THE PUMP RESOLUTIONS: SHRINKING BEDS, EXPANDING HORIZONS

Lim Wei Xuan[1], Tham Wei Ping Vivien[1], Juweita Binte Arba'in [2,3], Michelle Tan Woei Jen[4]

[1]Division of Pharmacy, Singapore General Hospital[2] Division of Population Health & Integrated Care, Singapore General Hospital [3] Division of Nursing, Singapore General Hospital [4]Department of Family Medicine & Continuing Care, Singapore General Hospital

Background and Objectives

- Ganciclovir is classified as a **hazardous** drug on the NIOSH List of Hazardous Drugs in Healthcare Settings and is used in the treatment of cytomegalovirus (CMV) infections.
- Its handling restriction has historically limited treatment delivery to hospital settings, resulting in prolonged hospital stays.
- Elastomeric pumps are disposable, non-electronic infusion devices that deliver medication at a preset, fixed rate. They enable safe and convenient home-based administration of intravenous therapies, safely bypassing traditional hospital stay requirements.
- This projects aimed to describe the development and implementation workflow for preparing ganciclovir in elastomeric pumps at Singapore General Hospital (SGH) to enable safe community use.
- To optimize inpatient bed utilization by **reducing physical hospital bed days** and generate **potential financial cost savings** for the healthcare institutic



B. Braun Easypump II

Methods

Patient Selection:
- Clinically stable.
- Suitable venous access, typically a Hickman line.
- Requires approximately one week of intravenous ganciclovir and had demonstrated clinical response.
- Has a reliable caregiver at home to assist.
- Agrees to participate in home-based treatment

Central Compounding:
- All ganciclovir doses were prepared directly by the pharmacy following sterile hazardous protocols.

Delivery Protocol:
- Using **B. Braun Easypump II 270-27** elastomeric devices configured at a fixed rate of **10 mL/hr** with a total volume of **240 mL.**
- Stored under refrigeration with a shelf life 10 days.

Monitoring and escalation:
- Weekly CMV Polymerase Chain Reaction (PCR) to monitor viral load. Twice weekly full blood count (FBC), renal panel (RP), and C-reactive protein (CRP).
- Regular update to Infectious Disease team.
- Escalation triggers:
  - Rising CMV viral load
  - New symptoms

Risk Mitigation:
- Nurses received training on pump handling and hazardous drug spill management in community setting.

Results and Discussion

Between December 2024 and July 2025, two patients requiring prolonged intravenous ganciclovir therapy were successfully enrolled and monitored in the home-based infusion workflow.

Bed Capacity Impact

Table 1: Number of inpatient bed days saved

Patient	Total duration of intravenous (IV) therapy (days)	Days of home infusion	Total number of bed days saved for patient A & B
A	44	25	33
B	27	8	

- 2 patients successfully completed home-based ganciclovir therapy
- This pilot saved a **total of 33 inpatient bed days**, demonstrating improved hospital bed utilization.
- This workflow enabled a reduction in inpatient bed utilization while maintaining continuing of care, supporting SGH@Home's objective of providing hospital-level treatment in the community.

Potential Cost Saving

- Estimated cost saving : SGD 33,000 (at an estimated cost of SGD 1,000/bed day)

Clinical outcomes

Table 2: Clinical and safety outcomes

Clinical Outcomes	
Treatment completion	2/2 (100%)
Unplanned readmissions	0
Administration errors	0
Therapy-related complication associated with pump	0
Hazardous spills	0

- No therapy interruptions, major safety incidents, or unplanned hospital returns related to treatment were observed, suggesting that appropriately selected patients can be managed safely through this model of care.
- The findings are limited by the small sample size and short evaluation period. Further implementation involving a larger patient population is required to assess long term clinical outcomes, safety ,and cost-effectiveness.

Conclusion

- This pilot demonstrates the clinical feasibility of delivering hazardous therapy at home using a standardized elastomeric pump workflow, therefore enabling earlier supported discharge.
- The workflow establishes a highly scalable framework for extending similar hazardous intravenous medications requiring prolonged therapy beyond the traditional inpatient setting.