

Piperacillin/ Tazobactam - Elastomeric Pumps in Pediatric Hematology and Oncology



Pharmacist Tiina Kallio, Licensed Pharmacist Elina Smolander OYS Pharmacy

Development Pharmacist Jaakko Mustakallio OYS Information Management

Pediatric Oncology Nurse Merja Jurva, Ward Pharmacist Ulla Taipale, Chief of Department Riitta Niinimäki OYS Pediatric Hematology and Oncology

Department

Background

Bacterial infections are a frequent complication in children with cancer. The standard first-line therapy is intravenous piperacillin/tazobactam.

Treatment is typically administered three times daily, either in inpatient or outpatient settings. While the usual duration is 3–5 days, therapy may continue for several weeks if necessary.

At OYS (Oulu University Hospital), children come from across the Northern Finland collaboration area. For many families, outpatient care is not feasible due to long travel distances.

The pilot study aimed to explore how continuous piperacillin/tazobactam infusion via an elastomeric pump influences the practicality and effectiveness of treatment.



Northern Finland collaboration area

Objectives

1. Administering antimicrobial therapy via a pump reduces the length of hospital stays for children.
2. Using a pump that requires replacement only once daily saves valuable working hours for healthcare staff.
3. Centralized preparation at the hospital pharmacy ensures that treatment can be safely provided even to the smallest pediatric patients.



Prior to the pilot, piperacillin/tazobactam therapy could only be delivered through inpatient care or required three outpatient visits each day.

Materials and Methods

The pilot study was carried out between November 1, 2024, and April 30, 2025. Pump dosing was established for children weighing 15–37.5 kg. For children weighing 40 kg or more, the adult pump containing 12/1.5 g of piperacillin/tazobactam was used. Physicians determined the most appropriate dose for each child individually.

Preparation was performed with 120 ml and 240 ml (24 h) Folfusor elastomeric pumps. Batch records documented the exact quantities and concentrations of raw materials for every pump dose.

Weight (kg)	Piperacillin Dose (mg)	Piperacillin Volume (ml) (173 mg/ml)	Pump Volume (ml)
15	4500	26,0	120,0
17,5	5250	30,3	120,0
20	6000	34,7	120,0
22,5	6750	39,0	120,0
25	7500	43,4	120,0
27,5	8250	47,7	120,0
30	9000	52,0	240,0
32,5	9750	56,4	240,0
35	10500	60,7	240,0
37,5	11250	65,0	240,0

Medication dosing is determined by the child's body weight, with both the dose and dilution volume calculated according to the amount of piperacillin.

The concentration of piperacillin reconstituted in vials is 173 mg/ml. For tazobactam, separate calculations are not required, since its ratio remains fixed when the piperacillin/tazobactam 4/0.5 g infusion powder is used as raw material.

Results

1. The introduction of pumps has enabled earlier hospital discharge for children. At home, children showed improved appetite and greater physical activity.
2. Ward workload has been reduced, and a total of 117 hospital days were saved. The use of pumps has generated substantial cost savings.
3. Children weighing at least 15 kg throughout the Northern Finland collaboration area have successfully received pump-based treatment. Standardized preparation of pumps at the hospital pharmacy has further improved medication safety.

Patient satisfaction has risen, and families' quality of life has improved. Children and their accompanying parents have been able to return home sooner, allowing them to reunite with the rest of the family.

Conclusions

Pumps originally designed for adult patients have long been in use. Our pilot demonstrated that the same benefits extend to children.

This treatment approach helps free up hospital beds and reduces the workload of healthcare staff, leading to significant financial savings.

Beyond these measurable outcomes, pump-based therapy offers invaluable advantages: it enhances the child's quality of life and allows families to spend more time together during a demanding treatment period.

As a result of the pilot's findings, pump therapy for children has become an established practice at the hospital.



Before the pilot, antibiotic therapy meant hospitalization for the entire course of treatment. Today, children can continue their therapy safely at home.

Healthcare system savings during the pilot	
Pump cost (€)	95
Hospital days saved (pcs)	117
Costs if patients had been treated in hospital (€)	99 000
Costs when patients were treated via home hospital or outpatient visits (€)	26 000- 45 000
Total savings during the pilot (€)	54 000- 73 000

The pump price covers the medication, the pump itself, and all required supplies and materials, along with preparation costs such as personnel, cleanroom facilities, cleaning and microbiological monitoring. During the pilot, 10 pumps were discarded as waste, representing the equivalent cost of roughly one hospital day.

Savings were calculated according to whether patients received care through home hospital services or outpatient visits. Both approaches were applied during the pilot depending on the patient's municipality of residence, meaning overall savings fall within the defined range.

Contact data
elina.smolander@pohde.fi
tiina.kallio@pohde.fi



Abstract number : NP-010