Home-Based Infusion Therapy: Safe and Effective Implementation of Elastomeric Pump in KTPH@Home

Kanak N[2]. , Gavin L[3], Tan R.L[1], Yoong A.W.F[1], Nurliyana H. [1] ,Ranjeev K.[2]
[1]KTPH@Home, [2]Emergency Department, [3]Pharmacy
Khoo Teck Puat Hospital

Background and Aims

Hospital at Home (HaH) provides an alternative care model to conventional inpatient hospital admissions, allowing patients to recover comfortably at home while receiving safe, high-quality inpatient care. In this model, virtual hospital beds are created within patients' home, enabling the medical team to provide care as though the patients are hospitalized. This approach significantly reduces hospital beds demand, optimizes hospital resources and reduces costs. HaH service were mainstreamed in Singapore in April 2024, with Khoo Teck Puat Hospital (KTPH) providing HaH service as KTPH@Home.

Cellulitis is one the top admitting diagnoses for HaH program in Singapore. This bacterial infection of the skin or soft tissue may lead to bacteraemia or necrotizing fasciitis if not treated promptly. Traditionally patients with moderate to severe cellulitis will receive multiple daily doses of Intravenous (IV) antibiotics. At KTPH@Home, elastomeric infusion pumps (EIP) have transformed selected intravenous antibiotics from multiple daily administrations to a single daily administration. Patients were taught on how to care and monitor the infusion at home by our nursing team.

Elastomeric infusion pumps (EIP) represents a significant advancement in community-based acute care. At KTPH@Home, these pumps reduced nursing manpower and operational costs while maintaining optimal patient outcomes. This study describes our implementation experience with EIP therapy in the home setting.

Methodology

A retrospective analysis was conducted on patients diagnosed with cellulitis who were admitted under the KTPH@Home service between March 2025 and August 2025. Key outcomes measured included clinical resolution, healthcare resource utilisation, and return to hospital rates. Data were extracted from electronic health records.

Clinical resolution is defined as patients being discharged in stable condition. Patients requiring a return to the Emergency Department for escalation of care related to cellulitis were classified as clinically unresolved.

Healthcare resource utilisation is measured by the number of hospital bed days saved during the period patients recovered at home, from admission until discharge from KTPH@Home.

Return to hospital rate is defined as the proportion of patients whose care is escalated back to the Emergency Department during the service.

Safety indicators are recorded in our hospital's Portal for Risk Identification and Safety Management (PRISM), where all incidents are tracked and adverse events are reported to and investigated by the hospital's Clinical Quality, Performance Value Office (CQPV).



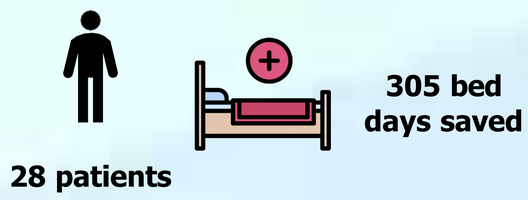
KTPH@Home nurse administering antibiotics



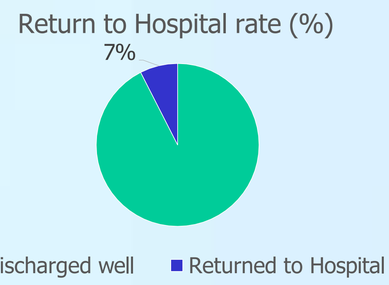
Elastomeric Infusor Pump

Results

A total of 28 patients with cellulitis received elastomeric pump therapy during the 6 months study period from March to August 2025 during their admission under KTPH@Home. A total of 305 bed days were saved. Generally, the number of home visits were reduced approximately 69% which led to cost savings of 73% for the hospital.



93% of patients achieved complete symptom resolution (n=26).
Approximately 7% (n=2) of patients returned to the Emergency Department, requiring readmission back to hospital due to worsening cellulitis. One patient had to undergo wound debridement.



For this study, we only administer IV cefazolin through elastomeric pump based on hospital antibiotic guidelines. The dosing is calculated based on patient's weight. A second antibiotic therapy may be added depending on the severity of cellulitis (most commonly Oral Clindamycin).

There were no reported adverse outcome such as thrombophlebitis, dislodged cannula/PICC or elastomeric pump malfunction.

However, there was a case where the clamp on the infusion pump was not released in time. This was immediately rectified the following morning when patient alerted the team that the balloon in the elastomeric pump was not deflated as advised.

Summary	
No. of Home Visits	**Reduced by 69%**
Cost to KTPH@Home	**Savings of 73%**

Conclusion

The implementation of elastomeric pumps in our hospital-at-home service demonstrated safety and effectiveness, with potential cost savings through reduced nursing visits and preserved hospital bed capacity. However, careful patient selection is crucial for optimal outcomes, as patients with very poor IV access, cognitive impairment, or limited self-care abilities may not be suitable due to increased risks of cannula dislodgement and inability to safely manage the pump independently. This model could also be scaled to include additional medical conditions and other hospital-at-home services across Singapore.