Abstract:

Objective: The current study aimed to evaluate the extent of the slide-stick phenomenon in differently designed infusion syringes at various infusion rates and filling positions.

Methods: Fluid delivery from three 50 mL infusion syringe brands (BD; Codan; Fresenius) was investigated using a flow sensor at flow rates of 0.5, 1.0 or 5.0 mLh⁻¹, with the syringes filled with either 10, 30 or 50 mL of distilled water. Two identical models (A/B) of the same infusion pump model were used. The effect of flow rate variations on the plasma concentration of a continuous epinephrine infusion in a 3 kg neonate receiving a continuous infusion of 0.1 μgkgmin⁻¹ epinephrine was studied using a pharmacokinetic simulation model.

Results: Considerable variations in calculated plasma epinephrine concentration were detected between flow rates of 5 and 0.5 or 1 mLh⁻¹ for all syringe types and filling volumes. The median deviation of plasma concentration for the 5 mLh⁻¹ flow rate varied depending on assembly from 1.3% (Codan) to 1.8% (Fresenius). This was more pronounced for lower flow rates, where at 1 mLh⁻¹ the deviation varied from 3.3% (BD) to 4.8% (Fresenius) and at 0.5 mLh⁻¹ from 4.9% (BD) to 5.4% (Fresenius). Differences between filling volumes (within syringe type and flow rate) did not appear to have relevant influence on variations in calculated plasma epinephrine concentration.

Conclusion: Infusion set rate rather than syringe brand or filling volume was a major predictor for syringe stiction-related amount of variation in the calculated plasma epinephrine concentration.

Reference: