# Challenges in High Dose Meropenem 24-hour Infusers in the OPAT Setting: A Case Report

Priscilla Goh[1], Kirsten Tsang[1], Rachel Nixon[1], Christopher Swan[2]
1. Pharmacy Department, Nepean Hospital, NSW. 2. Department of Infectious Diseases, Nepean Hospital, NSW.

## Objective

Meropenem is not commonly utilised in the OPAT (Outpatient Parenteral Antibiotic Therapy) setting due to the instability of its reconstituted form in an elastomeric device. This case highlights the challenges of managing daily meropenem infusers in a 75 year-old female with a *Bacteroides ovatus* and *Fusobacterium necrophorum* brain abscess.

## Case Presentation

The patient presented with confusion due to cerebral and pulmonary abscess on a background of bronchiectasis.

Specimens obtained from surgical debridement cultured *Bacteroides ovatus* and *Fusobacterium necrophorum* with antimicrobial susceptibilities performed. Meropenem was selected based on antibiotic susceptibility testing results, its high central nervous system penetration, and the low risk of toxicity with prolonged therapy.[1]

## Literature Review

A PUBMED review was conducted. Meropenem is a broad-spectrum carbapenem used to treat severe multi-resistant gram-negative infections. There is limited stability data guiding meropenem use in elastomeric devices within the OPAT setting.[2]

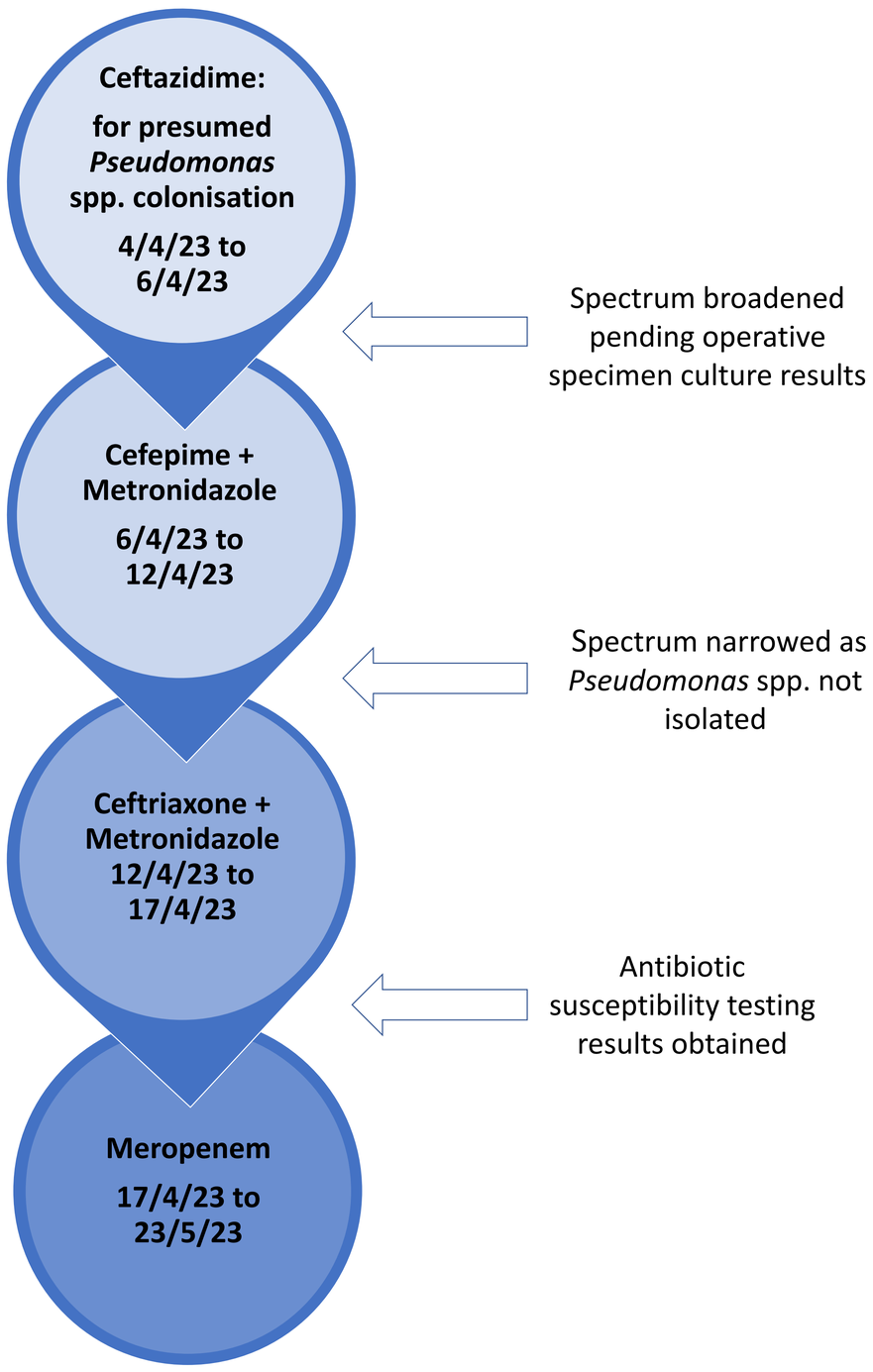
According to literature, the infusion stability is maintained when the drug concentration remains above 90%. Degradation was dependent on temperature, concentration, and time.[3]

## Discussion

The use of meropenem infusers allowed for home treatment, reducing hospital costs and bed days. The elected infuser expiry was extrapolated from available literature. It was acknowledged that meropenem degradation could be more than 10% by 72 hours of refrigeration.

The ability to deliver OPAT via elastomeric devices in a stable and optimised manner facilitates optimal treatment whilst reducing complications and costs associated with prolonged hospitalisation.[6]

## Antimicrobial Treatment Timeline




**Antimicrobial susceptibility testing results[5]**

| Antibiotic | *Bacteroides ovatus* | *Fusobacterium necrophorum* | Comments |
|---|---|---|---|
| Amoxicillin/clavulanic acid | S | S | Poor CNS penetration |
| Ceftriaxone | R | R | |
| Clindamycin | S | S | Poor CNS penetration |
| Meropenem | S | S | Acceptable CNS penetration |
| Metronidazole | S | S | Potential to cause neuropathy |
| Moxifloxacin | R | R | |
| Piperacillin/tazobactam | S | S | Poor CNS penetration |

**Meropenem (concentration 25 mg/mL) Stability Data*[4]**

| Temperature | Time (hours) | | | |
|---|---|---|---|---|
| | 0 | 24 | 48 | 72 |
| 6.7 °C# | 100 | 94.79 | 91.45 | 88.75 |
| 22.5 °C^ | 100 | 87.40 | 82.42 | 79.08 |

*Solutions were made up and stored in an elastomeric device and stored separately in HPLC glass vials and transferred to the stability chamber. Following 24 hours, these solutions were assayed.

# Percentage of meropenem remaining in solutions in refrigerated (6.7°C ) elastomeric infusion device at different time points.

^ Percentage of meropenem remaining in solutions following 24 hr storage at 22.5°C at different time points after being previously refrigerated in elastomeric infusion devices. Time = 24 was not initially refrigerated.

## Pharmacist Interventions, Case Progress, and Outcomes

The patient case was discussed between infectious diseases (ID) and pharmacy teams. Based on data extrapolated from literature, the dose of meropenem was increased to 6.5g per infuser (beyond maximum daily dose) to allow for 10% degradation targeting delivery of 6g over 24 hours and a 96-hour shelf life was assigned. The infuser waist pouch was lined with ice bricks. A waiver form was required to be completed and signed by the ID and pharmacy departments since the concentration and proposed expiry date of reconstituted meropenem exceeded the maximum established by our external manufacturing companies. The proposal was accepted by the Drug and Therapeutics Committee. Clinical and radiological cure was achieved with a 6-week course of antibiotic therapy including 3.5 weeks of OPAT with meropenem 6.5g infusers.

### References

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Contact: Priscilla Goh: Priscilla.Goh@health.nsw.gov.au

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