Digitally-Monitored Gravity Administration of Infliximab: A Safe and Cost-Effective Alternative to Ambulatory Infusion Pumps

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Background

- New England Life Care (NELC) has been providing Infliximab infusions in the home using pumps since 2003.
- Exponential growth in demand for these infusions has presented new challenges in the cost, maintenance, and management of a distributed pump fleet.
- To address growing cost and complexity of pumps for home infusion, NELC piloted the DripAssist Infusion Rate Monitor (Shift Labs, Inc., Seattle, WA), as a potential alternative.
- A six-week pilot using DripAssist found similar accuracy and safety compared to pumps, and further evaluation was sought to assess long-term outcomes.

Purpose

This study compares the long-term safety, accuracy, and cost efficiency of the DripAssist Infusion Rate Monitor to ambulatory infusion pumps for infliximab administration in patient homes.

Methods

- All primary nursing patients who received infliximab from Q3 2017 to Q2 2019 were monitored for infusion reactions.
- All patients in the study received at least one infusion by pump in in the first year, and DripAssist in the second year.
- Patients were assessed for any symptoms of infusion reactions and categorized according to severities shown in Table 1.
- The same criteria for infusion reactions were used for both pump and DripAssist infusions.
- Reaction rates for each category were compared using a two-tailed z-score for two population proportions (using a significance threshold of $p<0.01$).

Figure 1. (above) DripAssist Infusion Rate Monitor (image provided by Shift Labs, Inc)

Table 1. (below) Categorized reaction severity (adapted from Cheifetz 2003*)

Reaction Severity	Symptoms
Mild Reaction	Flushing
	Dizziness
	Nausea
	Headache
	Diaphoresis
	Palpitations
Moderate Reaction	Chest tightness
	Dyspnea/SOB
	Hypo/ hypertension (> 20 points SBP)
	Fever (≥38°C)
	Palpitations
	Urticaria
Severe Reaction	Hypo/hypertension (> 40 points SPB)
	Fever (>38°C) with rigors
	Chest tightness
	Shortness of breath with wheezing
	Stridor

* Cheifetz, A., Smedley, et al. (2003). The incidence and management of infusion reactions to infliximab: A large center experience. *American Journal of Gastroenterology, 98*(6), 1315-1325.

Results

Infusion Reactions / Safety - During the two-year period, 239 patients received Infliximab infusions from both medication delivery systems for a total of 2796 infusion experiences. Reactions from each are shown below:

Table 2. Infusion and reaction totals for each pump and DripAssist modes

	Pump infusions	DripAssist Infusions
Total Infusions	**1241**	**1555**
Mild Reactions	12	2
Moderate Reactions	2	2
Severe Reactions	0	0
Total Reactions	**14 (1.1% reaction rate)**	**4 (0.25% reaction rate)**

This data demonstrated a statistically significant decrease in the overall number of reactions with a z-value of 2.67, and p value of 0.0076.

Costs - For this study, an investment of $12,000.00 equipped each nurse with a DripAssist, which do not require calibration or maintenance. The estimated cost for using pumps for infliximab infusions is $2300.00 per month.

Discussion

DripAssist a Safe Pump Alternative – Fewer reactions were observed in the DripAssist group than in the pump group, although the underlying cause for this change is currently unknown. In the patient population assessed, digitally monitored gravity infusion was found to be a safe alternative to ambulatory pumps.

Cost Reduction vs Pumps - By eliminating the estimated costs of pump dispensing and the proprietary administration sets, we estimate a monthly savings of $2300.00 from the use of DripAssist instead of pumps for Infliximab in the home.

Conclusions

Digitally monitored gravity infusion is a safe and cost-effective alternative to an ambulatory infusion pump for the administration of infliximab in this home infusion population. This innovative technology has reduced the cost-burden of care delivery and is consistent with the not-for-profit mission at NELC.

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