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Holmium Laser Enucleation of the Prostate (HoLEP) as a Value Based Proposition in the Surgical Management of Benign Prostatic Hyperplasia (BPH)

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Introduction

- BPH is the commonest male urological disorder resulting in lower urinary tract symptoms (LUTS).
- Both Transurethral Resection of Prostate (TURP) and HoLEP are Grade A recommendations in the surgical management of BPH in Singapore¹.
- Traditionally, TURP is the mainstay of surgical management.
- HoLEP has been introduced as an alternative in recent decades due to advantages such as complete enucleation of adenoma, shorter length of stay (LOS) and reduced blood loss². However, it comes with relatively steeper learning curve, longer operative time and higher instrumentation costs as compared to TURP².

Aim

To compare outcome data and projected cost for patients with BPH undergoing TURP against HoLEP to provide a value-based proposition for HoLEP in the management of patients with BPH for surgery in a single institution.

Methods

Comparison of Outcomes

Cohort outcome data was obtained from retrospective review of medical records of patients with BPH >30g who underwent TURP or HoLEP from April to December 2023 since the initiation of HoLEP in the institution in April 2023.

Comparison of Costs

- Identifying Cost Drivers:** Mapping of respective patient journeys was conducted to identify cost drivers of each technique.
- Cost simulation:** Cost simulation of cost drivers was conducted based on FY23 cost data and present-day equipment cost, which were obtained from the institution's finance department and vendors respectively.

Results

Comparison of Outcomes

- 130 patients with BPH >30g underwent surgery, of which 77 (59.2%) had TURP.
- There was no significant difference in age, BMI or ASA between the two groups.
- Patients who had HoLEP had significantly larger prostate size and longer operative duration. However, HoLEP had greater surgical efficiency, although this was not statistically significant.
- There was significantly lower LOS for patients who underwent HoLEP, while other outcomes were similar.

Demographic	TURP (n=77)	HoLEP (n=53)	p-value
Mean Age (SD)/years	71.84 (7.69)	72.81 (5.11)	0.39
Mean BMI (SD)/kg/m ²	24.44 (3.87)	25.29 (3.63)	0.22
ASA (%) [†]			
I	1 (1.30)	1 (1.89)	0.789
II	72 (93.50)	52 (98.11)	0.219
III	4 (5.19)	0	0.092
Surgical characteristics			
Mean Prostate Size (SD)/g [*]	31.89 (17.64)	54.52 (29.19)	<0.001
Mean Operative Duration (SD)/min	86.04 (35.58)	129.26 (40.60)	<0.001
Mean Surgical Efficiency (SD)/ g/min [*]	0.38 (0.18)	0.42 (0.18)	0.21
Outcomes			
Mean post-op LOS (SD)/days	2.47 (2.36)	1.23 (1.90)	0.002
No. patients with blood transfusion (%)	2 (2.60)	1 (1.89)	0.40
No. patients with 90-day complications (%)	2 (2.60)	0	0.12
No. patients with 90-day re-interventions (%)	0	0	-
No. patients with 90-day re-admissions (%)	0	0	-

Table 1:

Patient demographic and outcome data

[^] 1 case of TURP and 3 cases of HoLEP had missing data

[†] There were no patients with ASA IV or V

^{*} 19 cases of TURP and 1 case of HoLEP had missing data

Comparison of Costs

(a) Identifying Cost Drivers

Cost drivers for TURP and HoLEP were LOS and equipment cost respectively.

(b) Cost simulation

The following economic assumptions and methodologies were used for cost simulation:

- Equipment capacity of 2 cases/day – each methods requires 1 energy source with 2 scopes, plus 2 morcellators for HoLEP.
- Straight line depreciation applied to useful life of equipment - 5 years for scopes and 8 years for other equipment³.
- Annual volume of patients with BPH>30g requiring surgery is constant at 180 (CY23 data), with equal proportions undergoing TURP and HoLEP.

Simulation 1

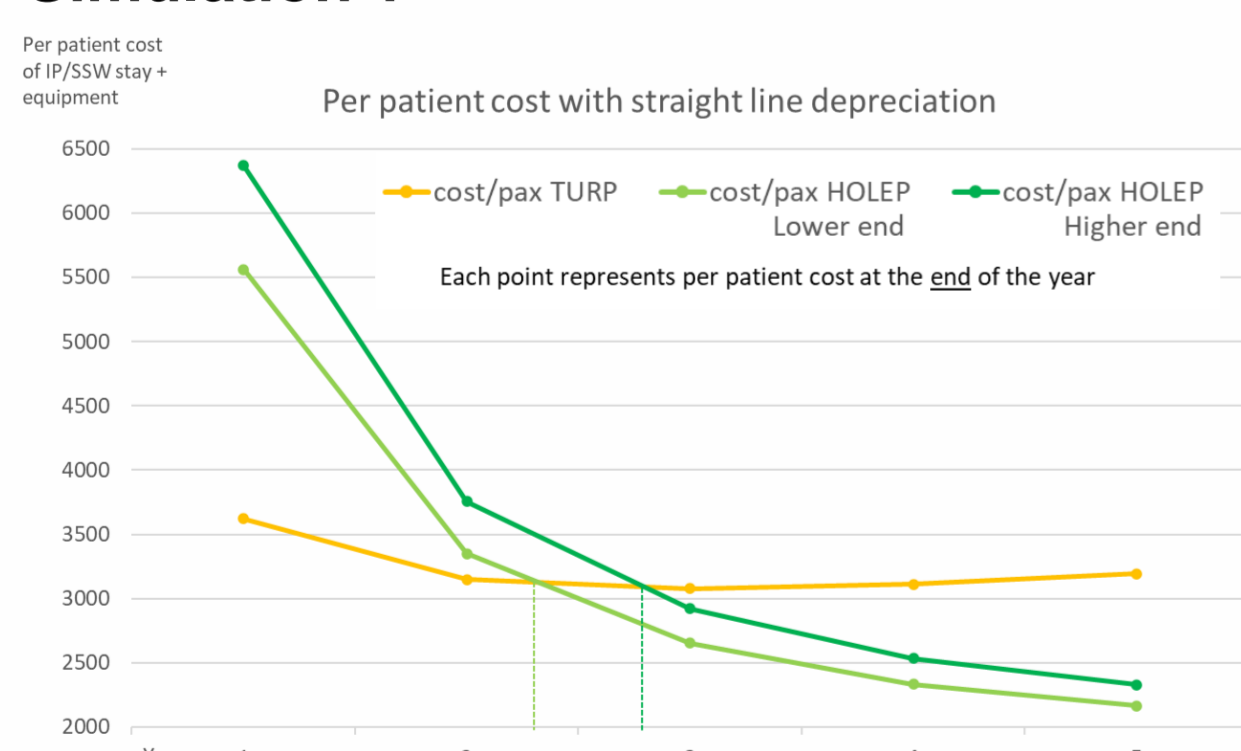


Figure 2: Simulation assuming all patients undergoing HoLEP are admitted under Short Stay Ward (SSW).

- Initial per patient cost for TURP is lower due to lower upfront equipment cost till the intersection at 2.32-2.80 years.
- Thereafter, an additional patient undergoing HoLEP yields lower per patient cost, as equipment cost is spread over a larger volume, with significantly lower LOS cost.
- This translates to HoLEP breaking even after 210-252 patients.

Simulation 2

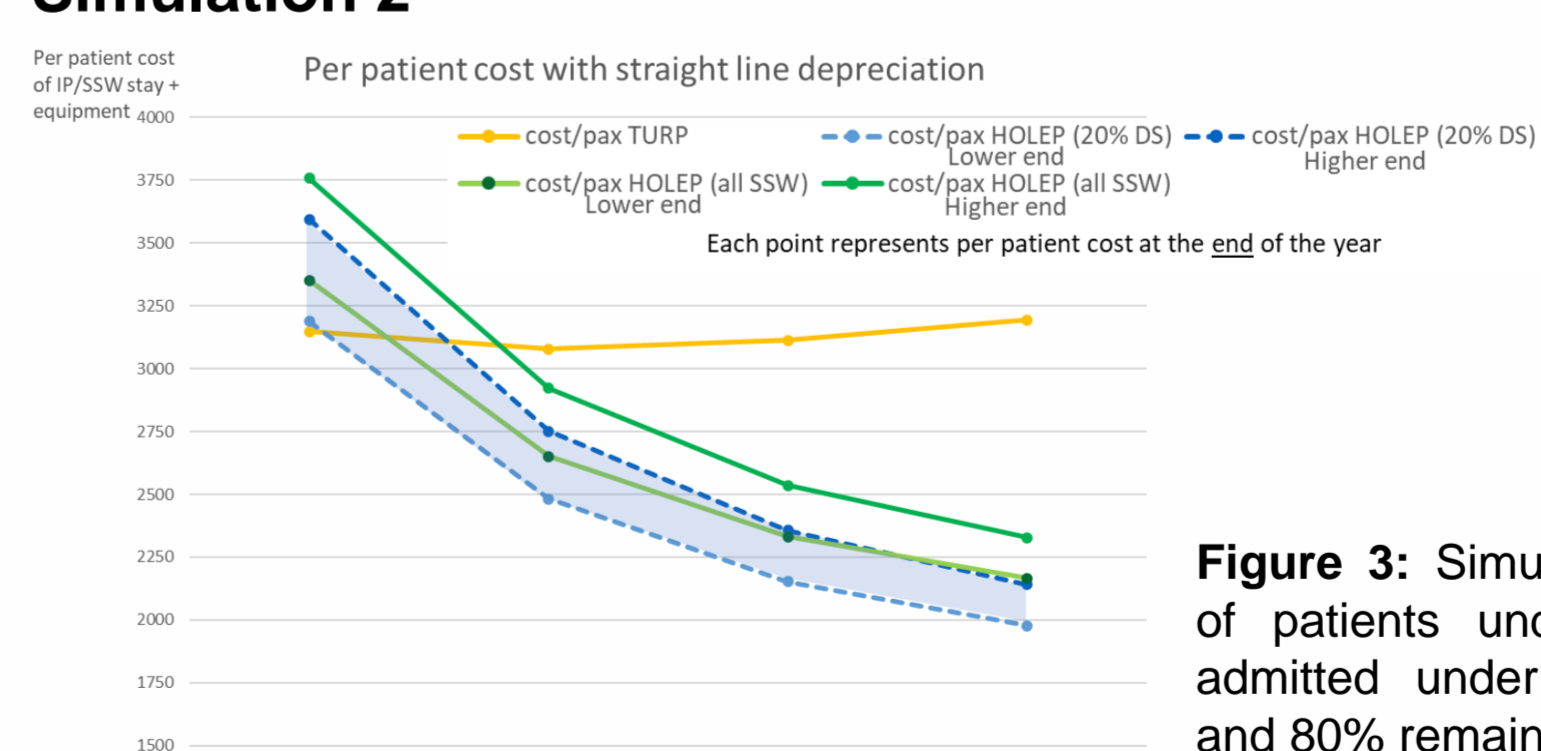


Figure 3: Simulation assuming 20% of patients undergoing HoLEP are admitted under Day Surgery (DS), and 80% remains as SSW.

- HoLEP breaks even at 2.06-2.58 years, equivalent to 186-232 patients. This is approximately 1 quarter faster than in Simulation 1.
- The area shaded in blue highlights enhanced cost savings attributed to selecting appropriate patients into DS.

Conclusions

For patients who qualify for HoLEP, there is good value potential attributed to shorter LOS. For the health system, introducing HoLEP has a potential to reduce bed-days, enjoy cost savings after a critical volume while maintaining similar clinical outcomes.

¹ Singapore Urological Association Male Lower Urinary Tract Symptoms/Benign Prostatic Hyperplasia Guidelines Committee 2015. Singapore Urological Association Clinical Guidelines for Male Lower Urinary Tract Symptoms/Benign Prostatic Hyperplasia. Singapore Medical Journal 2017; 58(8): 473-480 doi: 10.11622/smedj.2017082

² Pirola GM, Maggi M, Castellani D, Sciarra A, Rubilotta E, Gubbiotti M. A Cost-Benefit Analysis of Bipolar TURP for the Treatment of Bladder Outflow Obstruction. Res Rep Urol. 2021 Jul 9;13:487-494. doi: 10.2147/RRU.S277480. PMID: 34268258; PMCID: PMC8276822.

³ Ministry of Health Singapore. National Costing Guidelines, Annex A. Singapore.