



To determine the effects of an in-line filter to remove air and/or contaminants on syringe pump performance at low flow rates, we compared the measured rates with the programmed flow rates with and without in-line IV filters” Chau et al (2016).

Abstract:

BACKGROUND: Complex surgical and critically ill pediatric patients rely on syringe infusion pumps for precise delivery of IV medications. Low flow rates and in-line IV filter use may affect drug delivery. To determine the effects of an in-line filter to remove air and/or contaminants on syringe pump performance at low flow rates, we compared the measured rates with the programmed flow rates with and without in-line IV filters.

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METHODS: Standardized IV infusion assemblies with and without IV filters (filter and control groups) attached to a 10-mL syringe were primed and then loaded onto a syringe pump and connected to a 16-gauge, 16-cm single-lumen catheter. The catheter was suspended in a normal saline fluid column to simulate the back pressure from central venous circulation. The delivered infusate was measured by gravimetric methods at predetermined time intervals, and flow rate was calculated. Experimental trials for initial programmed rates of 1.0, 0.8, 0.6,

and 0.4 mL/h were performed in control and filter groups. For each trial, the flow rate was changed to double the initial flow rate and was then returned to the initial flow rate to analyze pump performance for titration of rates often required during medication administration. These conditions (initial rate, doubling of initial rate, and return to initial rate) were analyzed separately for steady-state flow rate and time to steady state, whereas their average was used for percent deviation analysis. Differences between control and filter groups were assessed using Student t tests with adjustment for multiplicity (using  $n = 3$  replications per group).

**RESULTS:** Mean time from 0 to initial flow (startup delay) was

**CONCLUSIONS:** With low flow rates used in complex surgical and pediatric critically ill patients, the addition of IV filters did not confer statistically significant changes in startup delay, flow variability, or time to reach steady-state flow of medications administered by syringe infusion pumps. The overall flow rate was lower than programmed flow rate with or without a filter.

Reference:

Chau, D.F., Vasilopoulos, T., Schoepf, M., Zhang, C. and Fahy, B.G. (2016) Syringe Pump Performance Maintained with IV Filter Use During Low Flow Rate Delivery for Pediatric Patients. *Anesthesia and Analgesia*. April 12th. .

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