

A Comparative Study of Constant Flow Electronic and Constant Pressure Mechanical Infusion Pumps

T. Kinner, A.Sealfon, P.Baker, MD, R.Gani, M.Bullock, BS, BSN,MS, CRNI, IgCN

OBJECTIVE

A standardized procedure, AAMI TIR101:2021 *Fluid delivery performance testing for infusion pumps*, was applied to compare the differences in subcutaneous immunoglobulin (SCIg) infusions between two infusion pump technologies – Electronic (constant flowrate) and Mechanical (constant pressure). The comparison was to evaluate infusion outcomes between the two technologies in homecare without clinical, pharmaceutical, and biomedical professional support.

DESIGN

TIR101:2021 highlights infusion flowrate reduction caused by inline resistance as a performance metric; which concerns flowrate degradation as a result of infusion backpressure; causing the patient to under-infuse.

References:

Association for the Advancement of Medical Instrumentation. (2021). *Fluid delivery performance testing for infusion pumps* (AAMI TIR101:2021). Retrieved from <https://www.aami.org/>.

MKT03-1023v1

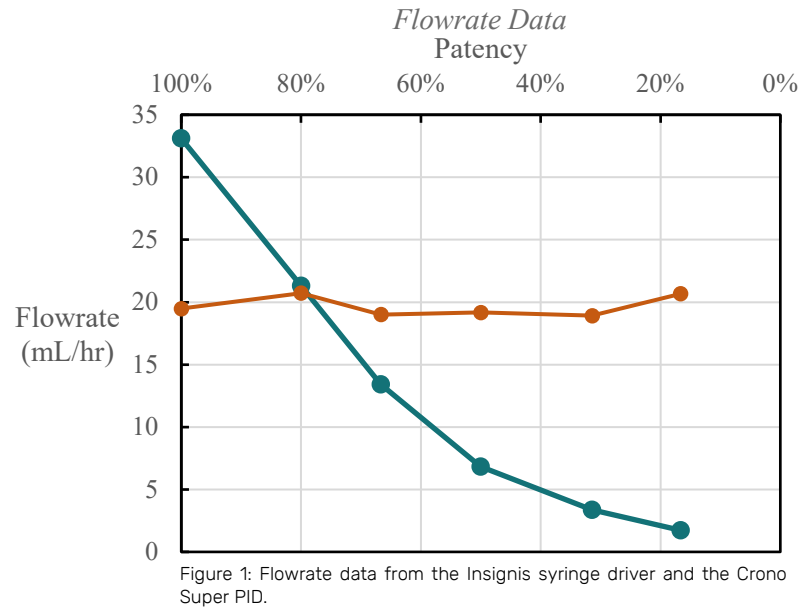


Figure 1: Flowrate data from the Insignis syringe driver and the Crono Super PID.

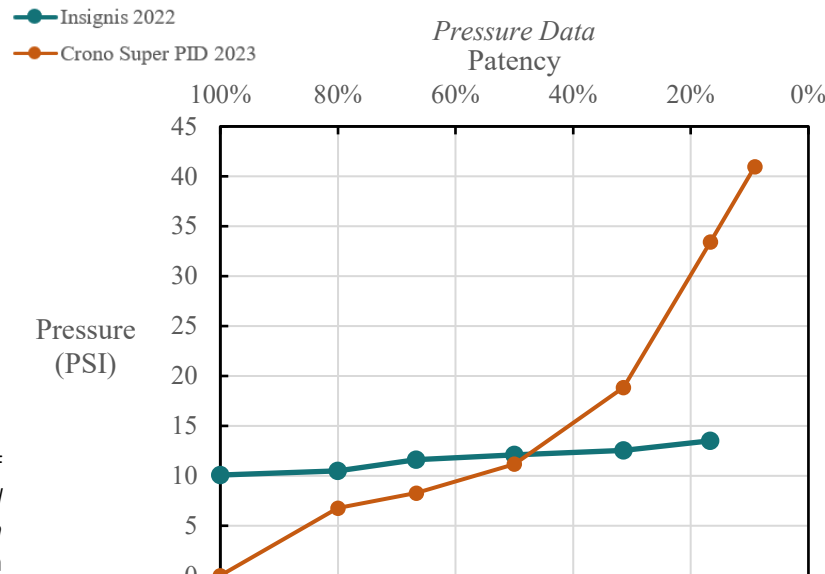


Figure 2: Pressure data from the Insignis syringe driver and the Crono Super PID.

METHOD

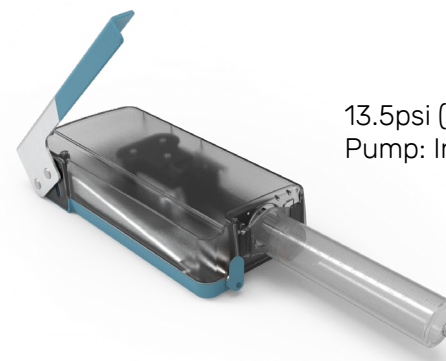
To simulate increasing backpressure, flowrate-restrictive tubing was used to create occlusions within the fluidic path for both infusion pumps. 18 – 90% occlusions were modeled; these values were based on the maximum occlusion-pressure alarm from high performance electric pumps. Pressure and flowrate were measured; flowrate was measured gravimetrically using mass accumulation over time and density.

RESULTS

The electric pumps maintained a constant flowrate as backpressure increased. The mechanical pump's flowrate decreased as backpressure increased. The mechanical pump (constant pressure) maintained a constant pressure while the electric pump increased in pressure as backpressure increased.

CONCLUSION

For home infusions, where increasing pressure can cause harmful adverse reactions, low-constant pressure mechanical pumps that decrease the infusion flowrate as backpressure increases are safer for protecting users against harm when compared to electronic pumps that deliver the programmed constant flowrate but at high delivery pressures.



13.5psi (0.9 bar) Mechanical Infusion Pump: Insignis™ Syringe Driver



INNOVATIVE HEALTH SCIENCES LLC www.innohealthsci.com

1108 Kings Hwy, Suite 4
Chester, NY 10918
+1-855-680-0630

© 2023 Innovative Health Sciences LLC. All Rights Reserved.