

Evaluation of an elastomeric pump device for the administration of continuous intravenous flucloxacillin in an inpatient setting

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Introduction:

Elastomeric pump devices have been described in clinical use since 1989^[1]. The device is used to continuously or intermittently infuse therapeutic drugs including antimicrobial agents.

This device uses an elasticated balloon reservoir which contracts to deliver the infusion at a constant rate over a set time period.

For our evaluation, we used the Baxter *Infusor* device (see *Figure 1*) to infuse flucloxacillin continuously over 24 hour periods.

"Much more convenient for nursing staff and patient as not tied to four doses. Easy to assemble and administer"

Aims:

- To evaluate patient and staff perceptions of the elastomeric device
- To estimate the financial and time implications of using the device as part of routine practice

"When sleeping, it can fall out of bed or be irritating if you roll onto the canister"

Flucloxacillin 2g IV 6 hourly				Elastomeric device		
Item	Input	Unit Cost	Totals	Input	Cost	Totals
Nurse Times (hrs)	0.52	£ 14.41 ^[3]	£ 7.44	0.008	£ 14.41	£ 0.12
Ancillaries	4	£ 2.42	£ 9.68	-	-	-
Drug	4	£ 1.50	£ 6.00	-	-	-
Gravity set	4	£ 1.59	£ 6.36	-	-	-
IV bag	4	£ 0.44	£ 1.76	-	-	-
Elastomeric	0	-	-	1	£ 74.83	£ 74.83
Needle and Syringe	4	£ 0.19	£ 0.76	-	-	-
Total for 24 hours			£ 32.00			£ 74.95

Table 1: Total daily cost of consumables for 6 hourly flucloxacillin 2g compared with elastomeric device

Methods:

This device evaluation took place in one general non-elective orthopaedic ward at Whiston Hospital.

We determined that the most commonly prescribed antimicrobial regimen within this department is four times daily infusions of flucloxacillin 2g (6 hourly).

The elastomeric pump device was supplied to us pre-filled from the manufacturer, with a total 24-hour dose of flucloxacillin 8g, costing £74.83 per device (see *Table 1* for more costing data).

Patients were identified prospectively by review of all antimicrobial prescriptions and results of relevant microbiological investigations. The following patient inclusion criteria were agreed prior to recruitment:

- Current inpatient on the evaluation ward
- Current therapy with flucloxacillin 2g 6 hourly IV
- Peripherally inserted central catheter (PICC) in situ or suitable candidate for this
- Patient able to understand and agree to take part

We used standardised questionnaires for nursing staff and patients involved in the evaluation to discuss their experiences and any feedback given.

We also assessed time taken to prepare elastomeric devices for use, which was compared with previous data for time taken to prepare the standard flucloxacillin 2g 6 hourly in the same clinical area.

"Disliked nothing, totally comfortable with it"

Results (feedback):

We recruited a total of five eligible patients and five staff nurses for the device evaluation. All of these people preferred the elastomeric device compared with 6 hourly dosing, and would choose to use it again in the future given the opportunity. Qualitative feedback from patients and nurses are shown in speech bubbles around the poster.

- The clear protective outer shell of the Infusor contains a UV filter
- Flow rates from 1 ml/h to 10 ml/h
- Range of infusion durations from 1 day to 7 days
- +/- 10% accuracy under nominal conditions
- Integral particulate filter and kink-resistant tubing
- Transparent reservoir allowing visualisation of the solution
- Infusion progression lines on outer shell to monitor infusion progress
- Latex free
- Range of SV and LV devices available
- Tested for compatibility and stability with over 100 of the most commonly used drugs¹



Figure 1: Features and examples of *Infusor* devices. Used with permission from Baxter^[2]

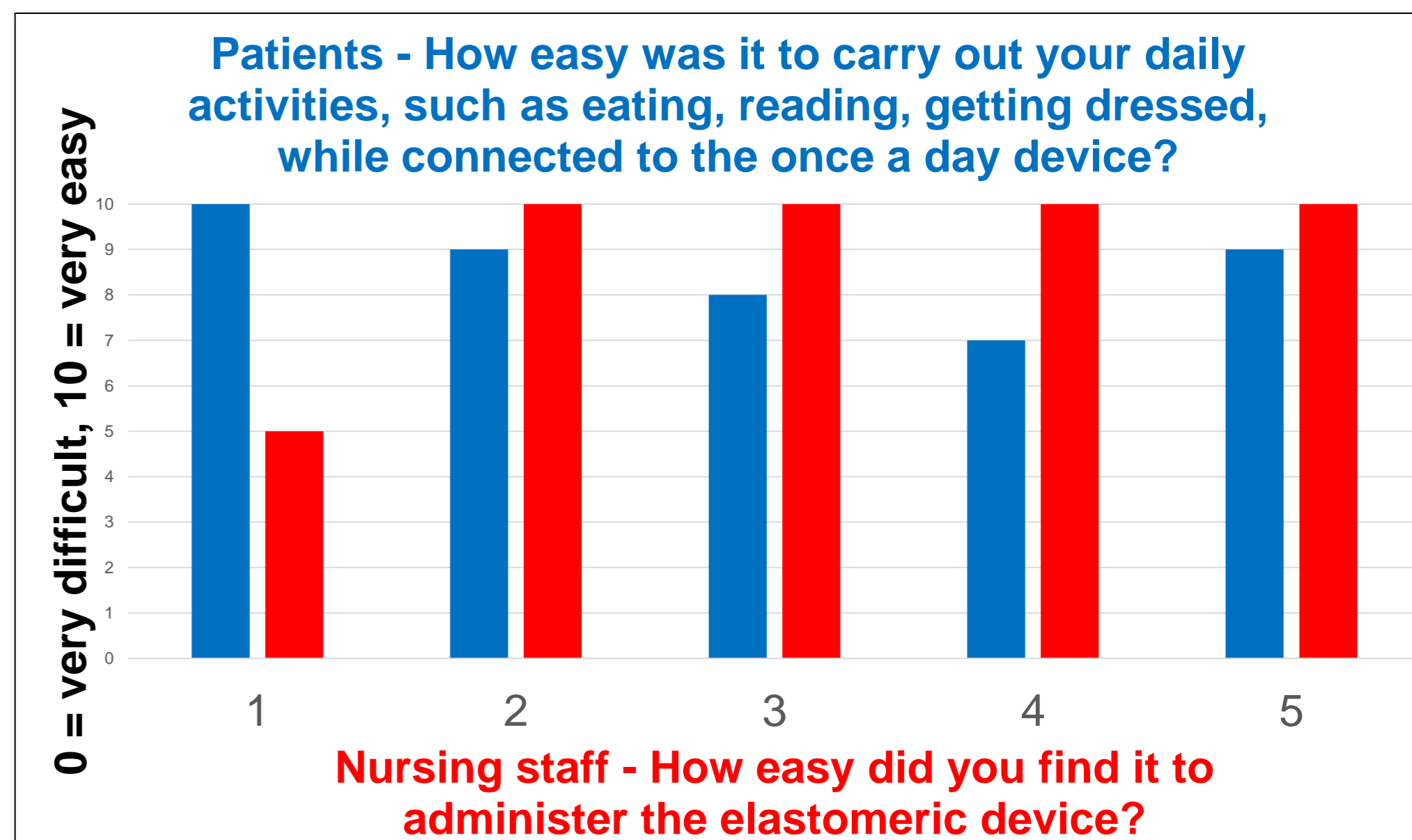


Figure 2: Example questionnaire responses from patients and nursing staff

Results (cost/time impact):

There was a significant cost implication of using the elastomeric device compared to 6 hourly flucloxacillin (see *Table 1* for costing data).

We did, however, also demonstrate a significant time-saving benefit by using the elastomeric device. The total time to prepare and attach the device is 30 seconds per patient, per day. Compared with 6 hourly flucloxacillin infusions, the average time spent preparing a single dose of flucloxacillin 2g for infusion was 7 minutes 45 seconds. In a 24-hour period this equates 31 minutes per patient, per day.

"Would recommend to anybody about to be offered the device"

Conclusions:

The main benefits of the device are patient freedom and time-saving for nursing staff; who effectively save 30 minutes per day, per patient, of clinical time, which can be used elsewhere.

The main limitation of using the device is cost.

A logical application would be OPAT (Outpatient Parenteral Antimicrobial Therapy). Typical OPAT agents are broad-spectrum, compromising the ability to administer them once per day. The risk of *Clostridium difficile* infection, and emergence of increasing antimicrobial resistance, make the use of narrow-spectrum agents more essential than ever, and the device makes this practical.

The device is pre-made, reducing the number of consumables used for drug preparation. The frequency of line access is also reduced, hence potentially reducing risk of line infection.

"Gave me increased mobility, allowed me to be more self-sufficient"

References:

- 1) Quebbeman EJ, Hamid AA, Hoffman NE, Ausman RK. American Journal of Hospital Pharmacy. 1984;41(6):1153-6.
- 2) Ordering and user guide - Baxter elastomeric disposable infusion devices: May 2017. Image and text used with permission.
- 3) Royal College of Nursing NHS pay scales 2015-16. Available here: <https://www.rcn.org.uk/employment-and-pay/nhs-pay-scales-2015-16> Last accessed 29/11/2018.