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Intra-procedure cost variability: a retrospective analysis of real-world patient level information costing (PLICS) data for a minimally invasive BPO therapy in the NHS

A. Zervakis[1], J. Hicks[2], M Rochester[3]

[1]Olympus Europa SE & Co. KG, Hamburg, Germany [2]Olympus KeyMed, Southend-on-Sea, United Kingdom
[3]Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich, United Kingdom

INTRODUCTION

Benign prostatic obstruction (BPO), also known as benign prostatic hyperplasia (BPH), is a condition affecting ageing men, in which the enlargement of the prostate gland can slow or block the flow of urine. The management of BPO represents a growing healthcare burden on the NHS in England. In 2024/25, there were 42,489 finished consultant episodes in admitted patient care and 8,140 outpatient attendances in which the primary diagnosis was hyperplasia of prostate[1]. This is up from 34,638 and 1,563 respectively in the year 2014/15[2], a cumulative increase of 40%. With spending on health services in the UK growing by just 2.3% per year in real terms between 2015/26 and 2023/24[3], the evaluation of cost of healthcare delivery has never been more essential.

OBJECTIVE

Patients suffering with BPO have access to an array of treatment options in the NHS, depending on their age, prostate size, prostate and bladder neck anatomy, as well as their outcome preferences. One such treatment option is a minimally invasive surgical therapy (MIST), known as the temporary implantable nitinol device (temporary device). Our research evaluates the intra-procedural cost variance amongst a small cohort of patients treated with the temporary device within the NHS in England. We sought to establish the greatest determinants of cost, the correlation between clinical variables and total cost, and identify strategies to minimise cost.

METHODS

Clinical records were searched from 2023-2025 for patients treated with the temporary device at Norfolk and Norwich University Hospital. Amongst the 22 patients treated, complete PLICS data were available for 16. Due to the small sample size, descriptive statistics were used to evaluate patient baseline demographics, perioperative theatre time, segmented costs and total episode costs. Scatter plots were used to visually assess for correlation between variables and cost. Episode HRGs were assessed to determine whether a greater complexity and comorbidity (CC) score had a notable impact on cost. Treatment costs for the temporary device were also compared to reference values for other BPO treatments in the NHS, using the National Schedule of NHS Costs.

RESULTS

The retrospective data analysis showed that the temporary device procedure is short, with a median (IQR) theatre time of just 11.0 (4.8) minutes. The median (IQR) length of stay was 8.2 (2.5) hours and 14 of the 16 patients had a length of stay of less than one day. No complications or adverse events impacting length of stay were observed. Median (IQR) total episode cost was £1,003 (£510), ranging from £589 to £2,757. The lowest cost was observed in a patient treated under local anaesthetic, whilst the highest cost patient required two nights stay in hospital. The total cost appeared to have a slight positive skew, driven largely by the highest cost patient who incurred significantly greater cost than any other patient (see Figure 1). On average, theatre costs accounted for 63% of total episode cost. The cost of the temporary device itself however was not included in the PLICS data. A full data summary is described in Table 1.

Figure 1. Total Cost

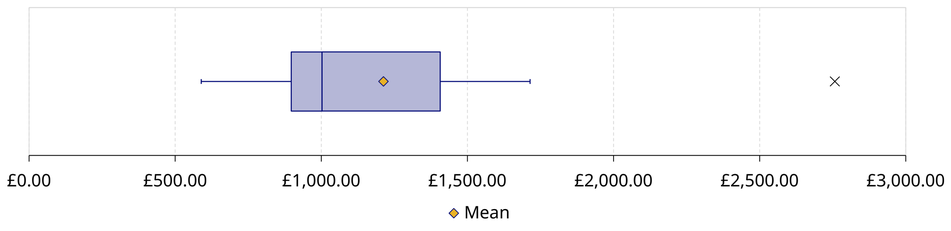


Table 1. Data Summary

	MEAN	SD	MEDIAN	IQR	Q1	Q3	MIN	MAX	RANGE
Age	67.5	11.5	68.5	20.0	57.3	77.3	51.0	89.0	38.0
Prostate Size (ml)	35.4	12.3	30.0	22.0	25.0	47.0	20.0	57.0	37.0
Theatre Anaesthetic Time (mins)	31.6	16.7	30.5	11.3	27.3	38.5	0.0	71.0	71.0
Theatre Time (mins)	11.4	4.8	11.0	4.8	9.3	14.0	3.0	21.0	18.0
Theatre Recovery Time (mins)	51.4	50.2	46.0	21.3	32.3	53.5	0.0	233.0	233.0
Total Perioperative Time (mins)	94.4	58.5	85.5	33.5	75.3	108.8	3.0	282.0	279.0
Ward Time (hours)	11.4	11.4	8.2	2.5	6.6	9.1	4.2	50.7	46.5
Theatre Costs	£765.40	£305.32	£646.57	£456.08	£564.54	£1,020.63	£262.28	£1,339.05	£1,076.77
Total Costs	£1,212.65	£496.12	£1,002.62	£509.72	£897.13	£1,406.85	£589.10	£2,756.86	£2,167.76

Visual inspection of scatter graphs showed the strongest correlation (positive, linear) between the perioperative time and total cost (Figure 2), as well as between theatre cost and total cost (Figure 3). No relationship was observed between baseline demographics (age , prostate size) and either total cost, length of stay (ward time) or perioperative time.

On review of the CC scores, six of the 16 patients has a CC score of two or more. Both patients that had length of stay > 1 day were in this group. Total cost in this group was £178 higher on average, though this was arguably skewed by one patient.

Figure 2. Perioperative Time vs. Total Cost

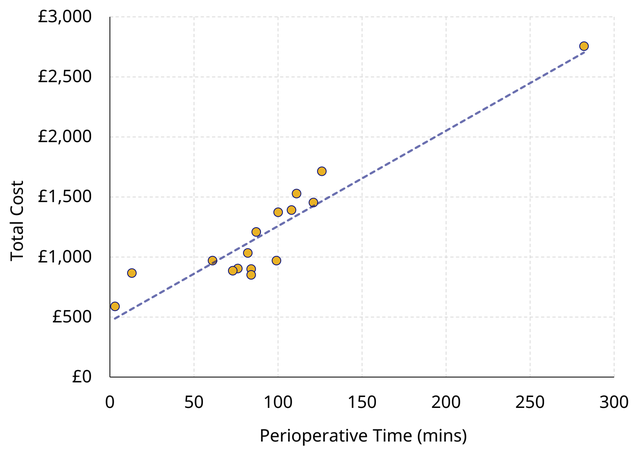
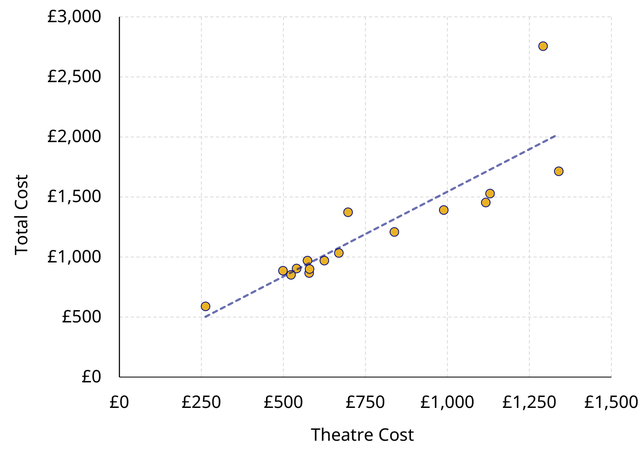


Figure 3 Theatre Cost vs. Total Cost



CONCLUSIONS

Our analysis showed that even in a small cohort, intra-procedure cost variability can be substantial, with a range of £2,168. It is clear that with the temporary device procedure, total cost is most sensitive to perioperative time and theatre cost. This can be expected, given the low average length of stay. Perioperative theatre timings are captured manually by staff in the theatre / anaesthetic / recovery areas, relying on human input to begin and stop timers. Accuracy of reporting these times is essential in measuring the cost for a procedure of this nature given the sensitivity to perioperative time.

Since there were no complications or adverse events impacting length of stay, it is likely that the patients requiring overnight stay were due to social factors, for example transportation or suitable accommodation not being available. Greater segmentation in the PLICS data could help better understand which costs are or aren't directly attributable to the treatment.

There was no obvious correlation between baseline demographics and episode cost, suggesting a patients age and prostate size do not have any impact on the temporary device procedure cost. Standardising treatment protocols, and utilising local anaesthesia and same-day discharge where clinically safe and appropriate, may help reduce treatment cost.

Whilst this research focused on intra-procedure cost, it is also important to consider comparative cost with other procedures, particularly where multiple treatment options may be available. Compared to national reference costs for other BPO MISTs (prostatic urethral lift and water vapour therapy which group to HRG LB70D), the temporary device procedure cost was 62% lower (£1,213 vs £3,191[4]). Compared to transurethral resection of the prostate (TURP, which groups to HRG LB25F), the temporary device was 73.7% lower (£1,213 vs £4,604[4]). One key limitation however is that the cost of the temporary device itself was not included in the PLICS data.

Further research requires larger sample sizes, should incorporate device costs and assess overall cost-effectiveness. A larger sample size may enable regression analysis to determine the relationship between multiple variables and total cost. Additional detail on the costing methodology for PLICS data may also help inform further research.

DISCLOSURES

This study was conducted collaboratively between Olympus and Norfolk and Norwich University Hospitals. No financial remuneration was exchanged between parties.

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CONTACT INFORMATION

For any queries relating to this research, or for further information, please contact: **alex.zervakis@olympus.com**

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