Cost-Utility Analysis of Upfront Pharmacotherapy Compared to an Upfront Surgical Intervention for Patients with Benign Prostate Hyperplasia

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INTRODUCTION

- Pharmacotherapy doesn't necessarily cure BPH and patients may require subsequent surgical interventions such as transurethral resection of the prostate (TURP) or alternatives such as photoselective vaporization of the prostate using Greenlight laser (GL-PVP).
- GL-PVP has better perioperative safety, shorter hospitalization time and lower costs compared to TURP and faster symptomatic improvement compared to pharmacotherapy.

AIM

The purpose of this study was to evaluate the cost-utility of upfront followed by delayed TURP or GL-PVP for those who fail, compared to receiving an upfront surgical intervention.

MATERIAL AND METHODS

- Men with a mean age of 65 years with moderate-to-severe symptoms with no contraindications for BPH surgery were included.
- A microsimulation model of the progression of BPH symptoms, cost projection, and quality-adjusted life-years (QALYs) in the target population was developed
- Cost-utility analysis was performed using a Canadian public payer perspective, a life-time time horizon, a discount rate of 1.5% and a willingness-to-pay threshold of $50,000 per QALY gained.
- Probabilistic sensitivity analysis (PSA) was performed to estimate parameter uncertainty.
- Costs of pharmacotherapy was obtained from the Ontario Drug Benefit Formulary. Costs of BPH surgeries were collected retrospectively. All other parameters were obtained from the literature

RESULTS

Cost:

- Upfront TURP was the most costly option. Upfront alpha-blocker with delayed GL-PVP was the least costly strategy
- Upfront TURP strategy cost $2,236 to $2,601 more per person than the upfront pharmacotherapy with delayed TURP alternatives
- Upfront GL-PVP strategy cost $9,156 to $14,069 more per person than the upfront pharmacotherapy followed by delayed GL-PVP alternatives

QALYs:

- Upfront BPH surgery strategies resulted in greater QALYs (15.31-15.35) compared to the upfront pharmacotherapy
- Upfront TURP strategy resulted in QALY gains of 0.15 to 0.26 compared to the upfront pharmacotherapy with delayed TURP alternatives
- Upfront GL-PVP resulted in QALY gains of 0.12 to 0.24 more compared to the upfront pharmacotherapy with delayed GL-PVP options

Cost per QALY gained:

- Upfront TURP cost between $10,060 to $14,812 per QALY gained compared to the upfront pharmacotherapy with delayed TURP
- Upfront GL-PVP cost between $9,156 to $14,069 per QALY gained compared to the upfront pharmacotherapy with delayed GL-PVP options

Cost-utility analysis (Table 1 and Figure 2)

- Upfront GL-PVP cost $1,586 more and resulted in an average gain of 0.12 QALYs compared to the next most effective strategy of upfront combination therapy followed by delayed GL-PVP. This translated to an ICER of $13,653 per QALY gained. While, the most effective strategy, upfront TURP, cost $1,009 more and resulted in only a small gain of 0.04 QALYs in comparison to upfront GL-PVP option. This translated to an ICER of $ 24,069 per QALY gained.

Probabilistic analysis (Figure 3)

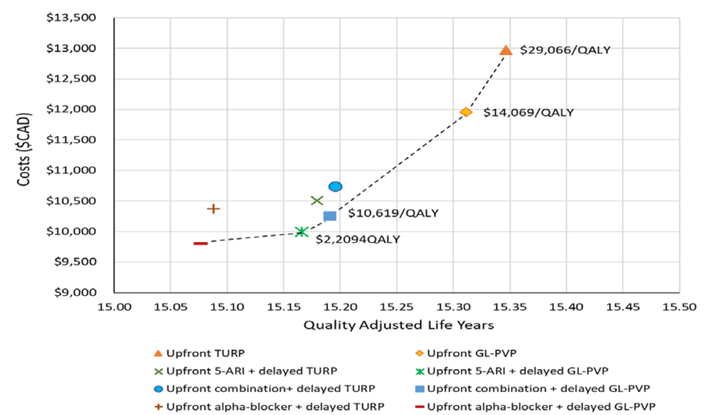
- Upfront surgery options were optimal at thresholds of 18,000 per QALY gained. At a threshold of $50,000 QALY gained, the probability of effectiveness was 78% for upfront surgery options (46% of upfront TURP, 33% of upfront GL-PVP) and 21% for upfront pharmacotherapy.

Table 1. Discounted lifetime costs and QALYs per patient and cost-utility analysis by treatment strategy

Strategies	Costs per patient ($CAD)	QALYs per patient	Incremental costs per patient	Incremental QALYs per patient	Incremental cost per QALY gained (ICER)
Discounted (1.5% - lifetime)					
Upfront TURP	$12,973.35	15.35	-	-	-
Upfront combination with delayed TURP*	$10,737.39	15.20	$(2,235.97)	-0.15	$14,812.97
Upfront 5-ARI with delayed TURP*	$10,507.91	15.18	$(2,465.44)	-0.17	$14,762.99
Upfront alpha-blocker with delayed TURP*	$10,372.53	15.09	$(2,600.83)	-0.26	$10,059.80
Upfront GL-PVP	$11,958.65	15.31	-	-	-
Upfront combination with delayed GL-PVP**	$10,258.43	15.19	$(1,700.22)	-0.12	$14,069.42
Upfront 5-ARI with delayed GL-PVP**	$9,993.82	15.17	$(1,964.83)	-0.15	$13,479.55
Upfront alpha-blocker with delayed GL-PVP**	$9,806.89	15.08	$(2,151.77)	-0.24	$9,155.68
Excluding dominated strategies***					
Upfront alpha-blocker with delayed GL-PVP	$9,806.89	15.08	-	-	-
Upfront 5-ARI with delayed GL-PVP	$9,993.82	15.17	$186.93	0.09	$2,094.34
Upfront combination with delayed GL-PVP	$10,258.43	15.19	$264.61	0.02	$10,618.96
Upfront GL-PVP	$11,958.65	15.31	$1,700.22	0.12	$14,069.42
Upfront TURP	$12,973.35	15.35	$1,014.70	0.03	$29,065.57

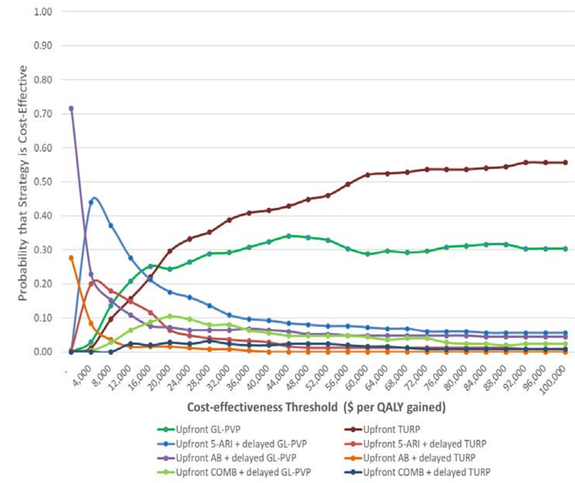
*** the next most effective undominated strategy.
Abbreviations: ICER: incremental cost-effectiveness ratio; 5-ARI: 5-alpha reductase inhibitor.

Figure 2. Cost-effectiveness plane for base-case analysis.



ICERs were calculated relative to the next most effective undominated strategy.

Figure 3. Cost-effectiveness acceptability curve.



Cost-effectiveness acceptability curve showing the probability that a given strategy has the highest net benefit across a range of willingness-to-pay thresholds.

SUMMARY/CONCLUSION

- Compared to the upfront pharmacotherapy options, upfront surgical interventions were more costly but more effective
- Compared to upfront GL-PVP, upfront TURP resulted in only marginally greater effectiveness, which translated to an ICER falling below the $50,000 threshold.
- Compared to upfront TURP, upfront GL-PVP was associated with lower costs ($12,973 vs. $11,959) and a marginally lower effectiveness (15.31 vs. 15.35 QALYs) translating to an incremental cost per QALY gained of $29,066.
- Given the lower costs, relative effectiveness and better safety, GL-PVP may be considered as a preferred upfront intervention for certain patients with moderate-to-severe BPH.

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