Total intended antibiotic delivery related to drug concentration affecting the flowrate of elastomeric devices used in outpatient parenteral antimicrobial therapy (OPAT).

Stephen Perks[1,2], Dr Tilley Pain[1,2], A/Prof Richard Franklin[2]

1. James Cook University, Australia
2. The Townsville Hospital, Australia

Background

- Many studies investigate drug stability in extended home-infusion pumps, but little is known of other factors which may affect the total daily dose the patient receives.
- It has been noted in previous studies that up to 40% of infusions may not run out to completion in the 24 hour period.

Aim

- The purpose of this study is to investigate the impact of solution concentration on flow rates when using MHIP for commonly used drugs and dosages; and to determine potential limitations of the dose or drug choice which still delivers the appropriate flowrate.

Methodology

- The flow rates of 10 different drug/dose formulations (4g to 18g in 0.9% sodium chloride) in Baxter LV10 infusion pumps were investigated.
- The pumps were run out 31°C and weighed at intervals with flow rate and total volume infused calculated over the 24 hour period.

Figure 1: Baxter elastomeric LV10 infusor pump

Results

- The 3 highest dose elastomerics tested Flucloxacillin 12g, and Piperacillin/Tazobactam 13.5g and 18g all had residual volumes remaining in the devices after 24 hours.
- Piperacillin/Tazobactam (18g) was the only formulation to not meet the minimum standard of 90% of the volume being infused over the 24h period. This indicates a failure of intended therapy.
- It was determined that any device with a dose/excipient weight above 12.02g would not run out under nominal conditions.
- The expected dose delivered can be calculated as: *% dose delivered = -1.9x + 122.85* (where x = the total drug and excipient weight within the infusor)

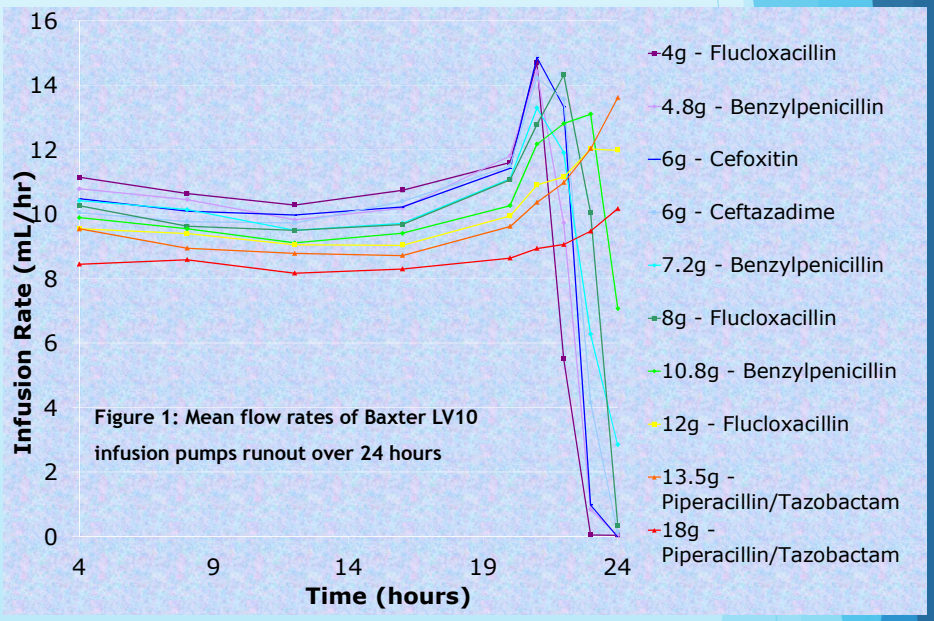

Figure 1: Mean flow rates of Baxter LV10 infusion pumps runout over 24 hours

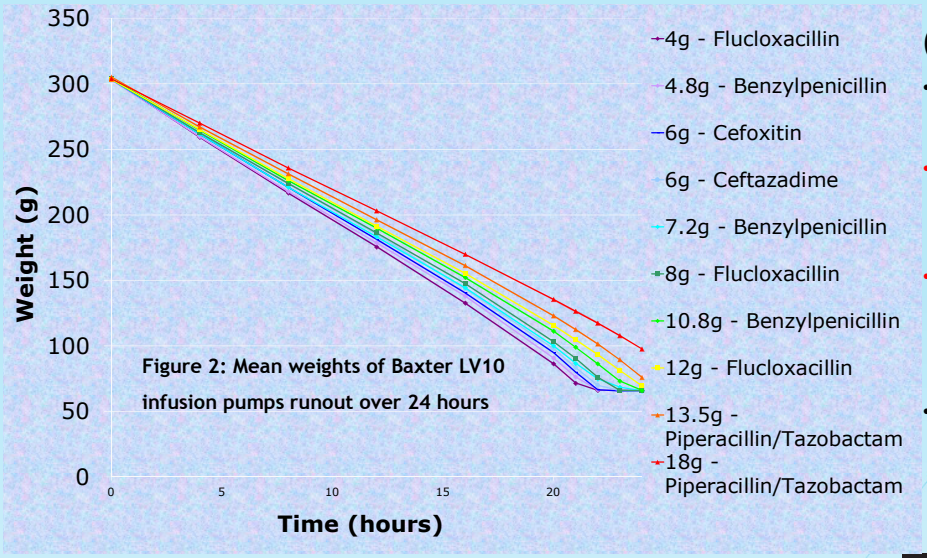

Figure 2: Mean weights of Baxter LV10 infusion pumps runout over 24 hours

Conclusions

- Dose has an inverse relationship to flow rate with the LV10 Baxter Infusor.
- Under nominal conditions any amount greater than 12.02g in the 240mL infusor will result in an incomplete run-out over the 24 hour period.
- Clinicians should be aware that prescribing daily doses higher than 17.28g may result in less than 90% of the intended dose being received by the patient.
- Further research is needed to confirm if this decrease in flow rate results in poor clinical outcomes.

Contact: steve.perks@my.jcu.edu.au