Meeting the Demand for Ambulatory Infusion

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Purpose and Background

Recent advances in biologics and subcutaneous therapies, often more viscous or requiring prolonged delivery, are reshaping the infusion landscape and increasing demand for innovative delivery platforms. The growing sophistication of chemotherapy and pain management formulations , combined with the benefits of oncology and palliative treatment outside hospitals, highlights the need for drug delivery technologies that are economical, easy to use, and responsive to patient needs.

The proprietary technology

A new category of reusable syringe pump' for ambulatory drug infusion, with:

- Spring-powered for efficiency and long battery life
- Electronically-controlled for accuracy and reimbursement
- Portability and wearability through low profile
- Long standby time (with Lithium cells)
- A lockbox for extra security

Context of use

Hospital/Home Care

Transfer

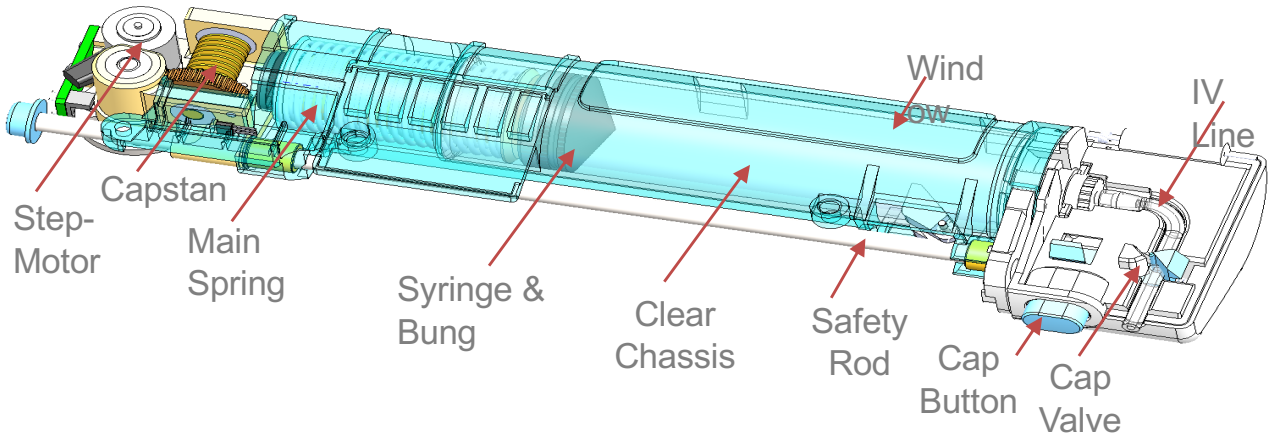
Ambulatory

Overall Principles

To address these challenges, a reusable body-worn ambulatory infusion platform was developed and studied under laboratory and simulated-use conditions. The system includes:

- 20mL or 50 mL syringe reservoir with manual loading
- Microcontroller-regulated actuation for programmable flow (0.1–400 mL/h)
- Integrated sensing for occlusion detection
- Compact enclosure suitable for body-worn use (approx. 380 g, 400 cc)
- Dual AA or AAA-cell battery operation, supporting 30+ days of typical use
- Simple button interface with easily visible display and alarms

This system was developed as a flexible evaluation platform to investigate ambulatory infusion independent of commercial specification. This study presents original research into the design and evaluation of this platform intended to meet emerging clinical and patient needs.



Preparation of the device

The user has 4 simple steps to prepare the device:

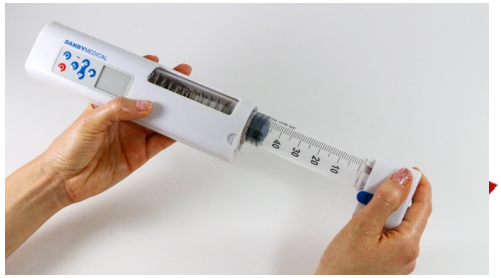
1. Insert the syringe & IV line into the cap

Lead the IV Line through the valve to exit

2. Close the cap

This closes valve to prevent free-flow

3. Load the Syringe into the Body



Push the syringe and cap into the body, charging the spring ready for use.

4. Lock the Cap in Place

Interlocking the cap sercures the syringe and drug in place.

Device Specification Summary

- Flow accuracy across the full range: (0.1–400 mL/h)
- Pressure: 120 – 60 kPa
- Accuracy: +/- 2%
- Constancy: 2-3 minutes at 1mL/h
- Occlusion detection: At 120mL/h, detection < 30seconds, and at 1ml/h, detection < 5 minutes
- Viscosity range: Up to 50cP with 27G needle

Viscosity tests showed better than +/-2% volumetric performance irrespective of viscosity up to 50cP and pumping up to 9psi back-pressure.