

pH and osmolarity of antibiotics administered via elastomeric pumps in OPAT: implications for venous tolerance and catheter choice

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Introduction & Objective

Outpatient parenteral antimicrobial therapy (OPAT) enables home-based intravenous treatment. However, vascular access complications remain a concern. pH and osmolarity are key determinants of venous tolerance and may influence the choice between peripheral and central access. Data on antibiotics administered via elastomeric pumps remain limited. This study aimed to evaluate the pH and osmolarity of antibiotics administered via elastomeric pumps under OPAT-like conditions.

Methods

- Ten OPAT antibiotics via continuous (24h) or intermittent (30 min) elastomeric pumps
- Pumps prepared as a weekly batch (one week's supply dispensed at a time) and stored refrigerated until use, then 24h at room temperature
- pH, osmolality and density measured at treatment initiation, mid-week and end of week

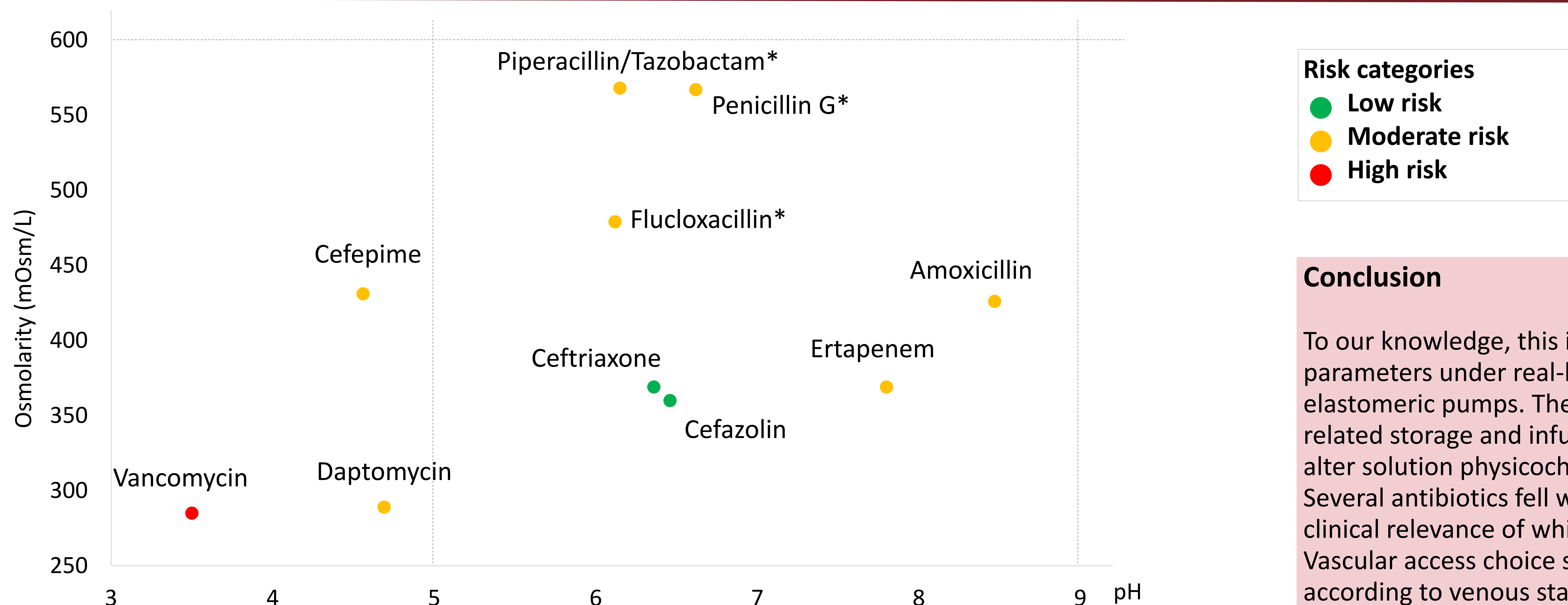


Figure 1. Distribution of pH and osmolarity of commonly used OPAT antibiotics.

Dashed lines indicate commonly used thresholds (pH <5 or >9, osmolarity >600 mOsm/L).

Based on published data, intermediate ranges have been described, with increased risk observed for pH 4–5 and 7.5–9 and osmolarity 450–600 mOsm/L. *buffered with sodium citrate

Results

- Vancomycin showed pH <4, while cefepime and daptomycin were within the intermediate acidic range (pH 4–5)
- No antibiotic exceeded pH >9; amoxicillin and ertapenem were within the intermediate alkaline range (pH 7.5–9)
- Piperacillin/tazobactam, Flucloxacillin and penicillin G were within the intermediate osmolarity range (450–600 mOsm/L)
- Most antibiotics fell within low or moderate-risk physicochemical ranges
- No significant variation in pH and osmolarity was observed over time

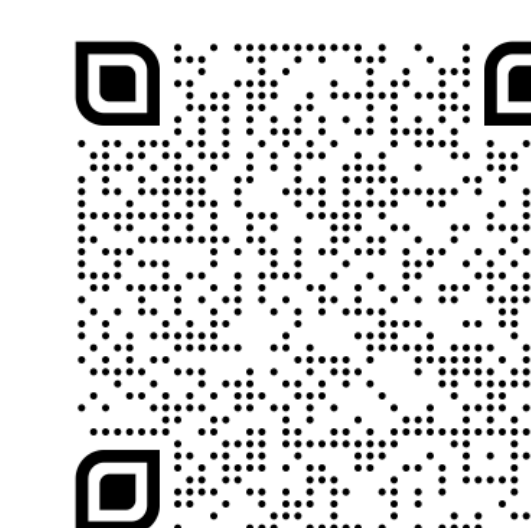
Risk categories

- Low risk
- Moderate risk
- High risk

Conclusion

To our knowledge, this is the first study to evaluate these parameters under real-life OPAT conditions using elastomeric pumps. These findings suggest that OPAT-related storage and infusion conditions do not significantly alter solution physicochemical properties. Several antibiotics fell within intermediate ranges, the clinical relevance of which remains uncertain. Vascular access choice should therefore be individualized according to venous status and antibiotic treatment duration.

Additional data and methods



Contact



References:

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Borgonovo, F., et al., Physicochemical Characteristics of Antimicrobials and Practical Recommendations for Intravenous Administration: A Systematic Review. *Antibiotics*, 2023