Comparison of Flow Rate Accuracy and Consistency between the On-Q, Baxter, and Ambu Pain Infusion Devices

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Background: Providing analgesia via continuous peripheral nerve catheters attached to an elastomeric infusion pump is proving to be an effective and feasible option in pediatric patients. This allows children to undergo ambulatory procedures and have subsequent shortened hospital stays. Consequently, portable infusion pumps are being used with increased frequency in pediatric patients. Because these pumps are infusing potentially toxic doses of medications, the accuracy and consistency of these devices becomes very important in this patient population. This prospective study is a comparison of the actual delivery volume of local anesthetic of three elastomeric devices approved for patient use in the ambulatory setting.

Methods: Three brands of disposable elastomeric infusion devices were used (Five On-Q, Five Baxter, and Five Ambu pumps). Each were filled with 200 ml of Ropivicaine 0.1% and connected to a single, end-hole infusion catheter and set to infuse at 12 ml/hr. The devices were run simultaneously and the fluid delivered was measured every hour with a graduated column over a ten hour period. The ambient temperature was also recorded.

Results: There were statistically significant differences in the output from all three elastomeric devices over the 10 hour infusion period when compared to the nominal rate of 12 ml/hr. The output from the Ambu and Baxter pumps was less than that set on the regulator, while the output from the On-Q pump was greater than that set on the regulator. The Ambu infusion device was the most consistent, while the Baxter infusion device was the most accurate.

Conclusions: This investigation demonstrates that three modern elastomeric infusion pumps have significantly different output than the nominal rate set on the regulator. This emphasizes the importance of health care providers understanding the infusion profile of the pump being used for continuous peripheral nerve block (CPNB), as these alterations in flow could result in inadequate analgesia, early reservoir exhaustion, excessive muscle weakness or potential toxicity, especially if used in pediatric patients.

References: