

2018-06

Solution density influence on syringe infusion pumps performance: An experimental study

Pedreira, M

<http://hdl.handle.net/10026.1/14954>

10.1097/01.pcc.0000537909.12046.c1

Pediatric Critical Care Medicine

Ovid Technologies (Wolters Kluwer Health)

All content in PEARL is protected by copyright law. Author manuscripts are made available in accordance with publisher policies. Please cite only the published version using the details provided on the item record or document. In the absence of an open licence (e.g. Creative Commons), permissions for further reuse of content should be sought from the publisher or author.

Results

The 17,199 eligible patients admitted to ICU for 2,208,475 hours received 1,954,171 administrations of 515 drugs. There were 894,709 (45%) enteral administrations, 998,490 (51%) intravenous injections and 60,972 (3%) infusions. Infusions were administered for 4,476,538 hours, with up to 11 infusions running simultaneously in one patient. Poly-pharmacy occurred in 12,273 (71%) patients and on 80,943 (75%) of patient days. The ten most commonly administered drugs comprised 834441 (43%) administrations.

Conclusions

Drug administration in the ICU is complex, as evidenced by a wide range of medications used and frequent poly-pharmacy. The potential for drug interaction and reaction is compounded by the volume of diversity of therapies routinely provided in ICU. Further evaluation of poly-therapy could be used to improve outcomes and enhance the safety of pharmacotherapy in critically ill children.

P-451

EFFECT OF THE WARMING OF RED BLOOD CELL ON THE LEVEL OF PLASMA FREE HEMOGLOBIN

M.P. Pires¹, M.A. Peterlini¹, A. Bulmer², A. Ullman³, C. Rickard³, M. Pedreira¹

¹Federal University of São Paulo, Department of Pediatric Nursing - Paulista School of Nursing, Sao Paulo, Brazil

²Griffith University, Alliance for Vascular Access Teaching and Research- School of Medical Science, Gold Coast, Australia

³Griffith University, Alliance for Vascular Access Teaching and Research- School of Nursing and Midwifery, Brisbane, Australia

Aims & Objectives:

The option of warming red blood cells (RBC) occurs in specific situations such as in massive transfusion, where the volume infused is high and can cause hypothermia with possible severe cardiac alterations. The aim of this study was to analyze the effect of the warming of red blood cells on levels of plasma free hemoglobin.

Methods

Experimental research carried out in the Laboratory of Nursing Experiments after approval by Research Ethics Committee. Were uses 18 RBC units, totaling 36 samples submitted to analysis of levels of plasma free hemoglobin (Free Hb; g/dL), 18 before warming (control - pre-warmed) and 18 after warming (warmed). The warming method was performed by infusing the blood bag into a 42°C water bath until RBC units reached 42°C. To the statistical analyze were used mean and standard deviation (M±SD), and the student's t-test

Results

The free hemoglobin levels before warming were 0.11 ± 0.11 (0.03 to 0.54) and after warming were 0.14 ± 0.12 (0.02 to 0.62). The difference was not significant as presented on Table 1.

Table 1: Comparison of free hemoglobin outcomes for the Pre-warmed and Warmed experiments. (n= 36)

| Experiments | M±SD | Min-Max | P-value* |
|-------------|-----------|-----------|----------|
| Pre-Warmed | 0.11±0.11 | 0.03-0.54 | |
| Warmed | 0.14±0.12 | 0.02-0.62 | 0.2726 |

Legend: M±SD: mean and standard deviation; Min-Max: minimum-maximum; *: student's t-test.

Conclusions

In the present study, the warming of red blood cells in water bath did not result in significant increase of plasma free hemoglobin. Acknowledgement: National Council for Research Development - CNPq - Grants n. 474906/2013-2 and 2308281/2015-2.

P-452

SOLUTION DENSITY INFLUENCE ON SYRINGE INFUSION PUMPS PERFORMANCE: AN EXPERIMENTAL STUDY

M. Pedreira¹, M. Felipe¹, J. Latour², M.A. Peterlini¹, K. Orsi¹

¹Federal University of São Paulo, Department of Pediatric Nursing - Paulista School of Nursing, Sao Paulo, Brazil

²Plymouth University, School of Nursing and Midwifery, Plymouth, United Kingdom

Aims & Objectives:

The aim of this study was to describe density and osmolality of sodium chloride 0.9% in water (D1) and parenteral nutrition solution (D2) and to determine if solution type can influence performance of syringe infusion pumps (SIPs).

Methods

Three SIPs were randomly studied in 0.5ml/h and 10.0ml/h. SIPs were placed at the same level of the distal exit infusion line, 30cm above and 30cm below. Differences on density (g/cm³) and osmolality (mOsmol/Kg) of solutions were measured. Data were analyzed according to mean and standard deviation, and Student t test (p≤0.05).

Results

The D1 and D2 solutions demonstrated densities of 0.98–1.00g/cm³-D1 and 1.09–1.12g/cm³-D2; osmolality variations were 0.224–0.296mOsmol/Kg-D1 and 1.613–1.829mOsmol/Kg-D2. The D2 solution lead to a longer star delay at 0.5ml/h and SIP positioned 30cm below (p<0.001). At 10.0ml/h the star delay was significantly lower (p=0.039) with D2 and SIP at the same level of the distal exit infusion line. After two hours, density did not affect performance at 0.5ml/h comparing D1 and D2; at 10.0ml/h there were differences: same level: D1-19.505ml and D2-20.796ml(p=0.004); 30cm above: D1-19.341ml and D2-20.676ml(p<0.001); 30cm below D1-19.325ml and D2-20.503ml(p=0.018).

Conclusions

The height of the syringe infusion pump and the density of the infused solution can influence the infusion start delay. The results of this study provides valuable information for clinical practice. Nurses should consider the correct position of infusion pumps, particular in critically ill children with vasopressor related medications. Acknowledgment: Grants to research for FAPESP number 2016/15815–8 and CNPQ number 308281/2015-2.

P-453

EFFECTS OF ENDOTRACHEAL SUCTIONING IN NEWBORN PRETERM INFANTS WEIGHING BETWEEN 500 AND 1500g

A.C. Pirone¹

¹Hospital das Clinicas da Faculdade de Medicina de Ribeirao Preto, Puericultura e Pediatria, Franca, Brazil

Aims & Objectives:

Objective: To observe different ways of implementing the techniques of aspiration of preterm infants and verify factors associated with changes in oxygen saturation, contamination of equipment and heart rate.

Methods

Methods: An observational, prospective, descriptive study. The aspirations of the endotracheal tube in infants with birth weights between 500 and 1500 grams were observed during two procedures; morning and evening. The associations between the number of professionals performing the technique, shift work and the variables of interest were made by linear mixed effect models.

Results

Results: We evaluated 32 infants with a mean weight of 942g and a mean gestational age of 28 weeks, 64 aspiration procedures were followed. During aspiration 61 % of children had hypoxemia. The saturation drops were more related to the aspiration held by a single professional, also when they were made more than three disconnections of the fan and when disconnections occurred beyond fifteen seconds. During the night more contamination events and longer ventilation disconnection occurred. There was no association between changes in heart rate with the variables analyzed. The use of saline during suctioning in less than 1ml volume was associated with significant decreases saturation.

Conclusions

Conclusions: The aspiration of the endotracheal tube can lead to hypoxemia. To minimize episodes is important that it be performed by two professionals that meet the care disconnecting the system less than 3 times and use less than 15 seconds.