, different drugs must be administered through the same infusion line and there may be incompatibilities between. These are known to have a risk for worse outcomes like catheter occlusion, embolism, or decreased effectiveness1,2. If incompatible drugs cannot be administered through different infusion lines, flushing with an inert fluid such as normal saline is required. However, children in PICU have also a high risk for fluid overload which is associated with a higher morbidity3. Consequently, unnecessary fluids should be avoided. The aim of our study was to evaluate the intervention to reduce flushing volume without increasing incompatibilities in a PICU.

Material and methods

Our study was conducted in a 13-bed PICU in Kassel, Germany. Inclusion criteria:
• 0–18 years
• ≥2 IV drugs
• Period of stay >24h

Study design

For statistical analysis, the Mann-Whitney-U-Test was used for quantitative variables and the χ2-Test for categorical variables.

To optimize flushing processes and to avoid incompatibilities, patient-specific compatibility charts were created by a pharmacist during the intervention period. These indicate whether the IV drug was compatible or incompatible with the continuous infusion and the following IV drug.

Results

In the intervention study 170 patients (85 per period) were included. The median of the flushing volume was significantly reduced from 0.68ml/kg/day to 0.35ml/kg/day. Also, the number of daily flushing processes decreased (median (Q25/Q75) 2.60 (1.33/3.40) vs. 1.44 (0.67/2.33); p<0.001).

During the bedside observation, 504 drug combinations were observed from 24 patients in the control period and 523 drug combinations from 23 patients in the intervention period. During the control period, 41 drug combinations were incompatible and literature data were not available for 45. In the intervention period, these numbers decreased to 20 incompatible combinations and 23 combinations with no literature data (p<0.001).

Conclusion

Our results show that having a pharmacist in PICU can reduce the volume of flushing during IV drug administration. This can save nonessential volume and provides an approach to reduce fluid overload in children. Furthermore, pharmaceutical interventions reduced the incidence of incompatibilities by 51%. Knowledge of drug incompatibilities is a core competence of clinical pharmacists and contributes to increase patient safety in children in the PICU.

Literature